UNITED STATES TARIFF COMMISSION

SUMMARIES OF TRADE AND TARIFF

INFORMATION

Prepared in Terms of the Tariff Schedules of the United States (TSUS)

Schedule 4

Chemicals and Related Products (In 12 volumes)

VOLUME 2

Inorganic Chemicals I

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SUMMARIES OF TRADE AND TARIFF INFORMATION BY SCHEDULES

Schedule 1	-	Animal and Vegetable Products
		(In 14 volumes)
Schedule 2	-	Wood and Paper; Printed Matter
		(In 5 volumes)
Schedule 3	•••	Textile Fibers and Textile Products
		(In 6 volumes)
Schedule 4	-	Chemicals and Related Products
		(In 12 volumes)
Schedule 5	-	Nonmetallic Minerals and Products
		(In 5 volumes)
Schedule 6	-	Metals and Metal Products
		(In 11 volumes)
Schedule 7	-	Specified Products; Miscellaneous
		and Nonenumerated Products
		(In 8 volumes)
Schedule 8		Special Classification Provisions
		(In 1 volume)

Schedule 4 Volumes

- 1 Benzenoid Chemicals and Products
- 2 Chemical Elements and Inorganic Chemicals I
- 3 Inorganic Chemicals II
- 4 Inorganic Chemicals III
- 5 Organic Chemicals I
- 6 Organic Chemicals II
- 7 Drugs, Synthetic Plastics Materials, and Rubber
- 8 Flavoring Extracts and Essential Oils
- 9 Glue, Gelatin, Aromatic Substances, Toilet Preparations, Surface-Active Agents, Soaps, Dyes, and Tannins
- 10 Pigments, Inks, and Paints
- 11 Petroleum, Fertilizers, and Explosives
- 12 Fatty Substances, Waxes, and Miscellaneous Chemical Products

FOREWORD

In an address delivered in Boston on May 18, 1917, Frank W. Taussig, distinguished first chairman of the Tariff Commission, dalineated the responsibility of the newly established Commission to operate as a source of objective, factual information on tariffs and trade. He stated that the Commission was already preparing a catalog of tariff information--

> designed to have on hand, in compact and simple form, all available data on the growth, development and location of industries affected by the tariff, on the extent of domestic production, on the extent of imports, on the conditions of competition between domestic and foreign products.

The first such report was issued in 1920. Subsequently three series of summaries of tariff information on commodities were published--in 1921, 1929, and 1948-50. The current series, entitled <u>Summaries of</u> <u>Trade and Tariff Information</u>, presents the information in terms of the tariff items provided for in the eight tariff schedules of the Tariff Schedules of the United States (abbreviated to TSUS in these volumes), which on August 31, 1963, replaced the 16 schedules of the Tariff Act of 1930.

Through its professional staff of commodity specialists, economists, lawyers, statisticians, and accountants, the Commission follows the movement of thousands of articles in international commodity trade, and during the years of its existence, has built up a reservoir of knowledge and understanding, not only with respect to imports but also regarding products and their uses, techniques of manufacturing and processing, commercial practices, and markets. Accordingly, the Commission believes that, when completed, the current series of summaries will be the most comprehensive publication of its kind and will present benchmark information that will serve many interests. This project, although encyclopedic, attempts to conform with Chairman Taussig's admonition to be "exhaustive in inquiry, and at the same time brief and discriminating in statement."

This series is being published in 62 volumes of summaries, each volume to be issued as soon as completed. Although the order of publication may not follow the numerical sequence of the items in the TSUS, all items are to be covered. As far as practicable, each volume reflects the most recent developments affecting U.S. foreign trade in the commodities included.

111

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SUMMARIES OF TRADE AND TARIFF INFORMATION

SCHEDULE 4

Volume 2

CONTENTS

Page

Foreword	111
Introduction	1
Bromine, potassium bromide, and sodium bromide	3
Cesium potassium sodium and mubidium	7
Acetulene black and other elemental carbon	าา่
Chloring	זב
	17
	21
Lithium and lithium compounds	27
Phosphorus	29
Sulfur	- 33
Chemical elements not elsewhere enumerated	39
Boric acid	45
Hydrochloric acid	49
Hydrofluoric acid	55
Nitric acid	59
Phosphoric acid	63
Sulfuric acid	69
Inorganic acids not elsewhere enumerated	73
Aluminum oxide and hydroxide	77
Aluminum sulfate	81
Aluminum surrave	01
Aluminum ammonium sullate, aluminum potassium sullate, soulum	04
aluminate, and aluminum compounds not elsewhere enumerated	05
Ammonia, aqua and liquid annyarous	89
Ammonium carbonate and bicarbonate	97
Ammonium chloride	101
Ammonium nitrate	105
Ammonium perchlorate	113
Ammonium phosphate	115
Ammonium silicofluoride	121
Ammonium sulfate	125
Ammonium compounds not elsewhere enumerated	133
Antimony compounds	137
Arsenic compounds	11.2
General statement on inorganic barium compounds	11.7
Berium chloride	1).0
Bonium di ovi de	エムグ
Dallum utortuc	1.22
Dartum nyuroxide	1))
parium nitrate	159
Barium ox1de	163

CONTENTS

Page

Barium carbonateBarium sulfate	165 171 179
Beryllium compounds	183
Bismuth compounds and mixtures	185
Appendixes:	
Appendix A. Tariff Schedules of the United States Annotated: General headnotes and rules of interpretation, and excerpts relating to the items included in this volume	A 3
Appendix B. Value of U.S. imports for consumption, by TSUS(A) items included in the individual summaries of this	
volume, total and from the 3 principal suppliers, 1966 Appendix C. Value of U.S. imports for consumption, by TSUS(A) items included in the individual summaries of this	в 1
volume, total and from the 3 principal suppliers, 1967	C 1

CONTENTS

Numerical List of TSUS Items in This Volume

Page

415.05	3	417.36	121
415.10	7	417.38	125
415.15	11	417.44	133
415.20	15	417.50	137
415.25	21	417.52	137
415.27	21	417.54	137
415.30	27	417.60	113
415.35	29	417.62	143
415.40	7	417.64	143
415.45	33	417.70	11.9
415.50	39	417.72	153
416.05	143	417.74	155
416.10	45	417.76	159
416.15	49	417.78	163
416.20	55	417.80	179
416.25	59	417.90	183
416.30	63	417.92	183
416.35	69	418.00	185
416.45	73	419.10	27
417.10	85	420.02	ġ
417.12	77	420.68	85
417.14	85	420.82	3
417.16	81	423.80	185
417.18	85	472.02	165
417.20	89	472.04	165
417.22	89	472.06	165
417.24	97	472.10	171
417.26	101	472.12	171
417.30	105	472.14	171
417.32	113	480.65 (pt.) 89, 105,	125
417.34	115	480.70 (pt.)	63
		480.80 (pt.)	115

Page



INTRODUCTION

This volume (identified as volume 4:2) is the fourth in a series of 12 volumes of summaries on the chemicals and related products classified under schedule 4 of the TSUS. Schedule 4 is divided into 13 parts, and this volume is the first of three that deal with the inorganic chemicals provided for in part 2 of that schedule 1/. Volume 4:2 covers the chemical elements (subpart A--items 415.05 to 415.50). the inorganic chemical acids (subpart B--items 416.05 to 416.45), and aluminum, ammonium, antimony, arsenic, barium, beryllium, and bismuth compounds (subpart C--items 417.10 to 418.00). Volume 4:2 also includes lithium compounds (419.10), sodium aluminate (420.68), bariun pigments (472.02 to 472.14), fertilizer and fertilizer materials (480.65 (pt.), 480.70 (pt.), and 480.80 (pt.)), and mixtures in chief value of bismuth (423.80) because of the close relationship they bear to the other products discussed in this volume. Similarly, tungstic acid (416.40), ammonium molybdate (417.28), ammonium tungstate (417.40), and ammonium vanadate (417.42) are discussed in volumes 4:3 and 4:4 under molybdenum, tungsten, and vanadium compounds because of a comparable relationship. The complete list of products covered by summaries in this volume is shown in appendix A.

U.S. consumption of the chemical products covered by this volume is supplied principally by domestic production, which differed in value from domestic consumption by only 3 percent in 1966. U.S. production was valued at about \$4.5 billion in 1966. An exact numerical total of the value of production of the chemical products in volume 4:2 is not highly significant as it involves some duplication, particularly in the production of sulfuric acid from sulfur, of phosphoric acid from phosphorus, and of ammonium nitrate from ammonia. Also certain of these chemicals, especially the industrial elemental gases (such as nitrogen, oxygen, and hydrogen) and the inorganic acids (hydrochloric, nitric, and hydrofluoric) are produced and consumed in the same plant and often are not separated from their production sys-Total shipments of the industrial elemental gases, including tems. chlorine, were valued at about \$510 million in 1966; shipments of sulfuric acid and phosphoric, at \$246 million and \$118 million, respectively; shipments of aluminum oxide, at \$394 million; shipments of anhydrous ammonia, at almost \$400 million; and shipments of ammonium nitrate, at \$171 million.

Export statistics for some of the chemicals covered by this volume are not available; however, for the most part, these commodities are exported in small or negligible quantities. In 1966 the value of U.S. exports of the chemicals covered by this volume of summaries amounted to nearly \$300 million, more than twice the value of imports, which in that year totaled \$138 million. Ammonium

1/ The titles of the 13 parts of schedule 4 are listed in appendix A to this volume.

compounds--principally the sulfate and phosphate--and ammonia together accounted for about half the total value of exports--\$149 million; sulfur accounted for \$82 million; and aluminum oxide and hydroxide together for \$30 million. India, Canada, the Netherlands, and Mexico were the principal markets for these exports, accounting for more than half the total value.

The principal import item was sulfur, which accounted for \$33.5 million. Aluminum oxide, second in importance, accounted for \$30.7 million; anhydrous ammonia, third, for \$15.3 million; and ammonium phosphate, fourth, for \$13.8 million.

The distribution in 1966 of the imports of chemicals covered in this volume, by principal sources, was as follows:

	Value	
Source	(\$1 million)	Principal products
Canada	52.7	Ammonium compounds, sulfur.
Mexico	23.6	Sulfur, barite, arsenic trioxide.
Surinam	11.1	Aluminum oxide.
Trinidad	9.3	Ammonia.
Japan	7.2	Aluminum oxide,
		iodine.
Jamaica	5.5	Aluminum oxide.
Chile	3.7	Iodine.
United Kingdom	2.6	Antimony oxide.
Colombia	2.4	Ammonia.
Belgium	1.5	Antimony oxide.
West Germany	1.3	Aluminum compounds.
France	1.1	Antimony oxide, arsenic trioxide.
All other	15.8	Aluminum oxide, barite.

Total----- 137.8

Appendixes B and C to this volume give the value in 1966 and 1967, respectively, of total imports and imports from the three principal supplying countries, for each TSUS(A) item included in the volume.

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Commodity	<u>1505</u> <u>1tem</u>
Bromine	415.05
Potassium bromide	420.02
Sodium bromide	420.82

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. production supplies virtually all of the domestic consumption of bromine. The bromine contained in bromine chemicals sold by primary producers of bromine in 1966 amounted to 275 million pounds, of which 40 million pounds, valued at \$8.4 million, was in the form of elemental bromine. Exports of elemental bromine are believed to have been small. U.S. production of potassium and sodium bromide, combined, is estimated at about 7 million pounds annually; exports are probably small; imports have accounted for substantially less than 1 percent of domestic consumption in recent years.

Description and uses

This summary deals with the three inorganic bromine chemicals specifically provided for in the TSUS--elemental bromine, potassium bromide, and sodium bromide. Elemental bromine, the principal chemical discussed herein, is a reddish-brown, corrosive, liquid chemical element of the halogen group. It is recovered from sea water, dry lake brines, and well brines and is the basic bromine raw material. Nearly 80 percent of total bromine output is consumed in the production of the organic compound ethylene dibromide (item 429.28), a component of antiknock mixtures for gasoline. Another 5 percent is used to produce the organic fumigating compound methyl bromide (in item 429.48). The balance of output is used principally as a bleaching and disinfecting agent, analytical reagent, or swimming pool sanitizer, and for the production of other bromine chemicals. Among the latter are potassium bromide and sodium bromide, which are used as analytical reagents, as nerve sedatives in medicine, and in the preparation of silver bromide emulsions for photographic film, plate, and paper.

3

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
415.05	Bromine	lo¢ per lb.	5¢ per 1b. 2¢ per 1b.
420.82	Sodium bromide	10¢ per 1b.	5¢ per 1b. 1/

1/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

The ad valorem equivalents of the specific rates of duty in effect prior to January 1, 1968, on bromine, potassium bromide, and sodium bromide, based on imports in 1966, were 0.4, 6.1, and 0.3 percent, respectively.

U.S. consumption, production, and producers

U.S. consumption of elemental bromine and the bromides covered here is comparable in size to, and supplied almost entirely from, U.S. production. Statistics on U.S. production, however, are not available as such and output can only be gauged by sales of elemental bromine and bromine in all forms by primary (original) producers, as reported by the U.S. Bureau of Mines. During 1961-66 sales of elemental bromine by these producers increased in each year from about 18 million pounds, valued at \$3.5 million, in 1961, to 40 million pounds, valued at \$8.4 million, in 1966 (see accompanying table). Additional quantities of bromine were consumed by primary producers in the manufacture of a variety of bromine derivatives, sales of which in 1966 brought the total amount of bromine sold in all forms to 275 million pounds, valued at nearly \$80 million, a volume increase of more than 50 percent of the 180 million pounds, valued at \$45 million, sold in 1961. The rising

> January 1968 4:2

BROMINE, POTASSIUM BROMIDE, AND SODIUM BROMIDE

trend in bromine output, as reflected in increased sales by primary producers, was due partly to the increasing use of antiknock compounds and partly to the development of new uses. Current domestic output of potassium and sodium bromide, combined, is estimated at about 7 million pounds annually, with the output of potassium bromide exceeding that of sodium bromide.

In 1967, elemental bromine was produced by 7 U.S. firms operating 12 plants, which were situated in Arkansas (4), California (2), Michigan (5), and Texas (1); approximately 85 percent of their output is consumed in the producing plants. For some of the producing firms, sale of elemental bromine is a substantial source of revenue. Potassium and sodium bromide are produced by about 5 domestic firms, all of which produce other chemicals.

U.S. exports and imports

U.S. exports of the chemicals discussed in this summary are not separately reported in official statistics; in recent years, these exports are estimated to have been small, although greater in volume than imports.

U.S. imports of the chemicals dealt with here have been negligible. Imports of potassium bromide have originated in Israel, the United Kingdom, Canada, France, and West Germany; imports of sodium bromide have originated in the Netherlands, France, the United Kingdom, and West Germany.

In 1964, the first full year for which separate statistics on imports of elemental bromine became available, such imports amounted to 200 pounds, valued at \$204; in 1966, imports amounted to 83 pounds, valued at \$1,844. These imports originated in Canada and were, as indicated by the unit values, for specialized uses. No imports of elemental bromine were reported for 1965. In recent years, imports of potassium bromide and sodium bromide have been small and irregular. The year of maximum imports during the period 1961-66 was 1963, in which 50,000 pounds of potassium bromide, valued at \$7,000, and 30,000 pounds of sodium bromide, valued at \$11,000, were imported (see accompanying table).

Yoon	Sales primary p	by i producers i	Impor	ts
1041	Elemental : bromine	Bromine in all_forms 1/	Potassium : bromide	Sodium bromide
	Qu	antity (1,000	pounds)	
1961 1962 1963 1964 1965 1966	17,706 23,106 26,248 30,435 35,118 39,952	180,798 : 190,747 : 203,333 : 238,019 : 274,569 : 275,009 :	- : - : 50 : 2/ 2 : 9 :	24 30 1 28 <u>2</u> /
		Value (1,000 de	ollars)	
1961 1962 1963 1964 1965 1966	3,510 : 4,267 : 4,443 : 5,096 : 7,477 : 8,388 :	: 44,517 : 46,617 : 48,558 : 66,064 : 77,259 : 78,883 :	$\frac{1}{3}$	9 - 11 2 6 1
		1	1	

Bromine, potassium bromide, and sodium bromide: U.S. sales of bromine by primary producers, and imports for consumption of potassium bromide and sodium bromide, 1961-66

1/ Value is value of elemental bromine sold as such plus value of bromine compounds including value added by manufacture.

2/ Less than 500 pounds.

3/ Less than \$500.

Source: Sales compiled from official statistics of the U.S. Bureau of Mines; imports compiled from official statistics of the U.S. Department of Commerce.

Note .-- Imports of bromine, first separately reported beginning September 1963, have been negligible.

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Commodity			TSUS	
			iter	
				1

Cesium, potassium, and sodium----- 415.10 Rubidium----- 415.40

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. consumption of the chemicals covered by this summary, valued at approximately \$51 million in 1966, is supplied almost solely by domestic production. Exports are estimated to be a small part of production, and imports are negligible relative to consumption.

Comment

Cesium, potassium, sodium, and rubidium are all highly reactive, silvery-white, chemical elements belonging to the alkali metals group. Sodium, by far the most important of the group commercially, is produced by the electrolysis of fused salt (item 420.94) and is used principally in the production of tetraethyl lead (item 429.70) and tetramethyl lead (item 429.85), both of which are antiknock additives for gasoline. Lesser quantities are used in the descaling of metal, as a heat transfer medium in nuclear reactors, in the preparation of other metals and chemicals, and in the development of electrical conductors. Cesium, potassium, and rubidium can be obtained by the thermochemical reduction of their chlorides, but only cesium is currently of commercial significance. It has various electronic applications, and in addition is being used in the development of ion propulsion systems for space flight and thermionic systems for converting heat to electricity.

The column 1 rates of duty applicable to imports (see general headnote 3 of the TSUSA-1968) are as follows:

TSUS item	Commodity	<u>Rate prior to</u> Jan. 1, 1968	Rate effective Jan. 1, 1972
415.10	Cesium, potassium,	17% ad val.	8.5% ad val.
415.40	Rubidium	10.5% ad val.	5% ad val.

The rates effective January 1, 1972, represent the final stages of a reduction resulting from concessions granted by the United

> January 1968 4:2

States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

Domestic consumption of these chemicals, estimated to have been valued at \$51 million in 1966, is supplied almost solely by U.S. production. Although cesium and sodium, particularly sodium, are produced in commercial quantities for important industrial applications, the very small output of potassium and rubidium has been confined mostly to laboratory and experimental use.

Annual production of sodium increased steadily from 218 million pounds in 1961 to 330 million pounds in 1966 (see accompanying table), reflecting mainly increasing output of antiknock mixtures. Three large, diversified corporations produce sodium at five plants situated in Louisiana, New York, Ohio, Tennessee, and Texas; the bulk of the output is used by the producers in their integrated operations.

Statistics on output of cesium are available only for 1961 and 1962, when 208 pounds and 159 pounds, respectively, were produced. According to estimates of the National Aeronautics and Space Administration, the annual demand for cesium may reach 2,000 pounds by 1970. Cesium is produced by four diversified companies in four plants situated in California, Michigan, and Pennsylvania.

Exports of the chemicals covered by this summary are not separately reported in official statistics but are estimated to be only a small part of domestic production.

Imports, first separately classified beginning August 31, 1963, have constituted a negligible share of domestic consumption. Imports under item 415.10 amounted in 1964 to 5,375 pounds, valued at \$7,000; in 1965, to 11,037 pounds, valued at \$15,530; and in 1966, to 16,237 pounds, valued at \$21,757 (1966 statistics as reported by the Department of Commerce have been adjusted to eliminate imports from Argentina which are believed to have been recorded in error). No imports were reported under item 415.40 before 1966; in that year imports were valued at \$254 (quantity not specified). The United Kingdom and France have been the principal supplying countries; sodium for specialized use has been the principal product imported.

Alkali metals, notably sodium, are produced in several industrialized countries in addition to the United States, but statistics on foreign output and trade are fragmentary.

January 1968 1:2

CESIUM, POTASSIUM, SODIUM, AND RUBIDIUM

Sodium: U.S. production, 1961-66

Year	Quantity	Value 1/
	<u>1,000</u> pounds	: <u>1,000</u> : <u>dollars</u>
1961	: 218,200	: 35,436
1962	: 238,168	: 39,343
1963	: 251,132	: 41,390
1964	: 278,626	: 45,954
1965	303,176	: 47,803
1966	329,768	: 50,633

1/ Estimated from the unit value of total shipments.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

January 1968 4:2

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ACETYLENE BLACK AND OTHER ELEMENTAL CARBON

Commodity

TSUS 1tem

Elemental carbon----- 415.15

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Until recently, the United States had no commercial production of any elemental carbon included in this statutory description. At present only one type, acetylene black, is produced domestically. U.S. annual output of acetylene black, about 7 million pounds, has been roughly equal to the quantity imported; exports have been virtually nil.

Comment

Acetylene black is the only commercial type of elemental carbon that is not provided for by name in the TSUS. Other types, such as carbon black (item 473.04) and lampblack (item 473.06) are discussed in other summaries.

Acetylene black, which is made by the continuous decomposition of acetylene gas, consists of minute particles of elemental carbon connected in a chainlike structure. This high-purity product, normally more than 99.5 percent carbon, is marketed in 50-percent and 100percent compression grades. The compression grades facilitate use of handling and processing. The principal use of acetylene black is in the manufacture of dry cell batteries; other uses include the manufacture of antistatic and conductive rubber and plastic products.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are indicated below:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
415.15	Elemental carbon	5% ad val.	Free

The duty-free status represents the final stage of a reduction resulting from a concession granted by the United States in the sixty (Kennedy) round of trade negotiations under the General Agreement on

ACETYLENE BLACK AND OTHER ELEMENTAL CARBON

Tariffs and Trade (GATT). The first of the five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume.

The sole domestic producer of acetylene black is a large, diversified firm which manufactures numerous products, including industrial chemicals and plastics. That firm began commercial production of acetylene black in 1964, after imports were unable to satisfy U.S. demand, especially during 1962-63, when imports were disrupted by foreign labor disputes.

Official statistics on the U.S. output of acetylene black have not been published because such data would reveal the operations of the one producer; it is estimated, however, that domestic output amounts to about 7 million pounds annually. The plant producing acetylene black is situated in Ohio, adjacent to a calcium carbideacetylene gas facility operated by the same firm; that facility manufactures acetylene gas, the raw material for acetylene black.

The apparent consumption of acetylene black in the United States increased from 7 million pounds in 1961 to about 14 million pounds in 1966. The increase in consumption during that period is chiefly attributable to the expanded domestic output of dry cell batteries.

U.S. imports of acetylene black have been relatively constant in recent years at an average annual rate of about 7 million pounds (see accompanying table). Canada, the chief source of U.S. imports during 1961-66, supplied about 90 percent of the total quantity imported in 1966. U.S. exports of acetylene black have been virtually nil.

Canada is probably the world's largest producer of acetylene black; since its internal consumption is small, most of its output has been for export markets, chiefly the United States. Other major foreign producers of acetylene black include the U.S.S.R., West Germany, and Japan.

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ACETYLENE BLACK AND OTHER ELEMENTAL CARBON

Source	1961	1962	1963	1964	1965	: 1966
	: Quantity (1,000 pounds)					
Canada East Germany All other Total	8,074 - - 8,074	7,435 448 - 7,883	4,927 549 757 6,233	6,465 413 6,878	5,908 339 <u>112</u> 6,359	: : 6,285 : 400 : <u>374</u> : 7,059
Value (1,000 dollars)						
Canada: East Germany: All other:	1,482 -	1,321 63 -	846 77 181	1,125 59 -	1,030 49 15	: : 1,081 : 55 : 49
Total:	1,482	1,384	: 1,104	1,184	1,094	: 1,185 :
Source: Compiled from official statistics of the U.S. Department						

Elemental carbon: U.S. imports for consumption, by principal sources, 1961-66

of Commerce.

CHLORINE

Commodity Item

TSUS

Chlorine----- 415.20

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Domestic production is valued at more than \$300 million a year and has been increasing. Imports and exports amount to less than 1 percent of production and consist largely of border trade with Canada.

Description and uses

Chlorine is a greenish-yellow, highly poisonous gas under normal conditions of temperature and pressure but is usually liquefied for shipment, storage, or use. It is produced almost entirely by the electrolysis of melted salt or salt solutions, which are in plentiful supply from domestic sources. For every pound of chlorine, the producers obtain about 1.1 pounds of a coproduct, caustic soda (item 421.08). Expensive containers are required for the long-distance shipment of chlorine.

Chlorine is one of the most important inorganic chemicals. The volume produced is exceeded only by that of sulfuric acid, anhydrous ammonia, and caustic soda. It is used in the production of a wide variety of chemicals, for the bleaching of pulp and paper, for water purification, in textile bleaching, and in sewage treatment.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
L15.20	Chlorine	10.5% ad val.	5% ad val.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General

> January 1968 4:2

Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, producers, and production

Domestic consumption rose from about 9.2 billion pounds in 1961 to 14.5 billion pounds in 1966 (table 1), or by about 58 percent. Use in chlorinated organic products and in the pulp and paper industry accounted for the bulk of the increase.

Chlorine is produced in the United States by about 36 chemical companies operating 68 plants situated in 26 States. Most of the plants are east of the Mississippi River. The producing concerns manufacture a variety of other chemicals and the importance of chlorine to total operations varies greatly between different plants; for some, it is an important source of income.

Domestic production increased from 9.2 billion pounds, valued at \$256 million, in 1961, to 14.4 billion pounds, valued at \$396 million, in 1966. More than half of the domestic output is consumed captively (i.e., used by the producers in their own operations).

U.S. exports and imports

Exports of chlorine increased from 65 million pounds in 1961 to 86 million pounds in 1965, then declined to 43 million pounds in 1966 (table 2). Exports amounted to less than 1 percent of production during 1961-66. Canada was the principal market, taking more than 90 percent of the total exports in most years.

Imports, nearly all from Canada, have generally been less than exports. They ranged from 43 million to 145 million pounds a year in 1961-66 (table 3). Chlorine is not usually shipped long distances. Imports and exports are nearly all the result of border transactions and consist largely of intracompany transfers.

World production and trade

Chlorine is produced in nearly all industrialized nations. In the free world West Germany is second to the United States in volume of production and Japan has a volume that is not far below that of West Germany. The United Kingdom, France, Italy, and Canada follow Japan in order. Many smaller countries produce a volume sufficient for their own use.

Table 1.--Chlorine: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

YearProductionImportsExports: Apparent:(percent) of : consumption		•	• •	:	: Ratio			
i : <td:< td=""> <td:< td=""> <td:< td=""></td:<></td:<></td:<>	Year	: Production	: Imports :	Exports: Apparent	:(percent) of			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$;	:	:consumption	: imports to			
Quantity19619,201,582 : $45,064 : 64,749 : 9,181,897 : 0.9196210,285,752 : 57,374 : 71,617 : 10,271,509 :196310,928,160 : 52,957 : 74,285 : 10,906,832 :196411,890,430 : 43,368 : 87,704 : 11,846,094 :196513,034,158 : 77,810 : 85,582 : 13,026,386 :196614,410,330 : 144,840 : 42,624 : 14,512,546 :1961255,655 : 1,561 : 1,764 : 255,452 : 0.61962290,269 : 1,870 : 1,966 : 290,173 :1963295,707 : 1,652 : 2,217 : 295,142 :$		•	::	:	: consumption			
19619,201,582 : $45,064 : 64,749 : 9,181,897 : 0.9$ 196210,285,752 : $57,374 : 71,617 : 10,271,509 :1963:10,928,160 : 52,957 : 74,285 : 10,906,832 :1964:11,890,430 : 43,368 : 87,704 : 11,846,094 :1965:13,034,158 : 77,810 : 85,582 : 13,026,386 :1966:14,410,330 : 144,840 : 42,624 : 14,512,546 :1961:255,655 : 1,561 : 1,764 : 255,452 : 0.61962:290,269 : 1,870 : 1,966 : 290,173 :1963:295,707 : 1,652 : 2,217 : 295,142 :$		•		Quantity				
1961:9,201,582: $45,064:64,749:9181,897:$ 0.91962:10,285,752: $57,374:71,617:10,271,509:$.61963:10,928,160: $52,957:74,285:10,906,832:$.91964:11,890,430: $43,368:87,704:11,846,094:$.11965:13,034,158:77,810:85,582:13,026,386:.61966:14,410,330:144,840:42,624:14,512,546:.61961:255,655:1,561:1,764:255,452:0.6.61962:290,269:1,870:1,966:290,173:.61963:295,707:1,652:2,217:295,142:.6		* <u></u>	: :	:	:			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1961	-: 9,201,582	: 45,064 :	64,749 : 9,181,897	: 0.5			
1963: $10,928,160:$ $52,957:$ $74,285:$ $10,906,832:$ 1964 : 1964 : $11,890,430:$ $43,368:$ $87,704:$ $11,846,094:$ $11,966,094:$ 1965 : $13,034,158:$ $77,810:$ $85,582:$ $13,026,386:$ 66 1966 : $14,410,330:$ $144,840:$ $42,624:$ $14,512,546:$ 1.60 Value 1961: 255,655: $1,561:$ $1,764:$ $255,452:$ 0.60 1961: 255,655: $1,561:$ $1,764:$ $255,452:$ 0.60 1962: $290,269:$ $1,870:$ $1,966:$ $290,173:$ $.60$ 1963: $295,707:$ $1,652:$ $2,217:$ $295,142:$ $.60$	1962	-: 10,285,752	: 57,374 :	71,617 : 10,271,509	: .6			
1964: $11,890,430$: $43,368$: $87,704$: $11,846,094$: $.1$ 1965 : $13,034,158$: $77,810$: $85,582$: $13,026,386$: $.6$ 1966 : $14,410,330$: $144,840$: $42,624$: $14,512,546$: 1.6 Value::::::::::::::::::::1961:255,655:1,561:1,764:255,4520.61961:255,655:1,561:1,764:255,4520.61962:290,269:1,870:1,966:290,173.61963:::::::::1963:::	1963	-: 10,928,160	: 52,957 :	74,285 : 10,906,832	: .5			
1965: $13,034,158$: $77,810$: $85,582$: $13,026,386$: .6 1966: $14,410,330$: $144,840$: $42,624$: $14,512,546$: 1.0 Value : <td>1964</td> <td>-: 11,890,430</td> <td>: 43,368 :</td> <td>87,704 : 11,846,094</td> <td>: .4</td>	1964	-: 11,890,430	: 43,368 :	87,704 : 11,846,094	: .4			
1966: 14,410,330 : 144,840 : 42,624 : 14,512,546 : 1.0 Value : : 1961: 255,655 : 1,561 : 1,764 : 255,452 : 0.6 1961: :	1965	-: 13,034,158	: 77,810 :	85,582 : 13,026,386	: .6			
Value 1961: 255,655 : 1,561 : 1,764 : 255,452 : 0.6 1962: 290,269 : 1,870 : 1,966 : 290,173 : 1963: 295,707 : 1,652 : 2,217 : 295,142 :	1966	-: 14,410,330	: 144,840 :	42,624 : 14,512,546	: 1.0			
1961: 255,655: 1,561: 1,764: 255,452: 0.6 1962: 290,269: 1,870: 1,966: 290,173: .6 1963: 295,707: 1,652: 2,217: 295,142: .6		•		Value				
1961: $255,655:$ $1,561:$ $1,764:$ $255,452:$ 0.6 $1962:$ $290,269:$ $1,870:$ $1,966:$ $290,173:$ $.6$ $1963:$ $295,707:$ $1,652:$ $2,217:$ $295,142:$ $.6$		•	• •	•	•			
1962:290,269:1,870:1,966:290,173:.61963:295,707:1,652:2,217:295,142:.6	1961	-: 255,655	1,561 :	1,764 : 255,452	. 0.6			
1963 : 295,707 : 1,652 : 2,217 : 295,142 : .6	1962	-: 290,269	: 1,870 :	1,966 : 290,173	: .6			
	1963	-: 295,707	: 1,652 :	2,217 : 295,142	: .6			
1964 : 318,857 : 1,471 : 2,557 : 317,771 :	1964	-: 318,857	: 1,471 :	2,557 : 317,771	: .5			
1965: 360,466 : 2,395 : 2,354 : 360,507 : .	1965	-: 360,466	: 2,395 :	2,354 : 360,507	: .7			
1966: $396,110: 4,167: 1,189: 399,088: 1.0$	1966	-: 396,110	: 4,167 :	1,189 : 399,088	: 1.0			
			::		:			

(Quantity in thousands of pounds; value in thousands of dollars)

Source: Compiled from official statistics of the U.S. Department of Commerce.

CHLORINE

Market	1961 :	1962	1963	: 1964	1965	1966	
	•	Quantity (1,000 pounds)					
	:		<u></u>	:		:	
Canada:	60,246 :	65,942	69,137	83,868	. 77,383	36,638	
Mexico:	87 :	1,286	244	: 716	: 3,506	: 1,249	
Panama:	283 :	421	: 158	: 119	: 198	: 460	
Honduras:	137 :	657	424	: 265	: 291	: 448	
Bahamas:	345 :	505	: 189	: 115	: 450	: 652	
Guatemala:	602 :	7 :	67	: 232	: 297	: 528	
Dominion . :	:			:	•	:	
Republic:	552 :	853 :	727	: 776	: 1,285	: 440	
Indonesia:	60 :		338	: 10	: 150	: 5	
All other:	2,434 :	1,946 :	3,001	: 1,603	: 2,022	2,204	
Total:	64,749 :	71,617 :	74,285	: 87,704	: 85,582	42,624	
:		1	Value (1,	000 dolla	rs)		
						<u> </u>	
Canada	1.620 :	1.780	2.030	2.397	2.114	961	
Mexico	2 :	52	13	: 35	82	37	
Panama:	10 :	12	7	: 7	10	36	
Honduras:	4:	17	12	. 9	10	31	
Bahamas:	10 :	16 :	10	. 9	: 17 :	22	
Guatamela:	16 :	1/ :	2	: 7	14	: 15	
Dominion :	:					-	
Republic:	20 :	24 :	25	: 27 :	: 31 :	: 10	
Indonesia:	5:	- :	11	: i:	: 20 :	8	
All other:	77 :	65 :	107	: 65	56 :	69	
Total:	1,764 :	1,966 :	2,217	2,557	: 2,354 :	1,189	
:			• ·	•		-	
1/ Less than \$500.							

Table 2.--Chlorine: U.S. exports of domestic merchandise by principal markets, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

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Source	1961	1962	:	1963	:	1964	:	1965	:	1966
	:	Quantity (1,000 pounds)								
:		:	:		:		:	<u></u>	:	
Canada:	39,641	: 49,937	:	51,634	:	36,021	:	75,523	:	142,225
Venezuela:	2,293	: 2,217	:	1,323	:	1,077	:	1,297	:	1,075
Mexico:	2,705	: 5,183	:	_	:	6,270	:	220	:	1,540
Japan :		: -	:	-	:	-	:	770	:	-
Belgium:		: 27	:	-	:	-	:	-	:	-
West Germany:	425	: _ 10	:	-	:		:		:	-
Total:	45,064	: 57,374	;	52,957	:	43,368	;	77,810	:	144,840
:	Value (1,000 dollars)									
			:		:		:		:	·····
Canada:	1,295	1,570	:	1,605	:	1,131	:	2,261	:	4.011
Venezuela:	97	. 91	:	47	:	94	:	106	:	95
Mexico:	110	: 205	:	_	:	246	:	9	:	61
Japan:		: -	:	-	:	_	:	19	:	-
Belgium:	-	: 2	:	-	:	-	:		:	-
West Germany:	59	: 2	:	_	:		:	·	:	-
Total:		:	:		:		:		:	
	1,561	1,870	:	1,652	:	1,471	:	2,395	:	4,167
Source: Compiled from official statistics of the U.S. Department of										

Table 3.--Chlorine: U.S. imports for consumption, by sources, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

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	Commodity	TSUS item
Iodine,	crude	415.25
lodine,	resublimed	415.27

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Between 1961 and 1966, U.S. consumption of crude iodine increased from 2.6 to 3.8 million pounds per year. At least 75 percent of this consumption was supplied by imports, primarily from Chile; exports are believed to have been small.

In 1961-66, annual U.S. production of resublimed iodine ranged between 100,000 and 200,000 pounds; in recent years imports have supplied a negligible part of domestic supply, while exports, not separately reported, are believed to have been small.

Description and uses

Iodine is a gray to purplish-black crystalline element of the halogen group. The crude grade is normally 99.0 to 99.8 percent pure, and the resublimed grade is usually 99.9 percent pure. Crude iodine is obtained from nitrate deposits, brines, and seaweeds and is used primarily to produce resublimed iodine and iodine compounds. Resublimed iodine is used in the manufacture of antiseptics and iodine compounds. The principal iodine compound produced is potassium iodide (item 420.20). Iodine, which is on the list of strategic materials, is stockpiled by the U.S. Government.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 of the TSUSA) are as follows:

TSUS	Commodity	Rate prior to	Rate effective		
item		Jan. 1, 1968	Jan. 1, 1972		
415.25	Iodine, crude	Free	Free <u>1</u> /		
415.27	Iodine. resublimed	10¢ per lb.	5¢ per 1b. 2/		

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

2/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume.

The duty-free status for crude iodine was provided for in paragraph 1698 of the Tariff Act of 1930 as originally enacted, and has been bound since March 1949 as a result of a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

The rate on resublimed iodine, effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the GATT. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing on January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The ad valorem equivalents of the specific duty of 10 cents per pound on item 415.27 based on imports (all from Japan) entered in 1965 and 1966 were 7.0 percent and 7.1 percent, respectively.

U.S. consumption, production, and producers

U.S. consumption of crude iodine dropped slightly from 2.6 million pounds in 1961 to 2.5 million pounds in 1962 and then advanced steadily to 3.8 million pounds in 1966 (table 1). The U.S. supply of resublimed iodine (production plus imports) increased steadily from 104,000 pounds in 1961 to 200,000 pounds in 1965, then dropped slightly to 196,000 pounds in 1966. Domestic consumption of both grades is expected to continue to increase as disinfecting and sanitizing uses expand.

The U.S. Bureau of Mines estimated in 1965 that the sole U.S. producer of crude iodine supplied about one-fourth of the domestic requirements. Domestic resublimed iodine production, amounting to 194,000 pounds in 1966, supplied more than 95 percent of U.S. consumption. January 1968 IODINE

The sole domestic producer of crude iodine operates plants in California and Michigan. Extraction in California is from oil-well brines and that in Michigan, from natural brines. Resublimed iodine is produced by seven firms with plants situated in California (one), Missouri (two), New Jersey (three), and Oklahoma (one).

U.S. exports and imports

U.S. exports of crude and resublimed iodine are not separately reported in official statistics; they are believed to be small.

In recent years, U.S. imports of crude iodine, originating primarily in Chile and secondarily in Japan (table 2), have supplied at least 75 percent of domestic consumption. Imports were somewhat larger than domestic consumption during 1961-63, averaging 3.1 million pounds (table 1) reflecting the stockpiling of iodine by the U.S. Government. On March 5, 1964, the stockpile objective for iodine was revised upward from 4.3 to 8 million pounds; on December 31, 1965, Government inventories amounted to 4.3 million pounds. Stockpiling was negligible in 1964 and 1965, and imports in those years decreased to 2.6 million and 2.8 million pounds, respectively. In 1966, imports increased to 7.1 million pounds, reflecting the resumption of stockpiling.

In recent years, imports of resublimed iodine peaked in 1962 at 9,000 pounds and have declined steadily since then. Imports in 1966 amounted to 2,000 pounds, equivalent to about 1 percent of total U.S. supply.

Foreign production and trade

Production of crude iodine in Chile in 1964 amounted to about 4.8 million pounds, approximately 40 percent of which was exported to the United States. Output originated from four companies, one of which produces more than 90 percent of the total; it is determined by projected sales volume, since capacity exceeds demand. Chilean iodine is recovered as a byproduct of the nitrate industry.

Production of elemental iodine in Japan amounted to 4.5 million pounds in 1964. Some six firms accounted for the bulk of this output, which is obtained from brines associated with natural gas.

23

Year	Reported consumption	: : :Imports <u>1</u> /: : :	Ratio of imports to consumption
	<u>1,000</u> pounds	: <u>1,000</u> : : <u>pounds</u> :	Percent
1961 1962 1963 1964 1965 1966	2,597 2,497 2,695 3,128 3,506 3,764	: 3,017 : 3,026 : 3,336 : 2,592 : 2,847 : 7,133 :	116 121 124 83 81 190

Table 1.--Crude iodine: U.S. consumption and imports for consumption, 1961-66

1/ In 1961-63 and 1966, imports exceeded domestic consumption owing to stockpiling by the Government.

Source: Reported consumption compiled from official statistics of the U.S. Bureau of Mines; imports compiled from official statistics of the U.S. Department of Commerce.

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Year		Total	:	Chile	:	Japan	:	Canada
		Quant	Ltj	r (1,00	0	pounds)	
1961 1962 1963 1964 1965 1966	<u>1</u>	3,017 3,026 3,336 2,592 2,847 7,133	: : : : /a	1,964 2,229 2,462 1,759 2,111 4,404	:::::::::::::::::::::::::::::::::::::::	1,053 797 874 804 736 2,718	: : : :	- - 29 - -
							:	
1961 1962 1963 1964 1965 1966	: 1/	2,852 2,841 2,958 2,369 2,476 2,934	: : : : : : : : : : : : : : : : : : : :	1,822 2,054 2,093 1,492 1,689 3,676		1,030 787 865 846 787 2,245	•	- - 31 -

Table 2.--Crude iodine: U.S. imports for consumption, by sources, 1961-66

1/ Includes 11 thousand pounds, valued at 13 thousand dollars, imported from Hong Kong.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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	TSUS
Commodity	item
Lithium	415.30
Lithium compounds	419.10

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Virtually all U.S. consumption of lithium compounds is supplied from domestic production. Commercial sales are estimated to have been above 10 million pounds in recent years. Exports are estimated to have absorbed a moderate part of production in recent years. Imports amounted to less than 100 pounds in 1966.

Comment

This summary covers lithium, a silvery-white chemical element of the alkali metals group, and some 30 lithium compounds not more specifically provided for elsewhere in the TSUS, principally lithium bromide, carbonate, chloride, fluoride, hydroxide, iodide, nitrate, and sulfate. Lithium stearate (item 490.30) and organic lithium salts (item 426.46) are discussed in separate summaries. Lithium and lithium chemicals are obtained chiefly from the mineral spodumene (item 523.81) and from dry lake brines such as those found at Searles Lake, Calif., and Silver Peak, Nev., and are used in the manufacture of thermonuclear weapons, alloys, ceramic products, specialty glass, welding and brazing fluxes, lubricants, and industrial cooling and drying systems.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
item		Jan. 1, 1968	Jan. 1, 1972
415.30	Lithium	25% ad val.	12.5% æd val.
419.10	Lithium compounds	10.5% ad val.	5% ad val.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages

27

January 1968 4:2 of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

No official statistics are available on the production and consumption of lithium and its compounds, but trade sources indicate that commercial sales approximated 9 million pounds (lithium carbonate equivalent 1/) in 1962, and are estimated to have increased substantially since then. Virtually all consumption is currently supplied from domestic output. Domestic productive capacity expanded greatly in the middle 1950's in response to requirements of the Atomic Energy Commission(AEC) for the isotope lithium-6, and in the period 1956-60 the AEC purchased large quantities of lithium compounds from which this isotope was extracted. As a result, the AEC accumulated large inventories of lithium materials depleted in lithium-6--competitive in all commercial respects with currently produced materials--for which disposal is contemplated when it will not disrupt domestic markets.

Three firms, with plants located in California, Nevada, North Carolina, Pennsylvania, and Virginia, account for the bulk of output, although lithium chemicals are also produced by some 20 additional firms. Sales of lithium chemicals are a substantial source of revenue for the major suppliers.

Official statistics on exports of lithium chemicals are not available, but exports are believed to have absorbed a moderate part of domestic production in recent years. In the 2-year period 1962-63, exports amounted to 2.1 million to 2.6 million pounds (lithium carbonate equivalent) according to trade information.

Official statistics on imports of inorganic lithium compounds first became available effective August 31, 1963. For the years 1964 and 1965, imports amounted to 1.2 million pounds, valued at \$0.5 million, and 1.3 million pounds, valued at \$0.6 million, respectively, but in 1966 they decreased sharply, amounting to only 97 pounds, valued at \$8,906. Lithium carbonate was the principal compound imported. Canada was the principal source of supply in 1964-65, but did not export to the United States in 1966 owing to suspension of production. The high unit value of imports in 1966 reflects imports of compounds for special purposes. There were no imports of lithium metal in the period 1961-66.

1/ One pound of lithium is equivalent to 10.6 pounds of lithium carbonate.

January 1968 4:2
Commodity	item
Phosphorus	415.35

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Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Phosphorus is an important chemical raw material used principally as an intermediate in the production of phosphoric acid. Although phosphorus is produced in substantial quantities in many countries, only small quantities enter international trade because of the difficulty and expense of handling this chemically unstable element. In 1966, U.S. consumption of phosphorus amounted to 1.1 billion pounds.

Description and uses

Phosphorus is produced in two forms--white and red. White phosphorus is a white or lemon-colored wax-like solid; it is poisonous and at normal temperatures is highly unstable (it ignites spontaneously in air, producing phosphorus pentoxide). Red phosphorus is a darkred amorphous solid; it is nonpoisonous and, when pure, is stable at normal temperatures. The commercial product contains impurities, however, which make it moderately unstable.

White phosphorus is produced in an electric furnace by smelting carefully proportioned charges of phosphate rock, coke, and silica. The resulting vaporized phosphorus is condensed and collected under water to prevent its ignition. Red phosphorus is made by heating white phosphorus to 250° C. in a closed retort containing no oxygen.

White phosphorus is used principally as an intermediate in the production of phosphoric acid (item 416.30), which is used largely in the production of detergents, fertilizers, and soft drinks. Substantial quantities of white phosphorus are also used to produce metal alloys and munitions, such as tracer bullets, incendiary bombs, and smoke bombs. Previously it was an important component of rodent and insect poisons, but has been largely replaced by organic compounds. Red phosphorus is used principally by the match industry as the striking surface on books and boxes of safety matches.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the TSUSA-1968) is as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
415.35	Phosphorus	4¢ per 1b.	2¢ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 12.2 percent.

U.S. producers

White phosphorus was produced in the United States in 1966 by six large diversified chemical companies and the Tennessee Valley Authority, in 13 plants. Ten of the plants are located in the South Atlantic States and the East South Central States, and three are located in the Mountain States. Red phosphorus is produced by one of these companies in one of its plants located in the South Atlantic States.

U.S. consumption and production

Virtually all of U.S. consumption of phosphorus is supplied by domestic production. Consumption has been increasing for many years and in 1966 totaled 1.1 billion pounds (see accompaning table). The increase has resulted from the growing demand for phosphorus compounds, particularly in the production of synthetic detergents.

Separate data on production of white and red phosphorus are not available, but it is believed that less than 5 percent of the output of white phosphorus is further processed into red phosphorus.

L. S. exports and imports

Exports of phosphorus are not separately reported but are be-

Imports of phosphorus are insignificant when compared with domestic production. Occasional local shortages of phosphorus have resulted in imports, but it is unlikely that imports will contribute more than token quantities to the domestic supply.

World production and trade

Capacity to produce phosphorus is reported for nine countries in the free world and three Communist countries. Official statistics on production and trade are not regularly available. In the free world, phosphorus is produced in Canada, the United Kingdom, West Germany, Sweden, France, Italy, Switzerland, Japan, and Australia. In the Communist bloc, phosphorus is produced in East Germany, the U.S.S.R., and mainland China.

World production in 1963 is estimated to have reached nearly 1.5 billion pounds, with the United States accounting for about twothirds of the output. West Germany and the United Kingdom, the major producers in Western Europe, together accounted for about 15 percent of world production. Production from Communist bloc countries is believed to have totaled about 10 percent of world output. The producing companies in Canada and Australia are subsidiaries of the United Kingdom producer.

Frobably less than 1 percent of the phosphorus produced in foreign countries enters international trade because of the difficulty and expense of handling this chemically unstable element.

Phosphorus: U.S. production, imports for consumption, and apparent consumption, 1961-66 <u>1</u>/

	• (<u>In thousar</u>	<u>ids of pound</u>	ls)		
	Year	:	Production	:	Imports	:	Apparent consumption 2/
1961 1962 1963 1964 1965 1966			861,234 903,940 976,182 1,007,760 1,100,276 1,120,314	:::::::::::::::::::::::::::::::::::::::	2,335 335 296 403 655 752	: : : : : : : : : : : : : : : : : : : :	864,000 904,000 976,000 1,008,000 1,100,000 1,121,000
-		:		:		:	

1/ Production and import data are not available separately for white or red phosphorus.

2/ Production plus imports (rounded).

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Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--Exports are not separately classified but are believed to be smaller than imports.

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	<u>TSUS</u>
Commodity	item

Sulfur----- 415.45

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States is the world's largest producer of elemental sulfur, accounting for about 50 percent of the output. In 1966, U.S. consumption of sulfur amounted to 8 million long tons, of which almost 20 percent was supplied by imports. U.S. exports were somewhat greater than imports.

Description and uses

Sulfur is a soft, brittle, yellow to yellow-gray element. It is one of the major chemical raw materials and large quantities of it enter international trade.

Sulfur is obtained both from deposits of native sulfur and from natural and refinery gases. Native sulfur is mined where feasible by the Frasch process, a method that uses hot water to melt deeply buried sulfur which is then pumped to the surface; other methods of mining native sulfur include conventional underground and open pit methods. The sulfur obtained from gases is called recovered sulfur. The gases from which recovered sulfur is obtained include natural gas, petroleumrefinery gas, water gas, and other fuel gases.

Very little sulfur is consumed directly; nearly all of it is converted to sulfur dioxide (item 422.94), which is generally further processed to yield sulfuric acid (item 416.35). A large part of the sulfuric acid is, in turn, used by the fertilizer industry in the manufacture of superphosphates and ammonium sulfate; other industries that use large quantities of sulfuric acid include the textiles, pulp, pigments, steel, and aluminum industries.

U.S. tariff treatment

Imports of sulfur are duty free. The duty-free treatment was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948, in a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption

Annual U.S. consumption of sulfur has increased substantially in recent years, largely as a result of the growing market for fertilizers made from sulfuric acid. The quantity of sulfur consumed in 1966 was 8 million long tons (table 1).

U.S. producers

In 1966 Frasch sulfur, which constitutes the major portion of the U.S. output of sulfur, was produced by four large diversified concerns at 10 mines in Texas and Louisiana. Sulfur was produced by conventional mining processes by three small companies at three mines in Nevada and California. Recovered sulfur was produced at 75 plants owned by 48 concerns, mostly large oil companies, in 18 States from coast to coast.

U.S. production

In 1966, U.S. production amounted to 8.2 million long tons (table 2), 12 percent more than in 1965. Frasch sulfur accounted for 85 percent of the output in 1966, and recovered sulfur, for 15 percent. The production of native sulfur other than Frasch sulfur has been insignificant in recent years.

U.S. exports

The annual quantity of U.S. sulfur exported amounted to about 1.6 million long tons during 1961-63, then increased to 1.9 million long tons in 1964, and to 2.7 million in 1965 (table 3). Exports decreased slightly in 1966. The U.S. share of the world market for sulfur declined somewhat as a result of increased competition from the recently developed Frasch and recovered sulfur industries in Mexico and Canada, respectively. Europe was the major market for the U.S. exports, accounting for 40 percent of the shipments in each of the years 1961-64 and for more than 50 percent in 1965 and 1966. Exports to North American countries, mainly Canada, decreased from 20 percent of total exports in 1961 to 7 percent in 1966.

U.S. imports

U.S. imports of sulfur, nearly all from Mexico and Canada, have been increasing in recent years and in 1966 amounted to 1.5 million long tons (table 4). Mexican sulfur was shipped mainly to Florida and east coast areas, while Canadian sulfur went to the Northwest and the Chicago area. Imports of sulfur supplied about 17 percent of consumption in 1966.

World production and trade

Elemental sulfur was produced in 1966 by more than 30 countries; such production amounted to more than 16.4 million long tons. The United States, the largest producer, accounted for 50 percent of world output. The next three largest producing countries and their shares of world output in 1966 were Canada--11 percent, Mexico--10 percent, and France--9 percent. Other countries that produced sulfur included the U.S.S.R., Poland, Japan, mainland China, East Germany, and West Germany.

The sulfur industry in Mexico was comprised of one recovered sulfur operation which was owned by the Government, two Frasch concerns which were Mexican controlled, and numerous small sulfur mines. The Mexican exports, all of which were of Frasch sulfur, amounted to nearly 1.5 million long tons in 1966.

In 1965 the sulfur industry in France was comprised of one large company, partly owned by the Government, that recovered sulfur from natural gas in southern France. In that year, French exports of sulfur amounted to nearly 1 million long tons.

The Canadian sulfur producers, essentially all operating recovered-sulfur plants, were affiliated with United States, British, and Belgium interests. The U.S. firms that had investment in the Canadian industry included Frasch sulfur and oil companies. Canadian exports of sulfur in 1965 totaled nearly 1.5 million long tons.

Year	Production	Imports	:	Exports	::	Apparent consump- tion	::	Ratio (percent) of imports to consumption
•	1,000	: 1,000	:	1,000	:	1,000	:	
:	<u>long tons</u>	: long tons	:	<u>long tons</u>	:_	<u>long tons</u>	:	
:		•	:		:		:	
1961:	6,336	: 831	:	1,596	:	4,911	:	17
1962:	5,925	: 1,049	:	1,553	:	5,267	:	20
1963:	5,829	: 1,351	:	1,614	:	5,719	:	24
1964:	6,249	: 1,462	•	1,928	:	6,297	:	23
1965:	7,331	: 1,465	:	2,652	:	6,940	:	21
1966:	8,238	: 1,514	:	2,373	:	8,084	:	17
:			:		:		:	

Table 1.--Sulfur: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

Source: Production and consumption compiled from official statistics of the U.S. Department of the Interior; imports and exports compiled from official statistics of the U.S. Department of Commerce.

Table 2.--Sulfur: U.S. production, by types, 1961-66

	(1.000	J	ong tons)					
Year	Frasch	:	Recovered	:	Mined		:	Total
	sulfur	:	sulfur	:	<u>native sulfu</u>	r	:	TOUAL
		:		:			:	
1961:	5,386	:	858	:	9	2	:	6,336
1962:	4,984	:	900	:	4	1	:	5,925
1963:	4,882	:	947	:	1	/	:	5,829
1964:	5,228	:	1,021	:	1	/	:	6,249
1965:	6,116	:	1,215	:	· <u>1</u>	/	:	7,331
1966:	7,001	:	1,237	:	1	/	:	8,238
		:		:		_	:	

<u>1</u>/Less than 500 long tons.

Source: Compiled from official statistics of the U.S. Department of the Interior.

Market a reas	1961	19	62	:	1963	:	1964	:	1965	:	1966
:		Quantity (1,000 long tons)									
		:	,	:		:		:		:	
North America:	327	:	193	:	168	:	157	:	180	:	168
South America:	186	:	179	:	172	:	210	:	263	:	244
Europe:	651	:	670	:	683	:	822	:	1.435	:	1.248
Asia:	168	:	260	:	326	:	396	:	419	:	296
Africa:	52	:	54	:	39	:	30	:	111	:	117
Oceania:	212	:	197	:	226	:	313	:	244	:	300
Total:	1,596	: 1,	553	:	1,614	:	1,928	:	2,652	:	·2,373
:			Va.	1 u	ue (1,00	00	dollars	3)			
		:	 ;	:		:		:		:	
North America:	7.866	5.	293	•	4.625	:	4.529	:	4.769	:	5,335
South America:	4,563	: 4.	515 :	:	3,847	:	4,559	:	6.507	:	8,748
Europe:	14,230	15	301 :	:	13,558	:	16,672	:	34,793	:	42,783
Asia:	4,105	: 6.	478 :	:	7,194	:	8,263	:	10,665	:	11,173
Africa:	1,146	: 1,	271 :	:	804	:	905	:	2,903	:	3,803
Oceania:	4,714	4,	437 :	:	4,560	:	6,009	:	5,911	:	10,321
Total:	36,624	37,	295 :	:	34,588	:	40,938	:	65,548	:	83,163
:						:		:		. :	-

Table 3.--Sulfur: U.S. exports, by market areas, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

Year	Mexico : Canada : All : Total : : other :
· · · · · ·	Quantity (1,000 long tons)
1961	: : : : 649 : 182 : <u>1</u> / : 831 752 : 297 : <u>1</u> / : 1,049 863 : 480 : 8 : 1,351 890 : 568 : 4 : 1,462 810 : 655 : <u>1</u> / : 1,465 799 : 703 : 12 : 1,514 Value (1,000 dollars)
1961	: : : : 13,310 : 3,837 : 5 : 17,151 15,533 : 5,029 : 13 : 20,575 17,101 : 6,650 : 191 : 23,942 18,248 : 7,779 : 73 : 26,100 17,818 : 8,934 : 7 : 26,759 21,117 : 12,084 : 324 : 33,525 : : : :

Table 4.--Sulfur: U.S. imports, by principal sources, 1961-66

1/ Less than 500 long tons.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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Commodity	

TSUS

item

Chemical elements in any physical form, not elsewhere enumerated--- 415.50

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

In 1966, U.S. shipments of the chemical elements considered here were valued at \$377 million. In that same year the value of U.S. imports was \$706,000, and that of U.S. exports was \$2.6 million.

Comment

This summary covers those elements which are not elsewhere enumerated in the TSUS, excluding their radioactive forms. It includes principally the gaseous elements oxygen, nitrogen, hydrogen, helium, fluorine, neon, argon, krypton, and xenon. Certain enumerated elements, such as bromine, iodine, and sulfur, are covered by separate summaries (see items 415.05 to 415.45). Radioactive chemical elements are provided for in item 494.50, and other enumerated elements are included in schedule 6 of the TSUS.

The elemental gases covered in this summary -- except for fluorine, which is pale yellow in color--are all colorless, odorless, and tasteless and have many varied industrial uses. The more important gases are oxygen, nitrogen, hydrogen, helium, and argon. Oxygen is used in large volumes by steel companies for oxygen enrichment in furnaces and converters, and by chemical processors in the manufacture of acetylene, methanol, ethylene oxide, and other chemicals; it is also used for welding metals and in medication. Nitrogen is used principally in the synthesis of ammonia; it is also employed in the manufacture of other chemicals, for food processing, in electronics, as a blanketing inert atmosphere for annealing steel, and for many miscellaneous uses. Hydrogen is a very light, highly explosive gas used in the manufacture of ammonia, methanol, and other chemicals; for the hydrogenation of fats and oils; in petroleum refining; and as a rocket propellant. Helium, an inert light gas, is employed principally for pressurizing liquid-fuel containers on missiles and space vehicles and in shielded arc welding, but it is also used as a controlled atmosphere in the nuclear energy program and for other research, and as a lifting gas in meteorological and other balloons. Argon, neon, krypton, and xenon are all rare inert gases used in shielded arc welding and metallurgical processing and in incandescent or neon light bulbs and vacuum tubes.

Fluorine is a highly reactive gas which has been produced in substantial volume in recent years for use as a fluorine-oxygen fuel in the space program.

These gases are produced commercially by cryogenic separation methods--cooling air or gas to extremely low temperatures (200° F. below zero) causing liquefaction and then separating the various individual gases by fractional distillation. Nitrogen, oxygen, and the rare gases are obtained from air, helium from helium-rich natural gases; hydrogen from oil-refinery cracking plants and certain chemical processes; and fluorine from the electrolysis of fluorine salts.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	.Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
415.50	Chemical elements in a	ny	

physical form, not elsewhere enumerated--- 10.5% ad val. 5% ad val.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The value of shipments (including interplant transfers) of argon, hydrogen, nitrogen, oxygen, and other industrial gaseous elements for 1961-66 are shown in table 1; however, shipments are much smaller than the amounts produced and consumed, since large quantities of oxygen, nitrogen, and hydrogen are used in the producing plants' own operations, such as in the manufacture of ammonia and in petroleum refining. The total value of shipments increased from \$183 million in 1961 to \$377 million in 1966.

More than 300 domestic plants produce the industrial gases covered in this summary. There is at least one plant in each of 40 States, but there are concentrations of plants in Pennsylvania, Ohio, Texas, California, Illinois, and Michigan. Helium is produced from helium-bearing natural gas in five federally owned extraction plants operated by the Bureau of Mines and in three privately owned plants. Three of these plants are located in Kansas, two in Texas, and one each in Arizona, Oklahoma, and New Mexico.

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CHEMICAL ELEMENTS NOT ELSEWHERE ENUMERATED

Exports were valued at \$2.5 million in 1965 and at \$2.6 million in 1966 (table 2).

Imports increased from 10 million pounds, valued at \$0.9 million, in 1964, to 21.8 million pounds, valued at \$1.3 million, in 1965, and decreased to 11.3 million pounds, valued at \$0.7 million, in 1966. U.S. imports have come chiefly from Canada and West Germany (table 3).

CHEMICAL ELEMENTS NOT ELSEWHERE ENUMERATED

Table 1.--Chemical elements not elsewhere enumerated: Value of shipments of certain chemical elements, 1961-66

Year	Argon <u>l</u> /	Hydrogen <u>2</u> /	Nitrogen <u>3</u> /	:0xygen <u>3</u> /	':Other <u>4</u> /: : :	Total
1961 1962 1963 1964 1965 1966	: 15,229 : 18,793 : 18,112 : 20,473 : 22,825 : 26,741 :	: 11,372 : 15,950 : 25,705 : 35,830 : 38,689 : 39,830 :	: 35,434 : 37,997 : 39,993 : 48,144 : 63,252 : 74,801 :	: 113,581 : 125,498 : 136,414 : 157,357 : 169,021 : 178,974	: 7,155: : 11,720: : 25,106: : 45,505: :5/54,820: :5/56,528: : :	182,771 209,058 245,330 307,309 348,607 376,874

1/ High-purity (99.97 to 100 percent).

 $\overline{2}$ / Includes both high-purity and lower purity (less than 99.5 percent). $\frac{3}{4}$ High-purity (99.5 to 100 percent). $\frac{3}{4}$ Includes lower purity nitrogen and oxygen, and crude and high-

purity helium produced in privately owned plants.

5/ Includes small value of carbon dioxide produced and transferred to other plants for further processing.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Market	: 1965	<u>2</u> /	:	1966	;
	Quantit	у (1	,000	cu.	ft.)
Canada United Kingdom France Belgium West Germany Japan Mexico All other Total	: 812 : 11 : 5 : 3 : 3 : 12 : 12 : 853	,746 ,028 ,170 147 ,687 643 ,131 ,354	: : : : :		2,721 607 287 723 581 613 395 2,677 8,604
	:Value	(1,	000	dolla	ars)
Canada United Kingdom France Belgium West Germany= Japan Mexico All other	: : : : : :	738 388 261 35 254 121 37 649			824 432 167 142 139 133 115 648
Total	: 2	,483	:		2,600

Table 2.--Chemical elements not elsewhere enumerated: $\frac{1}{1}$ U.S. exports of domestic merchandise, by principal markets, 1965-66

1/ Does not include fluorine.

 $\overline{2}$ / Quantity data for 1965 are probably erroneous,

Source: Compiled from official statistics of the U.S. Department of Commerce.

Quantity	/ (1,000 p	ounds)
9,533 443 <u>1</u> / 90 2 58 10,126	21,032 21 <u>1</u> / 10 473 223 21,759-	10,014 354 672 <u>1</u> / 16 132 68 11,256
Value	(1,000 dol	lars)
313 417 25 66 <u>2</u> / 60	; 721; 415; -; 28; 8; 70; 50;	307 231 86 20 20 16
	9,533 443 - <u>1</u> / 90 2 58 10,126 Value 313 417 - 25 66 2/ 60 881	Quantity (1,000 p : 2: 443 : 21 : 9,533 : 21,032 : 443 : 21 : - : - : 1/ : 1/ : 90 : 10 : 2 : 473 : 58 : 223 : 10,126 : 21,759 : Value (1,000 dol : 2: 473 : 10,126 : 21,759 : Value (1,000 dol : 2: 473 : 25 : 28: 66 : 8: 2/ : 70: 60 : 50: 881 : 1,292:

Table	3Cher	nical	elements	n nc	ot elsewher	re	enumera	ated:	U.S.	imports
	for	const	umption,	Ъу	principal	s	ources,	1964-	-66	

1/ Less than 500 pounds.

 $\overline{2}$ / Less than \$500.

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¢,

Source: Compiled from official statistics of the U.S. Department of Commerce.

BURIC ACID

	TSUS
Commodity	item

Boric acid----- 416.10

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. annual consumption of boric acid has amounted to about 100,000 short tons in recent years. U.S. production of boric acid in 1966 amounted to 125,000 short tons; exports totaled 28,000 tons and imports, 116 tons.

Comment

Boric acid (orthoboric, or boracic, acid) is a water-soluble, weakly acidic, white, crystalline material. It is manufactured from sulfuric or hydrochloric acid and sodium borate (borax). Boric acid is used as an ingredient in the manufacture of porcelain enamel, special glass, and certain ceramic products; as an analytical reagent; as a catalyst in dyes; as a preservative for fats, oils, and certain foods; and as a mild antiseptic in medicinal preparations and cosmetics.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
416.10	Boric acid	0.5¢ per 1b.	0.2¢ per lb. 1/

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate appli-

1/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume. cable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 7.6 percent.

In both 1965 and 1966 U.S. consumption of boric acid amounted to about 100,000 short tons. Boric acid consumption is supplied almost entirely by domestic production which, in general, has been increasing in recent years. U.S. production rose from 101,000 short tons in 1961 to a high of 127,000 short tons in 1965, and totaled 125,000 short tons in 1966 (table 1). In addition to the three large diversified chemical corporations that produce boric acid at their sodiumborate plants in California, there are about 20 other concerns that make boric acid at plants located throughout the country.

Exports, not separately reported prior to 1965, totaled 21,000 tons in 1965 and 28,000 tons in 1966, and accounted for about onefifth of U.S. production in those years. Exports were shipped mainly to Japan, Canada, Australia, and New Zealand, the Netherlands, and West Germany (table 2). Imports have been negligible; 116 tons of boric acid was entered in 1966, most of it from France.

Boric acid is produced in many foreign countries, but only small amounts enter international trade. The major portion of the sodium borate used in the production of boric acid originated in the United States.

Table 1.--Boric acid: U.S. production and imports for consumption, 1961-66

Year	Production	Imports
1961 1962	: 101,330 : 106,180 : 104,120 : 121,655 : 127,471 :	
· · · · · · · · · · · · · · · · · · ·		

(In short tons)

1/ Less than one-half ton.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Market	1965			1966			
	Quantity	, :	Value	:	Quantity	y:	Value
	• •	:		:		:	
	: <u>Short</u>	:	1,000	:	Short	:	1,000
	tons	:	dollars	3:	tons		dollars
_	:	:		:		:	0 -
Japan	: 6,368	:	769	:	9,274	•	1,180
Canada	: 2,362	:	334	:	3,943	:	535
Australia and New Zealand	: 2,622	:	405	:	2,727	:	345
Netherlands	: 639	:	88	:	2,589	:	337
West Germany	: 3,158	:	373	:	2,570	:	297
Mexico	: 1,575	:	207	:	2,105	:	270
Brazil	: 843	:	110	:	1,112	:	133
Sweden	: 328	;	63	:	314	:	36
United Kingdom	: 356	:	60	:	85	:	9
India	: 452	:	66	:	23	:	4
All other	: 2,498	:	472	:	3,556	:	538
Total	: 21,201	:	2,947	:	28,298	:	3,684
	•	:		:		:	

Table 2.--Boric acid: U.S. exports, by principal markets, 1965-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

Commodity item

TSUS

Hydrochloric acid----- 416.15

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. production of hydrochloric acid was 3 billion pounds, valued at \$75 million, in 1966. Imports were 38 million pounds, valued at \$952,000, and exports, although statistics are not available, are considerably less than imports.

Description and uses

Hydrochloric acid in anhydrous form is a colorless gas, very soluble in water; it is also known as hydrogen chloride. The liquid form is an aqueous solution that is colorless when pure; the commercial product, however, is usually slightly yellow owing to traces of iron. There are three principal commercial strength acid solutions--18, 20, and 22 degree Baumé--which contain about 28, 32, and 36 percent, respectively, of hydrogen chloride. U.S.P. (United States Pharmacopoeia) and c.p. (chemically pure) grades of hydrochloric acid are produced for medical and laboratory use, and are usually sold in bottles and carboys. On the other hand, most of the sales of the commercial acid sold is delivered in tank cars or large containers.

Hydrochloric acid, both anhydrous and in aqueous solution, is used extensively in many industrial applications. Between 40 and 50 percent of domestic consumption is used for the production of chemicals and metals, about 30 percent for oil-well acidizing and petroleum refining, probably 10 to 15 percent for the treatment of metals and ores and for food processing, and the remainder for many miscellaneous uses.

U.S. tariff treatment

Imports of hydrochloric acid are duty free. The duty-free treatment was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since June 1951 in a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption

Consumption of hydrochloric acid in the United States increased from 1.8 billion pounds in 1961 to more than 3 billion pounds in 1966 (table 1). The principal gain in consumption was in the pickling of steel and in certain new oxychlorination processes which use hydrochloric acid instead of chlorine for the production of organic chlorine compounds. About half of the domestic production of hydrochloric acid is consumed in the producing plants for manufacture into other chemical products.

U.S. producers

Hydrochloric acid was produced in 92 different plants, widely scattered over the United States in 1966. New Jersey had 13 plants; Texas had 10 plants; New York had 8; West Virginia, Ohio, and Louisiana had seven each; California had six; Kentucky and Michigan had five each; and the remaining 24 plants were located in 16 different States.

Eleven of the domestic plants producing hydrochloric acid use salt (sodium chloride) and acid (usually sulfuric acid) as raw materials; 19 plants produce the acid directly from hydrogen and chlorine, and the remaining producers make byproduct hydrochloric acid in the chlorination of organic compounds or other processes.

Most of the firms producing hydrochloric acid are large diversified companies; however, there are a substantial number of mediumsized and small companies.

U.S. production and foreign trade

U.S. production of hydrochloric acid (100-percent acid basis) increased from 1.8 billion pounds in 1961 to 3.0 billion in 1966 (table 1). Production is chiefly in the Southwest and Middle Atlantic States.

U.S. exports have generally accounted for less than one-half of 1 percent of production in recent years. Exports declined from 4.0 million pounds in 1961 to 3.6 million pounds in 1962 but increased to 4.4 million pounds in 1964 (table 1). Canada was the principal export market in 1964, taking more than half of all U.S. export shipments. Export data have not been available since 1964.

U.S. imports, practically all from Canada, composed about 1 percent of consumption. They increased from 10.6 million pounds, valued at \$181,000, in 1961 to 57.4 million pounds, valued at \$821,000, in 1965 and then declined to 38.0 million pounds, valued at \$952,000 in 1966 (table 1).

World production and trade

Practically every industrial country produces hydrochloric acid. The production is normally consumed in the producing country, and any import or export trade is comparatively insignificant. Table 2 shows the imports and exports of principal foreign countries, mostly in Western Europe. Virtually all of the trade shown is with neighboring countries.

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HYDROCHLORIC ACID

Table 1.--Hydrochloric acid: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

:Ratio (percent) : : : Apparent of imports è Year Production Imports Exports :consumption: to consumption : : Quantity : : : : 1961-----: 1,821,934 : 10,577 : 4,026 : 1,828,485 0.6 • 1962----: 2,104,232 : 27,092 : 3,620 : 2,127,704 : 1.3 1963-----: 2,107,004 : 24,893 : 4,364 : 2,127,533 : 1.2 1964-----: 2,473,648 : 27,291 : 4,448 : 2,496,491 1.1 : 1965-----: 2,740,184 : 57,386 : 1/ 1/ 1/ 1966--------: 3.038.744 : 37.973 : 1/ / ۱ Value : : : : 1961-166 : 51,025 : 181 : 51,040 : .4 1962----: 52,528 : 343 : 175 : 52,696 : •7 1963----: 54,686 : 478 : 189 : 54,975 : •9 62,647 : 1964----: 504 : 180 : .8 62,971 : 1965------68,663 : 821 : --- : 1/ : 1/ 1966----75,277 : 952 : 1/ : 1/ ī, . :

(Quantity in thousands of pounds; value in thousands of dollars)

l/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--Statistics on production are in terms of 100-percent acid; imports and exports are not reported according to strength.

January 1968

52

HYDROCHLORIC ACID

Item	Quantity	Value
	: 1,000 ;	1,000
	: pounds :	dollars
· ·	: · :	
Imports into	: :	
Belgium	: 67,864 :	210
France	: 939 :	95
West Germany	: 23,095 :	215
Netherlands	: 1,779 :	92
Denmark	: 34,625 :	595
Norway	: 3,737 :	57
Switzerland	: 2,963 :	54
Ireland	: 3,549 :	87
Turkey	: 1,947 :	73
Yugoslavia	: 2,974 :	91
	: :	
Exports from	:	
Belgium	: 9,224 :	148
France	: 16,784 :	259
West Germany	: 9,158 :	544
Italy	: 8,250 :	333
Netherlands	: 78,530 :	331
Japan	: 5,298 :	165
	::	

Table 2.--Hydrochloric acid: Imports and exports of selected foreign countries, 1965

Source: United Nations, World Trade Annual, 1965.

Commodity item

TSUS

Hydrofluoric acid----- 416.20

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

In 1966, U.S. consumption and production of hydrofluoric acid, excluding that produced and consumed by aluminum producers, amounted to about 350 million pounds, valued at nearly \$50 million. Marketed production accounted for about 70 percent of the above production and amounted to nearly 250 million pounds, valued at \$34 million, in 1966. Exports and imports were either very small or negligible.

Comment

Anhydrous hydrofluoric acid (hydrogen fluoride) is a colorless gas or fuming liquid; the aqueous forms are clear solutions. Anhydrous hydrogen fluoride constitutes about 90 percent of the domestic output of hydrofluoric acid, and the aqueous solution, the remainder. The grade of commercial hydrofluoric acid solution in greatest use contains approximately 70 percent hydrogen fluoride. Hydrofluoric acid is produced by the action of concentrated sulfuric acid on fluorspar (calcium fluoride). Both the anhydrous grade and the 70-percent solution of hydrofluoric acid must be handled in corrosion-resistant pressure containers.

The anhydrous acid is used in the manufacture of metallic aluminum; in the manufacture of flurocarbons, which are used as aerosols and refrigerants; in the production of uranium fluorides for the atomic energy program; and for miscellaneous purposes, including stainless steel pickling and petroleum alkylation. The aqueous acid is employed in the pickling of alloy steels, in the etching and polishing of glass, and in making many inorganic fluorides.

Imports of hydrofluoric acid are duty free. The duty-free status was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and was bound for the first time in the sixth (Kennedy) round of negotiations under the General Agreement on Tariffs and Trade (GATT).

U.S. consumption of hydrofluoric acid has been nearly equivalent to domestic production in recent years in view of the very small size of exports and imports. U.S. production of hydrofluoric acid, as reported by the U.S. Department of Commerce, increased from 235 million pounds, valued at \$36 million, in 1961, to 350 million pounds, valued at \$48 million, in 1966 (see accompanying table). These statistics, however, do not include the acid manufactured by aluminumproducing plants for use in their own operations.

About 70 percent of the total reported output of hydrofluoric acid is produced for sale. Sales of the acid increased from 147 million pounds, valued at \$22.7 million, in 1961 to 247 million pounds, valued at \$34 million, in 1966. The remainder of the production (estimated at about 40 percent), including that not reported in statistics is used by producing plants in their own operations, principally in the manufacture of aluminum metal and flurocarbons (aerosols).

Hydrofluoric acid is produced by 10 industrial chemical and aluminum-manufacturing concerns, which range in size from small firms to large integrated companies. The acid is made in 14 plants situated in 10 widely scattered States. There are three plants in Texas, two each in Louisiana and New Jersey, and one each in California, West Virginia, Delaware, Ohio, Illinois, Kentucky, and Arkansas.

Exports of hydrofluoric acid, which are not reported separately in official statistics, are probably larger than imports, but they are believed to be a very small part of domestic production.

Imports of hydrofluoric acid were 312,300 pounds, valued at \$14,166, in 1965, and 212,580 pounds, valued at \$31,244, in 1966. Imports in these 2 years, all from Canada, supplied about one-tenth of 1 percent of U.S. consumption.

56

HYDROFLUORIC ACID

Year	Q	uantity	:	Value
		1,000 pounds	: : <u>c</u>	<u>1,000</u> lollars
1961	: :	235,190 254,454	:	36,284 36,272
1963 1964	:	257,006	:	35,761 36,039
1965 1966	;	300,434 349,624	:	41,380 48,102

Hydrofluoric acid: U.S. production, $\frac{1}{1961-66}$

1/ Includes captive production, except that used in the manufacture of aluminum metal.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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Commodity <u>TSUS</u> item

Nitric acid----- 416.25

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

In 1966, U.S. production of nitric acid was 11 billion pounds, while imports were only 46,000 pounds. Statistics on exports are not available for the years after 1964; in 1964 exports amounted to 369,000 pounds.

Comment

Nitric acid, a highly corrosive liquid with powerful oxidizing properties, is one of the principal inorganic acids of the chemical industry. It is generally marketed as an aqueous solution that may contain nitrogen oxides. Virtually all is produced by the catalytic oxidation of synthetic anhydrous ammonia. Nitric acid is made and marketed in several grades and strengths. The commercial or technical grades in principal use contain from 52 to 67 percent acid. Small quantities of chemically pure grades with strengths of 70 to 72 percent acid and a fuming grade containing 95 percent acid are also produced.

About four-fifths of all the nitric acid produced in the United States is used in the manufacture of ammonium nitrate; most of the ammonium nitrate is used in fertilizer materials and another 15 percent is used in the manufacture of explosives and munitions. Another important use of nitric acid is as an oxidizing agent in the production of adipic acid, which is used in the manufacture of nylon. Smaller quantities of acid are used in the manufacture of dyes, nitrocellulose plastics, lacquers, and various chemical compounds. Chemically pure grades are used for laboratory work, and the fuming grade is employed as an oxidizing agent.

Imports of nitric acid are duty free. The duty-free treatment was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since August 1951 in a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

Annual U.S. consumption of nitric acid in recent years has roughly approximated annual production, which increased from 6-3/4 billion pounds in 1961 to 11 billion pounds in 1966 (see accompanying table). More than 90 percent of the domestic nitric acid output is consumed by the producing plants in their own operations, principally in the manufacture of ammonium nitrate and other fertilizer materials.

In 1966 there were 71 plants producing nitric acid in 30 States. Six plants each were situated in Texas and Alabama; five in Illinois; four each in New Jersey, Florida, and Missouri; and three each in Georgia, Tennessee, Louisiana, and California. The other 30 plants were in 20 widely scattered States. The bulk of the output was from large industrial chemical concerns and petroleum companies.

Exports of nitric acid have not been separately classified in official statistics since January 1, 1965. During the 4-year period 1961-64, annual exports averaged 357,000 pounds, valued at \$62,500 (see accompanying table).

U.S. imports of nitric acid amounted to 42,788 pounds in 1965, and 45,850 pounds in 1966.

: Year : :		Production <u>1</u> /			:	Exports			
		Quantity	:	Value	:6	uantity:	Value.		
	:	1,000	:	1,000	:	1,000 :	1,000		
	:	pounds	:	dollars	:	pounds:	dollars		
	:		:		:				
1961	•:	6,759,390	:	258,464	:	313 :	53		
1962	-:	7,339,294	:	268,357	:	276 :	62		
1963	-:	8,484,830	:	283,215	:	471 :	58		
1964	-:	9,464,992	:	282,828	:	369 :	77		
1965	-:	9,795,988	:	277,171	:	<u>2/</u> :	2/		
1966	-:	11,028,726	:	349,143	:	<u>2</u> / :	2/		
	:		:		:	:	-		

Nitric acid: U.S. production and exports of domestic merchandise, 1961-66

1/ Does not include small quantities produced in Government-owned plants.

2/ Exports were not separately classified in official statistics after 1964.

Source: Compiled from official statistics of the U.S. Department of Commerce.

PHOSPHORIC ACID

Commodity <u>TSUS</u> <u>item</u> Phosphoric acid------ 416.30

Phosphoric acid, liquid, for fertilizer or fertilizer manufacture----- 480.70 (pt.)

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States is the world's leading producer and consumer of phosphoric acid, one of the important inorganic acids. In 1966, both U.S. consumption and production of phosphoric acid amounted to 9.1 billion pounds on a phosphorus pentoxide equivalent basis (about 12.5 billion pounds on an orthophosphoric acid basis). Imports and exports have been negligible compared to production.

Description and uses

Although phosphoric acid is provided for by name under item 416.30, if it is an importation of a grade chiefly used for fertilizer or chiefly as an ingredient in the manufacture of fertilizer, it is included under item 480.70 since the use provision prevails over the <u>eo nomine</u> (by name) designation. The chief use of an article as defined in General Headnote 10(e)(i) of the tariff schedules, is the use which exceeds all other uses combined. In the case of phosphoric acid, practically all imports have been of "fertilizer" grade. This summary discusses all phosphoric acid whether or not of a grade chiefly used for fertilizer or as a fertilizer ingredient.

There are three commercial acids of phosphorus--orthophosphoric acid (H_3PO_4), pyrophosphoric acid ($H_4P_2O_7$), and metaphosphoric acid (HPO_3). Orthophosphoric acid is by far the most important and is the form generally sold as phosphoric acid. Depending on their compositions, these acids range from a clear, colorless, sirupy liquid to a crystalline solid. They are highly corrosive and require specially constructed containers for shipment.

Phosphoric acid is produced from phosphate rock (in item 480.45) by the wet process and from elemental phosphorus (item 415.35) by the furnace process. In the wet process, ground phosphate rock is mixed with sulfuric acid. The resulting phosphoric acid, containing about 32 percent phosphorus pentoxide, is filtered from the insoluble residue and is evaporated to the desired concentration. In the

furnace process, phosphate rock, coke, and silica are smelted in an electric furnace to produce elemental phosphorus which is oxidized to phosphorus pentoxide and subsequently cooled and diluted with the required quantity of water to yield phosphoric acid of the desired concentration.

Phosphoric acid is used principally as a fertilizer or an ingredient in the manufacture of fertilizer. The second most important use of phosphoric acid is as an intermediate in manufacturing phosphorus compounds. Substantial tonnages of the acid are added to ensilage and prepared animal feeds as a preservative, and to improve their nutrient qualities. Appreciable tonnages are used in place of citric and tartaric acids to impart tartness and palatability to soft drinks, jams, and jellies, and as a defecating agent in refining sugar. Smaller quantities are used in the synthesis of certain dyes, in the manufacture of special types of glass, and as an ingredient of dental cement. Phosphoric acid has proved to be an effective catalyst, promoting certain chemical reactions when absorbed on porous media, such as diatomaceous earth. It is also used in pickling metals and depositing rust-resisting coatings on them.

Generally, furnace acid is a purer product, and is used mainly in non-fertilizer applications. Wet-process acid usually contains more impurities than furnace acid, and is used mainly in fertilizers; however, considerable quantities of furnace acid and wet-process acid are interchanged in the use pattern. With improved technology in the wet process, and further economies in the furnace process, the production process will become a less-important determinant of the end use than at present.
U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
416.30 480.70	Phosphoric acid Phosphatic ferti- lizer and fertilizer materials:	l¢ per lb.	0.5¢ per lb. <u>1</u> /
	Liquid	Free	Free 2/

The rate effective January 1, 1972, for phosphoric acid not chiefly used as a fertilizer or as an ingredient in the manufacture of fertilizer represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. An ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, is not presented in this summary as imports have been negligible in recent years and most of such imports as have been recorded in import statistics are believed to be in error.

The duty-free status on phosphatic fertilizer and fertilizer materials was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and has been bound since January 1, 1948, as a concession granted by the United States in the General Agreement on Tariffs and Trade.

1/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume.

2/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

U. S. consumption and production

Total consumption and production of phosphoric acid in the United States have been increasing, and in 1966 totaled 9.1 billion pounds of phosphorus pentoxide (P_2O_5) equivalent (about 12.5 billion pounds on an orthophosphoric acid basis), or 100 percent more than in 1961. The P_2O_5 content of a theoretical 100-percent orthophosphoric acid is 72.5 percent. It is estimated that about 70 percent of that consumed in 1966 was for fertilizer use and the remainder for various industrial purposes.

Production of wet-process acid increased each year during the period 1961-66 and in 1966 was 126 percent greater than in 1961. Production of furnace acid increased each year from 1961-65 but decreased slightly in 1966 but still was 14 percent more than in 1961. The increase in wet-process acid results, largely, from the rising consumption of this acid for fertilizer purposes, its major outlet.

U.S. producers

At the end of 1966, 60 plants were producing phosphoric acid in the United States. Furnace acid, made from elemental phosphorus, was produced in 24 plants scattered in 15 States from coast to coast, all operated by large diversified concerns that make elemental phosphorus usually at different plant sites. Wet-process acid, made directly from phosphate rock, was produced in 36 plants in 12 States; 14 of the plants were located in Eastern States, 14 in Central States, and 8 in the Rocky Mountain and Pacific States. Nearly all wet-process acid producers also made phosphatic fertilizers and several mined the raw material, phosphate rock. Approximately half of the concerns that manufacture wet-process acid are large diversified chemical companies; a quarter are medium-size organizations; and a quarter are small concerns. It is believed that the small concerns produce only fertilizer and that little, if any, of their output enters industrial markets for phosphoric acid.

U.S. exports and imports

U.S. exports of phosphoric acid are not separately classified, but are believed to be nil. Annual U.S. imports of phosphoric acid of a grade not chiefly used for fertilizer have been negligible. Such imports reported in 1965 and 1966 are believed to be largely in error as a result of statistical misclassification. Imports of phosphatic fertilizers and fertilizer materials, liquid, were first separately reported for statistical purposes in 1966 (480.70 (pt)) and amounted to 23.2 million pounds, valued at \$934,000. These imports, believed to be all phosphoric acid, were from Canada.

Year	To	: We : ac: : phos	Wet-process acid from phosphate rock			Fur from pł	rnace acid m elemental hosphorus		
:	Quantity	(1,000 pounds	, phos	sphorus	pent	ox	ide	equiva	lent
1961: 1962: 1963: 1964: 1965: 1966:		4,507,868 4,893,562 5,809,538 6,566,084 7,813,622 9,097,274 Value	: : : : : (1,000	2,818 3,153 3,914 4,550 5,795 7,112	,346 ,952 ,952 ,836 ,676 ,344	:		1,68 1,73 1,89 2.01 2,01 1,98	9,522 9,610 4,586 5,248 7,946 4,930
1961 1962 1963 1964 1965 1966		287,768 297,304 346,507 378,474 429,509 497,370	:	153 168 208 231 286 348	,882 ,973 ,354 ,360 ,036 ,544			13 12 13 14 14 14	3,886 8,331 8,153 7,114 3,473 8,826

Phosphoric acid: U.S. production, by method of manufacture, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

	Commodity	item
Sulfuric	acid	416.35

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States is the world's largest producer and consumer of sulfuric acid, the most important inorganic acid, and accounts for nearly one-third of the world supply. Owing to the corrosive nature of sulfuric acid, shipments are kept to a minimum; thus, U.S. exports and imports are negligible compared with production, which in 1966, amounted to 28 million short tons on a 100-percent-acid basis.

Description and uses

This summary includes all grades or strengths of sulfuric acid, a heavy, oily liquid usually having an odor of sulfur dioxide. It is very reactive and corrosive, requiring special precautions in its manufacture and handling.

Sulfuric acid is made by oxidizing elemental sulfur or the sulfur in some sulfur-bearing material to sulfur dioxide (item 422.94) converting it to sulfur trioxide, and hydrating the trioxide to sulfuric acid.

The major uses of sulfuric acid are in fertilizer manufacturing, petroleum refining, metals and textile processing, production of explosives, and paint and pigment manufacturing.

U.S. tariff treatment

Imports of sulfuric acid are duty free. The duty-free treatment was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948, as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption and production

Consumption and production of sulfuric acid in the United States

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are increasing and in 1966 totaled 28 million short tons in terms of 100-percent acid (see accompanying table)--64 percent more than in 1961, reflecting increased industrial activity especially in the fertilizer sector. Uwing to the corrosiveness of this acid, stocks are usually kept to a minimum.

U.S. producers

At the end of 1965, sulfuric acid was made in 210 plants operated by nearly 100 companies in 42 States. About 45 percent of the plants were situated in the Eastern States, 40 percent in the Central States, and 15 percent in the Mountain and Pacific States. Because of the low value of sulfuric acid and difficulty of handling it, producing plants in general are located near the consumers to avoid high transportation costs. In 1965, more than half of the total production was either consumed by the producer or at the adjacent plants of other consumers.

Exports and imports

Both U.S. exports and imports of sulfuric acid are negligible, equivalent to less than one-half of 1 percent of domestic production in each year from 1961 to 1966. Canada has been the major market for the U.S. exports and the source of all the imports in recent years.

Foreign production and trade

Sulfuric acid is produced by most countries of the world with the exception of a few small countries that lack manufacturing facilities. World output of sulfuric acid in 1963 totaled more than 60 million short tons, with the United States accounting for nearly one-third of the total. The U.S.S.R., the second largest producer, reported more than 7.5 million short tons manufactured. Japan, with about 5 million tons, was third, followed by West Germany, the United Kingdom, France, and Italy, each with production of more than 2 million tons.

Sulfuric acid is of little importance in international trade since most countries find it advantageous to manufacture the acid, importing the raw material if necessary. Less than 1 percent of total world production is shipped out of the country of manufacture. Sulfuric acid: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

Year	Production 1/	:	Imports <u>1</u> /	:	Exports	<u>1</u> /	: Apparent :consumption 2/
		:		:			*
1961:	17,058	:	38	:		10	: 17,100
1962:	18,783	:	36	:		10	: 18,800
1963:	20,038	:	38	:		7	: 20,100
1964:	21,959	:	68	:		14	: 22,000
1965:	23,813	:	43	:		6	: 23,800
1966:	27,506	:	50	:		41	: 27,500
•		•			•		•

(In thousands of short tons)

<u>l</u>/ Production given in terms of 100-percent sulfuric acid; imports and exports given on an "as is" basis.
<u>2</u>/ Estimated and rounded.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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Commodity	item
0011110020J	

TSUS

Inorganic acids not elsewhere enumeraged------ 416.45

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Annual U.S. production of the inorganic acids covered by this summary is probably about 500 million pounds. Imports were 13.5 million pounds, valued at \$1,083,000, in 1966. Export statistics are not available, but exports are probably smaller than imports.

Comment

This summary covers all inorganic acids other than arsenic, boric, hydrochloric, hydrofluoric, nitric, phosphoric, sulfuric, and tungstic acids (items 416.05 to 416.40). There are probably between 30 and 50 of these miscellaneous inorganic acids, but most of them are of minor commercial importance. The four most important acids considered here are hydrocyanic acid (hydrogen cyanide), silica acid (silica gel), chlorosulfonic acid, and sulfamic acid.

Hydrocyanic acid is a poisonous gas or liquid (under pressure) which is used chiefly in the manufacture of acrylonitrile and adiponitrile, intermediates in the production of synthetic rubber, nylon, and certain plastics. Silicic acid, a white crystalline product is used as a catalyst and as a drying agent. Chlorosulfonic acid is a colorless or slightly yellow, corrosive liquid used principally in the manufacture of dyes and dye intermediates, synthetic detergents, and such items as saccharin and sulfa drugs. Sulfamic acid, a white crystalline material, is used in the manufacture of detergents, as a sulfonating agent, as a descaler of processing equipment, and in the electroplating and anodizing of metals. The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate	prior to	Rate effective
item	Commodity	Jan.	1, 1968	Jan. 1, 1972

416.45 Inorganic acids not else- 12.5% ad val. 6% ad val. where enumeraged.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. production of hydrocyanic acid increased from 211 million pounds in 1961 to 378 million pounds in 1965 and then declined to 323 million pounds in 1966. Shipments of chlorosulfonic acid, which are practically equivalent to production, amounted to 93 million pounds, valued at \$3.6 million, in 1961, and were 107 million pounds, valued at \$4.1 million, in 1962. Later data on chlorosulfonic acid are not available. The value of shipments of silica gel increased from \$35 million in 1961 to \$51 million in 1966. The domestic output of sulfamic acid is substantial, but the exact amount is not available for publication because there is only one producer. Production of the other inorganic acids considered here is small.

There are at least 15 concerns, principally large chemical companies, that produce the industrial inorganic acids considered here. In addition, three other companies produce only chemically pure or laboratory grades of these acids. Hydrocyanic acid is made by nine manufacturers in 11 plants. Five of these plants are in Texas, and there is one plant each in Louisiana, Tennessee, Kentucky, New York, Ohio, and West Virginia. Chlorosulfonic acid is produced by four companies in five plants, two of which are in New Jersey and one each in Indiana, Illinois, and Ohio. Silicic acid is produced by three concerns in eight plants situated in New Jersey (two); Ohio, Maryland, Alabama, Illinois, Louisiana, and California. The three companies that produce only chemically pure grades of the inorganic acids considered in this summary operate plants in New Jersey and Missouri.

Data on exports of these miscellaneous inorganic acids are not available, but exports are believed to be smaller than imports.

U.S. imports of inorganic acids not elsewhere enumerated increased from 4.4 million pounds, valued at \$575,000, in 1964 to 13.5 million pounds, valued at \$1,083,000, in 1966 (see accompanying table). Imports in recent years have consisted chiefly of sulfamic acid from Japan.

Source	1964	1965	1966
	Quantit	ty (1,00	0 pounds)
Japan West Germany United Kingdom Canada All other Total	4,040 99 23 <u>1</u> / <u>265</u> 4,427 Value	: 6,255 : 290 : 481 : 46 : 556 : 7,628 (1,000	: 9,385 166 14 3,616 289 13,470 dollars)
Japan West Germany United Kingdom Canada All other Total	365 73 88 3 46 575	; 568 ; 129 ; 269 ; 3 ; 108 ; 1,077	: 638 : 132 : 129 : 108 : 76 : 1,083

Inorganic acids not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1964-66

1/ Less than 500 pounds.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Commodity item

TSUS

Aluminum oxide and hydroxide----- 417.12

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. consumption of aluminum oxide and hydroxide is supplied primarily from domestic output. In 1966, U.S. production amounted to 12.3 billion pounds, exports to 663 million pounds, and imports to 1.1 billion pounds.

Description and uses

Aluminum oxide (alumina) and aluminum hydroxide (hydrated alumina) are two closely related chemicals produced chiefly from imported bauxite (item 601.06) as intermediates in the production of metallic aluminum (item 618.02). Aluminum oxide, which is obtained from aluminum hydroxide by calcination, is principally used in the production of metallic aluminum by electrolytic reduction, but substantial quantities are also used in the manufacture of abrasives, refractories, ceramics, catalysts and catalyst supports, and adsorbents. Aluminum hydroxide is obtained from bauxite by digestion in sodium hydroxide and subsequent precipitation. In addition to its use as an intermediate in the production of aluminum oxide, large quantities of aluminum hydroxide (principally alumina trihydrate) are used in the manufacture of glass, ceramics, rubber, paper, and aluminum chemicals.

Activated alumina (aluminum oxide) in the form of processed white chips of fairly uniform size is considered a manufacture of aluminum oxide and classifiable in item 523.91.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	<u>Rate effective</u>
item		Jan. 1, 1968	Jan. 1, 1972
417.12	Aluminum hyduoxide and oxide.	0.25¢ per 1b.	0.12¢ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The duty on aluminum oxide (alumina) imported for use in the production of aluminum has been suspended since July 17, 1956. Under Public Law 89-440 the suspension continues through July 15, 1968 (see item 907.15 of the TSUSA). The ad valorem equivalent of the rate of duty on imports other than those for use in the production of aluminum, based on imports in 1966, was 4 percent.

U.S. consumption, production, and exports

Combined annual U.S. production of aluminum oxide and aluminum hydroxide, which in recent years has approximated annual U.S. consumption within 5 percent, increased steadily from 7.8 billion pounds in 1961 to 12.3 billion pounds in 1966 (see accompanying table). Demand for output is largely derived from the demand for metallic aluminum--90 percent of the quantity produced is regularly supplied to aluminum-producing plants, where approximately 2 pounds of aluminum oxide is required for each pound of metallic aluminum produced. About 4 percent of total output of aluminum hydroxide is not converted to the oxide, but remains in the form of aluminum hydroxide (hydrated alumina).

The great bulk of the output of aluminum oxide and hydroxide is produced by the four largest aluminum companies at eight plants situated in Alabama, Arkansas, Louisiana, and Texas. Smaller quantities, particularly of the hydroxide, are produced by 15 companies in widely scattered plants. Most of the oxide and hydroxide produced is consumed by the producing companies in their own integrated operations. For none of the companies is the revenue from the sale of oxide and hydroxide their principal source of income.

Official statistics on exports of domestic merchandise first became available for 1965. For the year 1965, 646 million pounds, valued at \$27.3 million, was exported; of this quantity 636 million pounds (98 percent), valued at \$25.1 million, was aluminum oxide. The principal countries of destination were Norway, Canada, Mexico, Spain, and West Germany.

In 1966, exports totaled 663 million pounds, valued at \$30.3 million, of which 646 million pounds (97 percent), valued at \$26.9, was aluminum oxide. The principal countries of destination were Canada, Norway, France, Ghana, and West Germany.

U.S. imports and world capacity

U.S. imports for consumption advanced steadily in quantity from 363 million pounds, valued at \$11 million, in 1961 (see accompanying table) to 511 million pounds, valued at \$15 million, in 1964; in the following year they receded in quantity to 502 million pounds but advanced in value to \$16 million. In 1966, imports advanced sharply to 1.1 billion pounds, valued at \$31 million, in response to increased domestic aluminum capacity that relied on imported alumina for production.

More than 95 percent of the quantity imported in recent years has been alumina for use in producing aluminum. Effective September 1, 1964, statistics on imports of such alumina were first separately recorded under item 907.15. In 1965 approximately 487 million pounds, valued at \$15 million, and in 1966 approximately 1.0 billion pounds, valued at \$29 million (as revised by the U.S. Tariff Commission staff), was imported from Japan, Guinea, Jamaica, Guyana, and Surinam. Imports of aluminum hydroxide and aluminum oxide other than those for use in producing aluminum have originated chiefly in Austria, West Germany, the United Kingdom, and France in recent years.

World alumina capacity is estimated by the U.S. Bureau of Mines to have been 15.3 million short tons per year at the end of 1964. Of this capacity, 5.5 million short tons was situated in the United States, 1.3 million short tons in Canada, 2.0 million short tons in Europe, principally in France and West Germany, 0.9 million short tons in Asia, principally in Japan, 3.5 million short tons in the Soviet bloc, and nearly all the remainder in Jamaica, Guyana, Guinea, and Australia. Production of alumina in Surinam started in 1965; planned capacity was 0.8 million short tons.

79

:		:	Imports				
Year :	Aluminum :Alum Total : oxide : hy : : :		:Aluminum : hydrox- : ide 1/	Aluminum : hydrox- : Quanti ide 1/ :		: : Value :	
	1,000	: 1,000	: 1,000	:	1,000	:	1,000
· •	pounds	: pounds	: pounds	:	pounds	:	<u>dollars</u>
:		:	:	:		:	
1961:	7,820,048	: 7,398,844	: 421,204	:	362,871	:	11,095
1962:	9,262,580	: 8,804,780	: 457,800	:	353,180	:	9,710
1963:	10,093,380	: 9,634,160	: 459,220	:	384,606	:	10,698
1964:	11,143,536	: 10,637,526	: 506,010	:	<u>2/510,632</u>	:	2/15,292
1965:	11,684,858	: 11,153,474	: 531,384	:	2/501,706	:	2/15,941
1966:	12,308,998	: 11,767,940	: 541,058	:	<u>2/1,071,587</u>	:	2/30,684
:		<u>:</u>	:	:		:	

Aluminum oxide and hydroxide: U.S. production, total and by compound, and imports for consumption, 1961-66

 $\frac{1}{2}$ In terms of 100-percent alumina trihydrate. $\frac{2}{2}$ Includes aluminum oxide reported under item 907.15; see text.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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r	S	US	
i	t	em	

Aluminum sulfate----- 417.16

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections are reporduced in appendix A to this volume.)

U.S. trade position

Virtually all U.S. consumption of aluminum sulfate has been supplied by domestic production in recent years, when imports have amounted to less than 2 percent of consumption. U.S. production amounted to 2.4 billion pounds, and exports to 44 million pounds, in 1966.

Description and uses

Aluminum sulfate, a white, crystalline solid when pure, is marketed principally in two grades: the commercial grade, which contains a maximum of 0.5 percent iron, and the iron-free grade, which contains a maximum of 0.005 percent iron. Both grades are available in solution form (liquid alum) or in solid form (dry alum). The commercial grade is produced by reacting bauxite (item 601.06) or kaolin (item 521.41) with sulfuric acid (item 416.35), and is used to purify water, size paper, condition process water, treat sewage, coagulate synthetic rubber, and manufacture other aluminum chemicals. Iron-free aluminum sulfate, which is produced by reacting alumina trihydrate (item 417.12) with sulfuric acid, is used to tan white leather, size high-grade paper, manufacture catalysts and pharmaceutical preparations, and dye textiles.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective		
item	Commodity	Jan. 1, 1968	Jan. 1, 1972		
417.16	Aluminum sulfate	0.1¢ per lb.	0.05¢ per lb.		

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages

of the reduction became operative January 1, 1960. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. For the 1966 imports, this rate was equivalent to an ad valorem rate of 5.7 percent.

U.S. consumption, production, and producers

Virtually all U.S. consumption is supplied by domestic production; in the period 1961-66, apparent consumption increased from 1.9 billion to 2.3 billion pounds and production increased from 1.9 billion to 2.4 billion pounds (see accompanying table). The bulk of consumption and production has consisted of the commercial grade, with the share supplied by iron-free sulfate ranging between 5 and 7 percent during 1961-66. The future trend of consumption and production of aluminum sulfate is expected to follow the trend of population growth as its principal usessizing paper and purifying and conditioning water--are likely to do.

Aluminum sulfate is produced in the United States by 25 companies at plants dispersed throughout the country. The bulk of the total is produced by five companies in some 50 establishments and by four large municipalities for their own use. For all of the firms producing aluminum sulfate, it is a substantial source of revenue. The producing establishments, particularly those producing the commercial grade in liquid form, are usually situated near points of consumption.

U.S. exports and imports

Exports have not exceeded 3 percent of U.S. production in recent years, nor have imports exceeded 2 percent of U.S. consumption. Although exports have been larger than imports in recent years, exports have probably been principally the commercial grade, whereas imports have probably been the iron-free grade. Exports averaged 33 million pounds a year during 1961-65, but increased to 44 million pounds in 1966. They were destined primarily for Canada and South America. Imports averaged 13 million pounds a year during 1961-65, but increased to 24 million pounds in 1966. They entered chiefly from Canada, West Germany, and the United Kingdom.

Aluminum	sulfate:	U.S.	produc	ction	, imports	for	consumpt	ion,	exports
of	domestic	merchan	ndise,	and	apparent	consi	umption,	1961-	-66

:			•	:		:	Ratio
Year :	Production :	Imports	: Exports	:	Apparent	:	of
:	:	:	•	:	consumption	:	imports to
:			:	:		:0	consumption
:	1,000	1,000	: <u>1,000</u>	:	1,000	:	
:	pounds	pounds	pounds	:	pounds	:	Percent
:	:	:	:	:		:	
1961:	1,889,494	9,766	: 28,427	:	1,870,833	:	0.5
1962:	1,963,008	: 11,184	: 35,552	:	1,938,640	:	.6
1963:	2,013,268	: 11,885	: 35,151	:	1,990,002	:	.6
1964:	2,132,884	: 13,485	: 33,022	:	2,113,347	:	.6
1965:	2,243,520	: 16,490	: 31,282	:	2,228,728	:	•7
1966:	2,354,218	24,226	: 44,119	:	2,334,325	:	1.0
:	_	.	:	:		• :	

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--Apparent consumption was calculated by adding production and imports and substracting exports. Data on production and apparent consumption do not include relatively small quantities produced by municipalities for their own use.

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ALUMINUM AMMONIUM SULFATE, ALUMINUM POTASSIUM SULFATE, SODIUM 85 ALUMINATE, AND ALUMINUM COMPOUNDS NOT ELSEWHERE ENUMERATED

Commodity	150S item
Aluminum ammonium sulfate Aluminum potassium sulfate Sodium aluminate	417.10 417.14 420.68
Aluminum compounds not elsewhere enumerated	417.18

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. consumption, valued at an estimated \$51 million in 1966, has been supplied primarily from domestic production. In 1966, U.S. exports were valued at \$7.0 million, and imports at \$1.0 million.

Description and uses

This summary comprises those inorganic aluminum compounds not provided for elsewhere in the TSUS, principally the two alums, aluminum ammonium sulfate and aluminum potassium sulfate, sodium aluminate, aluminum chloride, and aluminum fluoride, but including some 20 other inorganic aluminum compounds as well. Aluminum hydroxide and oxide (item 417.12) and aluminum sulfate (item 417.16) are discussed in separate summaries.

Inorganic aluminum compounds are produced from aluminum hydroxide, primary aluminum (item 618.02), scrap aluminum (618.10), and bauxite (item 601.06), and are widely used as reagents, catalysts, and intermediates. The two alums mentioned above are used in medicinals, as ingredients in baking powder, and in textile dyeing, water purification, paper sizing, and leather tanning. Sodium aluminate is used in water treatment, textile dyeing, and paper sizing, and in the manufacture of zeolites, milk glass, and building stones. Aluminum chloride is used as a catalyst in the petroleum, synthetic rubber, and plastics industries, and for salting out glycerin lyes and carbonizing fine wool. Aluminum fluoride is used as a component of the electrolyte from which metallic aluminum is produced, and as a flux in the manufacture of ceramic glazes and enamels.

86 ALUMINUM AMMONIUM SULFATE, ALUMINUM POTASSIUM SULFATE, SODIUM ALUMINATE, AND ALUMINUM COMPOUNDS NOT ELSEWHERE ENUMERATED

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
item		Jan. 1, 1968	Jan. 1, 1972
417.10 417.14 420.68 417.18	Aluminum ammonium sulfate Aluminum potassium sulfate Sodium aluminate Aluminum compounds not elsewhere enumerated.	0.3¢ per lb. 0.6¢ per lb. 8.5% ad val. 8.5% ad val.	0.15¢ per lb. 0.3¢ per lb. 4% ad val. 4% ad val.

The rates effective January 1, 1972, represent the final stage of a reduction resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalents of the specific rates in effect prior to January 1, 1968, based on imports in 1966, on aluminum ammonium sulfate and aluminum potassium sulfate, were 6.7 and 11.3 percent, respectively.

ALUMINUM AMMONIUM SULFATE, ALUMINUM POTASSIUM SULFATE, SODIUM 87 ALUMINATE, AND ALUMINUM COMPOUNDS NOT ELSEWHERE ENUMERATED

U.S. consumption, production, and exports

U.S. consumption of the inorganic aluminum compounds covered here had an estimated value of \$51 million in 1966. Consumption has been supplied primarily by domestic output; total shipments as reported by the U.S. Department of Commerce, approximated \$57 million in 1966. In 1961-66, output of aluminum chloride and aluminum fluoride, separately reported by the Department of Commerce, was as follows (in thousands of pounds):

	Aluminum	:	Aluminum		
Year	Liquid and crystal 1/	:	Anhydrous	:	fluoride
1961 1962 1963 1964 1965 1966	: 45,952 47,964 53,274 57,886 51,486 49,298		44,758 49,932 50,292 59,780 66,848 73,318	•••••••••••••••••••••••••••••••••••••••	121,946 145,684 162,892 185,228 223,804 249,686

1/ In terms of 32° Baume solution, containing about 28 percent aluminum chloride.

The value of aluminum chloride output in 1966 is estimated to have been \$11.5 million; the value of aluminum fluoride was \$29.5 million. The value of the total shipments of the remaining aluminum compounds covered here approximated \$16 million in 1966. Each of some 50 firms with plants widely distributed throughout the United States produces one or more aluminum compounds.

Exports were first separately reported in official statistics in 1965. In that year, 26.9 million pounds, valued at \$4.1 million, was exported, principally to Australia, India, Brazil, Canada, and Surinam. In 1966, 43.4 million pounds, valued at \$7.0 million, was exported, principally to Canada, Brazil, Australia, India, Japan, and China.

U.S. imports

Aggregate imports increased irregularly from 7.5 million pounds, valued at \$0.7 million, in 1961 to 8.8 million pounds, valued at \$1.0 million, in 1966 (see accompanying table). Imports consisted primarily of aluminum chloride, aluminum fluoride, and sodium aluminate. They originated chiefly in Canada, West Germany, Italy, France, and the United Kingdom.

Year	Total aluminum compounds	Aluminum ammonium sulfate	Aluminum potassium sulfate	: Sodium aluminate	Aluminum compounds not elsewhere enumerated		
:		Quar	ntity (1,000	pounds)			
: 1961: 1962: 1963: 1965: 1966:	: 7,452 : 9,955 : 8,460 : 5,253 : 8,502 : 8,806 :	70 126 94 75 312 94	11 63 60 70 37 133	$ \frac{1}{1} \frac{1}{3}/373 1,685 1,453 1,268 $	<u>2</u> /7,371 <u>2</u> /9,766 <u>2</u> /7,933 3,423 6,700 7,311		
:		Valu	ue (1,000 do	llars)			
: 1961: 1962: 1963: 1964: 1966:	: 732 : 1,008 : 849 : 530 : 871 : 969 :	2 4 3 2 11 4	1 2 2 2 7 7 7	$ \frac{1}{1/2} \frac{1}{3/22} 103 88 79 79 7 $	2/729 2/1,002 2/822 423 765 879		

Specified aluminum compounds: U.S. imports for consumption, 1961-66

 $\frac{1}{1}$ Included with aluminum compounds not elsewhere enumerated. 2/ Includes sodium aluminate and relatively small quantities of

organic aluminum salts prior to September 1963.

 $\underline{3}$ / For September-December only; data for January-August included with those for aluminum compounds not elsewhere enumerated.

Source: Compiled from official statistics of the U.S. Department of Commerce.

AMMONIA, AQUA AND LIQUID ANHYDROUS



Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The production of ammonia is a fast-growing activity in the United States as well as in other countries. In 1966, this country produced more than 10 million short tons, a quantity about equal to its own requirements; exports, amounting to about 2 percent of the output, were offset by a similar quantity of imports.

Description and uses

Although aqua ammonia and liquid anhydrous ammonia are provided for by name under items ± 17.20 and ± 17.22 , respectively, if they are importations of grades chiefly used for fertilizer or chiefly as ingredients in the manufacture of fertilizer, they are included under item ± 80.65 since the use provision prevails over the <u>eo nomine</u> (by name) designation. The chief use of an article, as defined in General Headnote $\pm 10(e)(i)$ of the tariff schedules, is the use which exceeds all other uses combined. Nearly all of the aqua ammonia and liquid anhydrous ammonia imported during the period $\pm 961-66$ were of "fertilizer" grade. This summary discusses all aqua and anhydrous ammonia whether or not of a grade chiefly used for fertilizer or as a fertilizer ingredient.

Anhydrous ammonia, a colorless gas under normal temperature and pressure, is usually liquefied by decreasing the temperature and/or increasing the pressure. It is produced by high-pressure synthesis from nitrogen and hydrogen. The nitrogen is usually obtained from the atmosphere, and the hydrogen is obtained from one of several possible sources such as natural gas, refinery gas, naphtha, fuel oil, cokeoven gas, or water gas.

Aqua ammonia is obtained by dissolving anhydrous ammonia in water, and it is also produced as a byproduct from coke-oven plants. The principal commercial product contains 29.4 percent ammonia. Less

than 1 percent of anhydrous ammonia is converted to aqua ammonia.

The principal use of ammonia, both anhydrous and aqua, is as fertilizer or an ingredient in the manufacture of fertilizer. Ammonia is converted to other nitrogen compounds for most industrial uses. Such end uses include industrial explosives, plastics, synthetic resins and fibers, animal feeds, process metallurgy, refrigeration, photography, and organic synthesis.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
417.20 417.22	Ammonia, aqua Ammonia, iiquid	8.5% ad val.	4% ad val.
	anhydrous	1.25¢ per lb.	0.62¢ per 1b.
480.65	Nitrogenous fertilizer and fertilizer material:		
	Ammonia	Free	Free l/

The rates effective January 1, 1972, for aqua and liquid anhydrous ammonia of a grade not chiefly used for fertilizer nor in the manufacture of fertilizer, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of tariff negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced in appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, is not representative as the imports have been negligible in recent years.

The duty-free status of ammonia of a grade chiefly used for fertilizer or in the manufacture of fertilizer was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948, in a

^{1/} Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

concession granted by the United States in the GATT.

U.S. consumption and production

Total U.S. consumption and production of ammonia, both of which in 1966 amounted to more than 10 million short tons (table 1), have been increasing rapidly in recent years. Sufficient data are available to compute apparent consumption for only 1964-66. U.S. consumption, however, is generally equivalent to domestic production, which more than doubled in the period 1961-66.

Ammonia for fertilizer is used both directly and mixed with other compounds to produce nitrogen solutions (in item 480.65) or mixed fertilizer (in item 480.80). Statistics on anhydrous ammonia and aqua ammonia consumed as direct application fertilizer, given in tons of nitrogen content, in the year ended June 30, 1963, were estimated to have totaled 1,226,000 and 579,000 short tons, respectively, 31 percent and 17 percent more than in the previous year. These quantities are equivalent to 1,491,000 and 2,393,000 short tons gross weight.

The most recent percentage distribution of end uses for ammonia was in 1960, when total ammonia production amounted to 4,812,000 short tons, as follows:

Use	Percent
Fertilizer, total	77.5
Production of solid materials	29.5
Production of solutions	28.0
Direct application	20.0
Industrial uses, total	22.5
Plastics, synthetic resins, and fibers	5.2
Chemicals	4.0
Miscellaneous (animal feed, pulp and paper, metallurgy)	10.3

U.S. producers

In 1965 approximately 50 companies were operating 89 plants producing anhydrous ammonia in 31 States scattered from coast to coast. It is estimated that about half of the plants also produce aqua ammonia. Most of the producers are large corporations, either diversified chemical and fertilizer companies, oil and gas companies, or steel manufacturers.

Although there are many small plants--with a capacity of 60 to 100 tons per day--in operation, there is a definite trend to large plants with a capacity of 600 to 1,000 tons per day.

U.S. exports

Exports of anhydrous ammonia are separately classified for "industrial" use and "fertilizer" use. Exports of aqua ammonia are not separately reported, and little if any aqua ammonia is believed to be exported.

Total U.S. exports during the period 1961-66 have ranged from a low of 59,000 short tons in 1962 to 226,000 short tons in 1966 (table 1).

Exports of anhydrous ammonia for industrial use decreased from 9,500 short tons in 1961 to 3,500 short tons in 1963, then increased to 64,000 tons in 1965, and decreased to 54,000 tons in 1966 (table 2).

Exports of anhydrous ammonia for fertilizer generally increased during this period and amounted to 172,000 short tons in 1966 (table 3). Mexico was the major recipient of this material, each year accounting for 85 percent or more of the U.S. exports.

U.S. imports

During the period 1961-66 there were no imports of liquid anhydrous ammonia of a grade not chiefly used for fertilizer, nor in the manufacture of fertilizer, except two small shipments from Canada, one in 1963 and the other in 1965. Imports of aqua ammonia of a grade not chiefly used for fertilizer, nor in the manufacture of fertilizer, were not separately classified prior to September 1963, but it is believed that none was imported. There have been no imports of this grade of aqua ammonia since September 1963, except for a small shipment in 1965 from Mexico.

Imports of anhydrous ammonia of a grade chiefly used for fertilizer, or in the manufacture of fertilizer, were not separately classified until September 1963. Prior to 1964, imports were small, probably not exceeding 7,500 tons in any year, and are believed to have come only from Canada. In 1964, imports increased to more than 158,000 short tons, with 90 percent originating in Trinidad. Imports in 1965 amounted to more than 200,000 tons and in 1966 totaled 311,000 tons, with 65 percent coming from Trinidad in both years. Smaller amounts came from Canada, the Netherlands Antilles, and Colombia. This quantity of imports was equivalent to 2 percent of U.S. apparent consumption in 1964 and 1965 and 3 percent in 1966.

World production and trade

The world output of anhydrous ammonia has been expanding very rapidly since 1950 and totaled more than 28 million short tons in the year ended June 30, 1964. In addition to the United States, the world's largest producer, other leading producing countries included the United Kingdom, West Germany, France, the U.S.S.R., Italy, Japan, and Canada. Many other countries have smaller producing industries. Almost without exception the output in all plants has increased sharply in recent years; in addition, many new plants have been established.

Most anhydrous ammonia produced is used in the manufacture of nitrogenous fertilizers such as ammonium nitrate, ammonium sulfate, urea and nitrogen solutions, and there has been little international trade in ammonia as such; however, the increasing use of ammonia for direct application fertilizer has resulted in the construction of refrigerated tankers and bulk storage terminals. This undoubtedly will increase the world-wide shipment of ammonia.

Table 1.--Ammonia: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

	: Pro-	:	:		:	Apparent	:]	Ratio (perc	cent)
Year	duction 1/	:Imports 2	/ :E	xports <u>3</u> /	:	con-	:	imports t	50
	:	:	:		::	sumption 2	<u>/:</u>	consumpti	lon
	:	:	:		:		:		
1961	: 5,206,653	: 4/	:	102,418	:	4/	:	4/	
1962	: 5,809,671	: 4/	:	59,467	:	<u></u> []	:	<u> </u>	
1963	: 6,682,202	: 4/	:	75,281	:	4/	:	<u>4</u> /	
1964	: 7,634,256	: 158,26	4 :	148,480	:	7,644,040	:		2.1
1965	: 8,869,419	: 202,75	9:	184,203	:	8,887,975	:		2.3
1966	:10,622,437	: 310,65	9:	225,963	::	10,707,133	:		2.9
	:	:	:		:		:		

(Quantity in short tons)

1/ Production statistics are for anhydrous ammonia only; virtually all aqua ammonia is produced from anhydrous ammonia.

2/ Virtually all anhydrous ammonia.

 $\frac{3}{4}$ Believed to be practically all anhydrous ammonia. $\frac{4}{4}$ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 2Ammo	mia,	anhydrous	and a	aqua:	U.S.	expor	ts of	domestic
merchandise	for	industrial	uses	, by	princip	oal ma	rkets	3. 1961–66

Market	1961	:	1962	:	1963	:	1964	:	1965	:	1966
	:		Qı	ıan	tity	(short t	:01	ns)		
Mexico	: :1,527	: :1	,488	:	168	:	4,766	:	14,789	:	11,370
Denmark Trinidad	: - : -	: :	-	: :	-	: :	8,569 7,166	:	18,519 9,203	: :	18,232
Canada Philippine Republic	:6,465 : 226	:1 :	,908 105	:2 :	,476 79	::	24,473 138	::	13,721 157	: :	2,465 58
VenezuelaAll other	: 202 :1,094	:	262 954	:	191 565	:	203 862	:	158 7,332	:	18 7,660
Total	: <u>9,514</u> :	:4	,717	:3	<u>,479</u>	:	46,177	:(63,879	:	<u>53,63</u> 9
	:	:		va :	Tue (,000 ac)1. 		:	
Mexico	: 122	:	121	:	28	:	342	:	1,206	:	1,074
Denmark	: -	:	-	:	_	:	589 346	:	1, 052 534	:	968 814
Canada	: 770	:	216	:	165	:	1,604	:	1,012	:	263
Philippine Republic Venezuela	: 34 : 41	: :	29 53	:	21 43	:	31 46	:	41. 4	: :	18 5
All other	$\frac{178}{1145}$:	171	:	157 h11	÷	134	<u>:</u>	547	:	$\frac{5,167}{3,658}$
100a1-000000000000000000000000000000000	·	:	790	:	414	:	0,10	:		:	<u> </u>

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--The export class includes both aqua and anhydrous ammonia but it is believed that only anhydrous ammonia was exported.

95

^r Table	3Ammo	onia,	anhydrous	and	aqua	.: U.S.	exports	of	domestic
merc	chandise	for	fertilizer	use	, by	principa	al market	tś,	1961-66

,						
Market :	1961	1962 :	1963	1964	: 1965 :	: 1966 :
:		Qu	antity (s	short tor	ns)	
				•	:	:
Mexico:	82,513 :	53,283 :	65,477 :	: 94,198	:102,671	: 146,130
Trinidad:	- :	741 :	365 :	: –	: -	: 14,735
Canada:	7,451 :	359 :	2,013	: 3,270	: 16,932	: 7,942
Philippine :	:	:		•	:	:
Republic:	2,480 :	- :	- :	: -	: -	: 64
All other:	460 :	367 :	3,947	: 4,836	: 721	: 3,453
Total:	92,904	54,750 :	71,802 :	:102,304	:120,324	: 172,324
:		Valu	le (1,000	dollars)	
	:	:		:	:	:
Mexico:	6,527 :	4,484 :	5,680	; 7,892	: 8,191	: 10,869
Trinidad:	- :	48 :	22	: -	: -	: 774
Canada:	681 :	54 :	157 :	: 328	: 1,366	: 646
Philippine :	:	:	4		:	:
Republic:	244 :	- :	- :	: -	: -	: 6
All other:	44 :	34 :	275 :	: 320	: 69	: 242
Total:	7,496 :	4,620 :	6,134	: 8,540	: 9,626	: 12,537
:	:	:	:	:	:	•

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--The export class includes both aqua and anhydrous ammonia but it is believed that only anhydrous was exported.

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Commodity

•	TSUS
	item

Ammonium carbonate and bicarbonate----- 417.24

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

About half of the 5 to 10 million pounds of ammonium carbonate and ammonium bicarbonate consumed annually in the United States is produced within the country, and the other half is imported. Little or none is exported.

Comment

Both ammonium carbonate and ammonium bicarbonate are manufactured from anhydrous ammonia and carbon dioxide. Ammonium carbonate, a white powder or colorless crystals, is used in the manufacture of casein colors, casein glues, and other adhesives; cleaning powders; fire-extinguishing compounds; and baking powders. Ammonium bicarbonate, a white crystalline material, is used principally as a leavening agent in cookies, crackers, and other thin baked goods; as a neutralizing agent in leather tanning; and as an ingredient in certain catalysts.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective				
item	Commodity	Jan. 1, 1968	Jan. 1, 1972				

417.24 Ammonium carbonate and 0.5¢ per lb. 0.25¢ per lb. bicarbonate.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 9.3 percent.

Ammonium carbonate was produced in 1965 by three domestic concerns at plants in Ohio, Missouri, and New Jersey; ammonium bicarbonate is also made by three concerns at plants in New Jersey, New York, and Pennsylvania. Statistics on domestic production are not published, but the total annual U.S. output of both ammonium carbonate and ammonium bicarbonate is estimated to range from 5 million to 10 million pounds. It is believed that U.S. consumption has increased slightly in recent years and that domestic production has provided about 50 percent of the supply.

Exports are not separately classified but are believed to be negligible. Imports of ammonium carbonate and bicarbonate ranged from 2.7 million pounds in 1961 to 5.0 million pounds in 1966 (see accompanying table). Shipments have come mainly from West Germany, with increasing amounts from Norway. Prior to 1962, the United Kingdom was also a major supplier.

Production facilities are known to exist in many foreign countries, and with the rapid expansion of the world ammonia industry, additional plants will probably be built as the demand arises. Among the major foreign producers are West Germany, the United Kingdom, Norway, and Japan.

· Source	:	1961	:	1962	:	1963	:	1964	:	1965	:	1966
•	:	Quantity (1,000 pounds)										
	:		:		:		:		:		:	
West Germany	:	1,227	:3	3,450	:2	,785	:3	,867	:3	3,134	:3	3,197
Norway	;	20	:	82	:	127	:	173	:	467	:]	,108
Netherlands	:	-	:	68	:	22	:	85	:	68	:	376
Belgium	:	-	:	22	:	22	:	92	:	34	:	200
United Kingdom	:	1,438	:	114	:	11	:	9	:	_	:	-
All other	:	11	:	62	:	_	:	_	:	-	:	97
Total	:	2,696	: 3	3,798	:2	,967	:4	,226	:	3,703	:1	,978
	:	Value (1,000 dollars)										
	:		:		:		:		:	<u> </u>	:	
West Germany	:	108	:	197	:	159	:	216	:	169	:	179
Norway	:	1	:	3	:	4	:	5	:	16	:	42
Netherlands		-	:	4	:	1	:	6	:	4	:	37
Belgium	:		:	l	:	l	:	7	:	3	:	7
United Kingdom	;	34	:	11	:	3	:	3	:	-	:	_
All other	:	1/	:	3	:	·	:	-	:		:	11
Total	:	193	•	219	:	168	:	237	:	192	:	269
	:		:		:		:		:.		:	

Ammonium carbonate and bicarbonate: U.S. imports for consumption, by principal pources, 1961-66

. .

1/ Less than \$500.

.

Source: Compiled from official statistics of the U.S. Department of Commerce.
	Commodity	TSU5 item
Ammonium	chloride	417.26

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Ammonium chloride, or sal ammoniac as it is sometimes called, is widely produced throughout the world and is an important commodity in international trade. Annual U.S. production of ammonium chloride-about 50 million pounds--is normally supplemented by imports amounting to 15 or 20 percent of the total quantity consumed, while smaller quantities are exported, principally to Central and South America.

Description and uses

Ammonium chloride (sal ammoniac) is a white, crystalline, hygroscopic salt which is marketed in a number of particle sizes from fine to pressed lumps; it is usually the byproduct of soda ash manufacture, although some is produced by the reaction of ammonium sulfate with sodium-chloride solutions.

Ammonium chloride has its more important uses as an ingredient in the manufacture of dry cells, as a flux material in soldering, tinning and galvanizing, and as a mordant in dyeing and printing. Its less important uses are as an ingredient in the manufacture of various ammonium compounds and washing powders, as a pickling agent in zinc coating and tinning, and in electroplating.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
417.26	Ammonium chloride	0.53¢ per lb.	0.26¢ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United

AMMONIUM CHLORIDE

States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 15.1 percent.

U.S. consumption and production

Although statistics are not available to calculate apparent consumption, it is believed that consumption decreased during 1961-65, largely as a result of decreasing demand for ammonium chloride in dry cell batteries, the main use of ammonium chloride. The use of ammonium chloride as a fluxing agent has also decreased as a result of changed technology.

Annual U.S. production of ammonium chloride in 1961-65 ranged from 45 million pounds to 53 million pounds, as shown in the tabulation below (compiled from official statistics of the U.S. Department of Commerce):

Ľ	ear	•
	_	

<u>1,000</u> pounds

1961	49,502
1962	45,618
1963	45,074
1964	49,410
1965	53,230

U.S. producers

Production of ammonium chloride in 1965 was reported by three large diversified chemical corporations at six plants situated in Illinois, Michigan, New York, Ohio, Oregon, and Pennsylvania, and by three small chemical concerns at plants in Illinois, Missouri, and New Jersey.

Exports and imports

Exports of ammonium chloride are not separately classified. It is believed that they are small and are shipped mainly to countries in the Americas.

In 1961-66, annual imports of ammonium chloride into the United States ranged from 6.5 million pounds in 1965 to 11.8 million pounds in 1961 (see accompanying table). Imports in 1966 totaled 9.2 million pounds. The United Kingdom has been the major source of imports during this period. Canada, West Germany, and Japan accounted for smaller quantities, with occasional token shipments originating in Belgium and the Netherlands.

Foreign production and trade

Production of ammonium chloride is reported for some 25 countries, but no quantity or value data are available. It is believed that the United States is among the largest producers. Other free-world producing countries include Belgium, Canada, France, West Germany, India, Israel, Italy, Japan, the Netherlands, and Spain.

Source	:	1961	:	1962	:	1963	:	1964	:	1965	:	1966
	:			Quanti	ity	(1,0	000	pour	nds	;)		
United Kingdom Canada West Germany All other Total		7,955 1,315 2,457 <u>74</u> 11,801	:	7,487 1,059 1,258 515 10,319 Val	: :5 :1 : :8	,667 ,234 951 _49 <u>5</u> ,347 (1,0	:6 :1 : :9	,629 ,371 992 489 ,481 doll	:3 :1 :1 :6	549 952 ,264 ,533	: :5 :1 :2 :9	,052 ,009 655 ,459 ,175
	:	<u></u>	:	<u> </u>	:		:		:		:	
United Kingdom	:	333	:	269	:	189	:	217	:	133	:	177
Canada	:	67	:	55	:	62	:	75	:	24	:	45
West Germany	:	108	:	54	:	38	:	37	:	35	:	24
All other	:	4	:	15	:	12	:	17	:	41	:	85
Total		512	:	393	:	301	:	346	:	233	:	331
	:		:		:		:		:		:	

--Ammonium chloride: U.S. imports for consumption, by principal sources, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

AMMONIUM NITRATE

	TSUS
Commodity	item

Ammonium nitrate ----- 417.30 Ammonium nitrate for fertilizer or fertilizer manufacture----- 480.65 (pt.)

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States, the world's largest producer of ammonium nitrate, reported output of 5 million tons in 1966. In the same year, imports supplied 3 percent of U.S. consumption and exports accounted for 2 percent of domestic production.

Description and uses

Although ammonium nitrate is provided for by name under item 417.30, if it is an importation of a grade chiefly used for fertilizer or chiefly in the manufacture of fertilizer, it is included under item 480.65 since the use provision prevails over the <u>eo nomine</u> (by name) designation. The chief use of an article, as defined in General headnote 10(e)(i) of the tariff schedules, is the use which exceeds all other uses combined. Practically all imports of ammonium nitrate have been of "fertilizer" grade. This summary discusses all ammonium nitrate whether or not of a grade chiefly used for fertilizer or as a fertilizer ingredient.

Ammonium nitrate is a white, crystalline, hygroscopic compound produced by the reaction of ammonia with nitric acid. It becomes explosive when mixed with combustible materials or certain organic compounds. The material is marketed as a solution as well as in various solid forms--prilled (solid spherical pellets), granular, and grained--with specified nitrogen content. The solid forms are often coated with 2 to 4 percent of inert material to reduce moisture absorption.

The major use of ammonium nitrate is as a fertilizer or an ingredient in the manufacture of fertilizer, which use accounts for over 85 percent (estimated) of U.S. production. The principal nonfertilizer use is as a blasting agent or an ingredient in the manufacture of explosives. Its use in field-compounded explosives, prepared by mixing ammonium nitrate with fuel oil, saw dust, or other organic compounds, has been increasing.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
417.30 480.65	Ammonium nitrateAmmonium nitrate for	0.5¢ per lb.	0.25¢ per lb.
	fertilizer or fertilizer manufacture	Free	Free <u>1</u> /

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

The rate effective January 1, 1972, for ammonium nitrate of a grade not chiefly used for fertilizer nor as an ingredient in the manufacture of fertilizer under item 417.30 represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 21.2 percent.

The duty-free treatment of ammonium nitrate of a grade chiefly used for fertilizer or as an ingredient in the manufacture of fertilizer was provided for in the Tariff Act of 1930 as originally enacted and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948, in a concession granted by the United States in the GATT.

U.S. consumption and production

Apparent consumption of all grades of ammonium nitrate in the United States has been increasing, and in 1966 totaled 5 million short tons, 51 percent more than in 1961 (table 1). Domestic production during the same period increased about 55 percent.

More than 85 percent of the ammonium nitrate produced in the United States is consumed as fertilizer. It is estimated that nearly 50 percent of the material produced for fertilizer was marketed in liquid form, and 50 percent in solid form, nearly all of which was prilled material.

The apparent consumption of ammonium nitrate--both processed and unprocessed--as a blasting agent, totaled more than 551,000 short tons in 1964, 16 percent more than in 1963.

U.S. producers

At the end of 1965, 54 plants were producing ammonium nitrate in 27 States. No data are available indicating which plants produced the "fertilizer" and "non-fertilizer" grades, but any or all of the plants could produce either or both grades. All the manufacturers are large industrial concerns, and nearly all produce their own raw material.

U.S. exports and imports

Total U.S. exports of ammonium nitrate in 1961-66 ranged from 25,000 short tons in 1963 to 104,000 tons in 1965 (table 1). During the years 1961-64, fertilizer-grade material accounted for over 90 percent of the exports. Beginning with 1965, all exports of ammonium nitrate were grouped in one class. Although Mexico was the major recipient of the fertilizer-grade exports, numerous other countries received substantial single-year shipments (table 2). In 1961 and 1962, Mexico was the major foreign market for non-fertilizer ammonium nitrate, but by 1964, this market had ceased to exist for U.S. material (table 3).

U.S. imports of ammonium nitrate, nearly all of a grade chiefly used for fertilizer, totaled 157,000 short tons in 1961, increased to more than 250,000 tons in 1963, and then declined during the next 3 years, amounting to 155,000 tons in 1966 (table 1). Canada was the major source from 1961-66 (tables 4 and 5). In 1961-66, annual imports supplied from 3.0 percent to 6.1 percent of U.S. consumption.

World production and trade

World production of ammonium nitrate for the year ended June 30, 1963, is estimated to have been more than 11 million short tons. The major producing countries in 1963-64 were the United States, West Germany, the Netherlands, the United Kingdom, Italy, and East Germany. Output was reported by about 25 additional countries. .

Table 1.--Ammonium nitrate: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

(In short tons)

Year :	Production	:	Imports	:	Exports	:	Apparent con- sumption	::	Ratio (percent) of imports to consumption
1961: 1962: 1963: 1964:	3,235,316 3,405,535 3,989,616 4,543,086		156,699 216,595 252,315 200,175	: : : : .	29,877 42,223 24,972 88,237	: : : : .	3,362,138 3,579,907 4,216,959 4,655,024		4.7 6.1 6.0 4.3
1966:	5,017,052	:	154,983	:	86,996	:	5,085,039	:	3.0

Source: Compiled from official statistics of the U.S. Department of Commerce.

Markets	: 1961	:	1962	:	.1963	:	1964	:	1965	:	1966
·	:		Qu	a	ntity (s	hort to	ons	5)		
	:	:		:	<u></u>	:		:		:	
Mexico	:13,321	:	8,008	:	9,452	:	33,450	:	55,948	:2	24,227
Peru	: 7,504	:	7,166	:	2,730	:	6,587	:	8,472	:]	13,703
Venezuela	: -	:	-	:	475	:	5,022	:	4,395	:	7,040
Australia	: 389	:	1,668	:	4,045	:	3,459	:	2,120	:	1,963
Canada	: 332	:	2	:	288	:	3,189	:	1,385	:	1,305
Republic of South	:	;		:		:	-	:	•	:	•
Africa	: 43	:	-	:	30	::	22,665	:	10,018	:	-
All other	: 6,735	:2	24,689	:	6,289	:	12,705	:	21,378	::	38,758
Total	:28,324	:1	+1,533	:	23,309	:	87,077	:	103,716	:8	36,996
۱	:		v	a	lue (1,	,0	00 dol]	La	rs)		
	:	:		:		:		:		:	
Mexico	: 905	:	678	:	618	:	2,306	:	3,924	:	1,476
Peru	: 504	:	478	:	166	:	390	:	512	:	849
Venezuela	: -	:	_	:	38	:	345	:	318	:	392
Australia	: 42	:	170	:	410	:	330	:	157	:	151
Canada	: 30	:	2/	:	56	:	216	:	148	:	107
Republic of South	:	:	—	:		:		:		:	
Africa	: 3	:	-	:	3	:	771	:	364	:	-
All other	: 461	:	1,600):	560	:	938	:	1,199	•	2,389
Total	: 1,945	:	2,926	5:	1,851	:	5,296	:	6,622	:	5,362
	:	:		:	-	:		:	• •	:	
1/ Includes non-ferti	lizer g	ra	de in 1	19	65 and	้า	966.				

Table	2	Ammonium	nitra	ıte,	fertili	zer	U.S.	exports	of	
dome	stic	merchand	lise,	by	princip	oal n	narkets,	1961-66	51	/

<u>1</u>/ Includes non-fertilizer grade in 1965 and 1966.
<u>2</u>/ Less than \$500.

Source: Compiled from official statistics of the U.S. Department

of Commerce.

Mankat	• 10(1	•	10(0	•	1062	• -	06)
narket	. 1901	:	1962	:	1903	• 1	.904
	•	•	· · · · · ·			•	
	Qu	ant	ity ((sh	ort 1	tor	ns)
		:		:		:	
Canada	: 65	:	102	:	229	:	272
Australia	: 170	:	105	:	144	:	466
Chile	: 225	:	-	:	955	:	300
Mexico	:1.001	:	240	:	22	:	_
All other	92	:	243	:	313	:	122
Total	1.553	:	690	:]	.663	:	1.160
·	Va	lue	. (1,0	000) doll	lar	<u>s)</u>
	:	:		:		:	
Canada	: 16	:	24	:	43	:	63
Australia	: 19	:	9	:	13	:	48
Chile	: 16	:	-	:	67	:	19
Mexico	: 72	:	20	:	2	:	-
All other	: 8	:	28	:	39	:	15
Total	: 131	:	81	:	164	:	145
	:	:		:		:	

Table 3.--Ammonium nitrate, non-fertilizer: U.S. exports of domestic merchandise, by principal markets, 1961-64 1/

1/ After 1964 not separately classified; included with fertilizer grade ammonium nitrate.

Source: Compiled from official statistics of the U.S. Department of Commerce.

- .. .

Source :	1961	1962	1963	: 1964 :	1965	: 1966
:	•	Que		<u> </u>		
:		: :		:	•	•
Canada:	156,560 :	: 215,531 :	244,510	: 199,336	: 176,661	: 152,206
Norway:	- :	: - :	2,500	: 646	: 565	: 1,165
Nether- :	:	: :	:	:	:	:
lands:	- :	: - :	2,805	: -	: -	: -
United :	:	: :	:	:	:	:
Kingdom:	30 :	: _ :	: 100	: -	: -	: –
All other:	3	622	78_	33	6	<u>988</u>
Total-:	<u>156,593</u>	: 216,153 :	249,993	: 200,015	: 177,232	: 154,359
:		7	Value (1,0	00 dollars)	
:		:	}	:	:	:
Canada:	8,858 :	: 10,891 :	11,727	: 9,621	: 9,442	: 8,046
Norway:	- :	: – :	: 61	: 27	: 23	: 46
Nether- :	•	: - :		:	:	:
lands:	- :	: :	182	: -	: -	: –,
United :	:	: :	:	:	:	:
Kingdom:	2 :	: – :	5	: –	: –	: -
All other:	<u> 1/ </u>	: <u> </u>	<u> </u>	: 3	<u> </u>	: 30
Total-:	8,860 :	: 10,930 :	: 11,982	: 9,650	: 9,471	: 8,123
:		:;		:	:	:
1/ Less th	an \$500.					

Table 4.--Ammonium nitrate, fertilizer: U.S. imports for consumption, by principal sources, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

AMMONIUM NITRATE

Source	1961		1962	:	1963	:	1964	:	1965	1966
	Quantity (short tons)						<u> </u>			
		:		:		:		:		:
Canada:	40) :	284	:	2,300	:	160	:	240	: 621
Belgium:	66	5:	· _	:	22	:	-	:	-	: -
Japan:	-	- :	158	:	-	:	~~	:	-	: –
	106	5:	442	:	2,322	:	160	:	240	: 624
:			V	a 1	ue (1,0	000) dolla	r	3)	
		:		:	····	:		:	•	:
Canada:	2	2:	21	:	153	:	9	:	14	: 29
Belgium:	5	5:	-	:	2	:	-	:	-	: -
Japan:	-	- :	12	:	-	:	_	:		: -
Total:	1/ 8	3:	33	:	155	:	9	:	14	: 29
:		:		:		;				:

Table 5.--Ammonium nitrate, non-fertilizer: U.S. imports for consumption, by sources, 1961-66

1/ Figures do not add to total because of rounding.

Source: Compiled from official statistics of the U.S. Department of Commerce.

AMMONIUM PERCHLORATE

Commodity

TSUS item

Ammonium perchlorate----- 417.32

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Ammonium perchlorate is not an important item of international trade. U.S. consumption is supplied almost entirely by domestic output and is probably less than 150,000 tons per year.

Comment

This summary discusses ammonium perchlorate, a white, crystalline explosive compound. Its principal use is as an oxidizer in solid propellants; smaller quantities are consumed in explosives, fireworks, and in etching and engraving.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972

417.32 Ammonium perchlorate----- 0.75ϕ per lb. 0.3ϕ per lb. 1/

1/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, is not representative as imports have been negligible in recent years. Ammonium perchlorate is produced in the United States by four diversified chemical concerns at one plant in Mississippi, two in Nevada, and one in Oregon. Production statistics are not available, but the U.S. output of this compound is believed to be substantially less than the industry capacity of 150,000 tons a year; however, the production of ammonium perchlorate is expected to increase as the use of solid fuels increases in connection with the Government's development of rocketry and space vehicles.

Exports are not separately classified but are believed to be nil. Because of the explosive nature of ammonium perchlorate, imports of this material have not been extensive. There were no imports in 1961, 1962, 1965, and 1966. In 1963, 2,249 pounds, valued at \$571, and in 1964, 4,494 pounds, valued at \$1,141, were imported, all from Sweden.

Production facilities are known to exist in France, West Germany, Norway, Sweden, and Switzerland. The U.S.S.R. and some other countries probably also have producing plants but have not made information available concerning their output.

AMMONIUM PHOS PHATE

Commodity Item

Ammonium phosphate ----- 417.34 Ammonium phosphate for fertilizer or fertilizer manufacture----- 480.80 (pt.)

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. consumption of ammonium phosphate, an important fertilizer, is supplied almost entirely by domestic production which in 1966 amounted to 3.7 million short tons. U.S. exports in that year accounted for more than 20 percent of production.

Description and uses

Although ammonium phosphate is provided for by name under item 417.34, if it is an importation of a grade chiefly used for fertilizer or chiefly as an ingredient in the manufacture of fertilizer, it is included under item 480.80 since the use provision prevails over the <u>eo nomine</u> (by name) designation. The chief use of an article, as defined in General headnote 10(e)(i) of the tariff schedules, is the use which exceeds all other uses combined. Nearly all imports of ammonium phosphate during the period 1961-66 have been of "fertilizer" grade. This summary discusses all ammonium phosphate whether or not of a grade chiefly used for fertilizer or as a fertilizer ingredient.

Monoammonium and diammonium phosphates--the two commercially important ammonium phosphates--are both white crystalline salts produced by absorbing ammonia gas in phosphoric acid. These two salts often are mixed together in the commercial product. The nitrogen (N) content and phosphorus pentoxide (P_2O_5) content of these two ammonium phosphates when pure are as follows:

	N percent	P205 percent
Monoammonium phosphate	12.15	61. 71
Diammonium phosphate	21.19	53 . 76

The major industrial (non-fertilizer) use of ammonium phosphates is as a fire retardant for such materials as textiles, timber, and

fiberboard. Monoammonium phosphate is used in yeast culture and, to a limited extent, in the dye industry. Diammonium phosphate is used in ammoniated tooth pastes and mouthwashes.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item		Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
417.34	Ammonium phosphate	0.6¢ per 1b.	0.3¢ per lb.
480.80	Those grades of all sub- stances used chiefly for fertilizer: Ammonium phosphate	Free	Free <u>1</u> /

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

The rate effective January 1, 1972, for ammonium phosphate of a grade not chiefly used for fertilizer nor in the manufacture of fertilizer represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 8.2 percent.

The duty-free status of ammonium phosphate of a grade chiefly used for fertilizer or in the manufacture of fertilizer was provided for in the Tariff Act of 1930 and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption and production

Official statistics are not available but it is estimated that U.S. consumption of ammonium phosphate in 1966 amounted to 3.1 million short tons (table 1).

AMMONIUM PHOSPHATE

Production of ammonium phosphate of a grade chiefly used for fertilizer or in the manufacture of fertilizer has been increasing and in 1966 was about 3.7 million short tons (table 2); the output of ammonium phosphate of a grade not chiefly used for fertilizer is believed to have ranged from 13,000 to 18,000 tons annually in recent years.

U.S. producers

In 1966, more than 40 plants produced fertilizer ammonium phosphate of various grades and 5 additional plants were under construction. These plants, located in 19 States scattered from coast to coast, were mainly owned by large diversified chemical and petroleum corporations.

Industrial ammonium phosphate was produced by two large diversified chemical concerns at plants in Illinois and Missouri.

U.S. exports and imports

From 1961-64, U.S. exports of ammonium phosphate of a grade chiefly used as fertilizer or in the manufacture of fertilizer were included in "ammonium phosphate and other nitrogenous-phosphate type fertilizer material." This class included ammoniated superphosphate, ammoniated triple superphosphate, and ammonium phosphate-sulfate, as well as various grades of monoammonium and diammonium phosphates. Exports of this class are believed to have consisted largely of ammonium phosphates. During this same period exports of ammonium phosphate of a grade not chiefly used as fertilizer or in the manufacture of fertilizer were not separately classified but are believed to have been negligible.

Beginning in 1965, ammonium phosphates of all grades for all uses increased and were established in a single class and totaled 772,000 tons in 1966 (table 3). Nearly 50 percent of the exports went to countries with active fertilizer assistance programs of the Agency for International Development.

Imports of ammonium phosphate of a grade chiefly used as fertilizer or chiefly in the manufacture of fertilizer ranged from 96,000 short tons to 179,000 short tons during the period 1961-66. Canada has been the major source of imports, accounting for over 95 percent of the imports each year. Imports of ammonium phosphate of a grade not chiefly used as fertilizer nor in the manufacture of fertilizer during the years 1961-66 ranged from 12 tons to 79 tons during the period 1961-66 and were mainly from the Netherlands.

World production and trade

Ammonium phosphate is produced in the United Kingdom, Belgium, the Netherlands, France, West Germany, Italy, and Japan. Little enters international trade, except among the European Common Market countries.

The use of ammonium phosphate as fertilizer is a recent development and there is no large production of this fertilizer material except in the United States and Canada. There are, however, many ammonium phosphate fertilizer plants under construction or planned throughout the world.

The industry of Canada is comprised of three large diversified mining and chemical corporations operating four plants. One of these is a subsidiary of a large U.S. concern. Output in 1964 is estimated to have exceeded 400,000 tons, about a 30-percent increase over 1963 production.

Table	1Ar	nmonium j	phos	sphate <u>l</u> /s	U.S.	produ	ictio	n, import	is for	con-
sum	otion,	exports	of	domestic	merchar	ndise	and	apparent	consu	nption,
1963	3-66									

Year	Production	(Quantity Imports	in short tons) Exports	Apparent consumption	Ratio (per- cent) of im- ports to consumption
1963	2,649,000	: 129,742	185,282 :	2,593,460	5.0
1964	3,184,000	96,148	363,116 :	2,917,034	3.3
1965	2/ 2,880,000	174,490	2/ 319,365 :	<u>2</u> / 2,735,128	3/6.4
1966	2/ 3,671,000	178,869	2/ 772,294 :	<u>2</u> / 3,077,575	5.8

1/ Includes both fertilizer and industrial grades, gross weight with impurities and (especially for exports through 1964) some related or admixed materials.

2/ Not comparable with previous years; includes only ammonium phosphates after 1964.

 $\underline{3}$ / Estimated ratio to compare with previous years is 5 percent.

Compiled from official statistics of the U.S. Department of Source: Production of industrial ammonium phosphate (about one-half Commerce. of 1 percent of the total) estimated by the U.S. Tariff Commission.

Table	2Ammonium	phosphate	for	fertilizer:	U.S.	production,
			190	63-66 1/		

(NTCROBEL CONCELL and	phosphorus	heurovine co		10 001137
:	1963 <u>2</u> /	1964 2/	1965	1966
Gross weight: Nitrogen content: Phosphorus pentoxide : content:	2,635,124 400,103 891,063	: 3,171,357 487,969 : 1,050,421	2,864,034 460,298 1,081,251	3,653,305 <u>3</u> / <u>3</u> /

(Nitrogen content and phosphorus pentovide content in short tons)

1/ Data not available for earlier years.

Includes other phosphatic fertilizer materials.

 $\overline{3}$ / Data not available.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Market	1961	1962	1963	1964	1965	1966					
:		Quantity (short tons)									
: Canada: Mexico:	: 1,886 : 12,134 :	: 4,178 : 17,503.:	: 14,349 : 4,517 :	: 19,314 : 8,936 :	45,729 7,549	52,917 925					
Other Western : Hemisphere:	9.)(]); :	: 16.)16	33.8/17	50,598	61,80)	115.056					
Europe: India:	4,889 : 175 :	36,007 : 24,858 :	55,612 : 51,832 :	41,398 : 3,858 :	15,328 74,490 :	46,598 431,048					
Republic of : Korea: South Viet Nam-:	: 24,938 : 1.212 :	: - : 5.759 :	: - : 8.692 :	187,669 : 23.214 :	95,644 1,737	80,987 6.475					
Formosa: All other:	11,485 : 11,373 :	8,822 : 6,977 :	11,023 : 	11,133 : 16,996 :	17,370	38,288					
Total:	77,506 :	120,520 : Va	185,282 : lue (1,000	363,116 :) dollars)	319,652 :	772,294					
Canada: Mexico:	168 : 1,139 :	311 : 1,554 :	1,131 : 344 :	1,570 : 769 :	3,908 : 650 :	4,081 68					
Hemisphere: Europe: Tudia	763 : 373 :	1,322 : 1,384 : 1,693 :	2,595 2,793	3,550 : 3,072 :	4,736 980 5 193	8,649 3,028					
Republic of : Korea: South Viet Nam-	2,502 : 100 :	ـــــــــــــــــــــــــــــــــــــ	: : : - 699	: 13,802 : 1 351 •	6,202 : 188	5,787					
Formosa: All other:	472 : 988 :	338 : 639 :	570 : 433 :	600 : 		2,365					
Total:	0,519 :	7,800 :	12,484 :	26,139 :	23,094 :	56,978					

Table 3.--Ammonium phosphate, fertilizer: U.S. exports of domestic merchandise, by principal markets, 1961-62 <u>1</u>/

1/ 1961-64 includes other nitrogenous-phosphatic type fertilizer material.

Source: Compiled from official statistics of the U.S. Department of Commerce.

AMMONIUM SILICOFLUORIDE

Commodity

TSUS item

Ammonium silicofluoride------ 417.36

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. consumption of ammonium silicofluoride is estimated to be approximately 3 million pounds annually. Exports are probably negligible. Imports amounted to 202,000 pounds, valued at \$23,000, in 1966. This chemical is of minor importance in international trade.

Comment

Ammonium silicofluoride, also called ammonium flurosilicate, is a white crystalline powder produced by neutralizing hydrofluosilicic acid with ammonia. It is employed principally as a laundry sour. It is also used as an insecticide, for the mothproofing of textiles, and in foundries to prevent oxidation of light metals cast in sand molds.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
417.36	Ammonium silicofluoride	10% ad val.	5% ad val.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. production of ammonium silicofluoride is by two large chemical fertilizer companies at plants in Maryland and Ohio. Statistics on production are not available, but the amount produced is believed to be between 2 and 4 million pounds annually. Export data are not separately classified; however, exports, if any, are probably negligible. There were no imports of ammonium silicofluoride in 1962 and 1963. U.S. imports by sources for 1961 and the years 1964-66 are shown in the accompanying table.

Facilities for the production of ammonium silicofluoride exist in Denmark, the Netherlands, West Germany, the United Kingdom, Japan, and other highly industrialized countries; however, production of this material is very small and international trade in this product is insignificant.

AMMONIUM SILICOFLUORIDE

······		_			
Source	: 1961	:.	1962	:	1963 1964 1965 1966
· · · · · · · · · · · · · · · · · · ·	:				Quantity (pounds)
West Cormony	:	:		:	
Netherlands	:5,000	:		:	
Total	:5,000	:		:	- : 55,012 :43,886 : 201,758
	•				Value
	:	:	e	:	· · · · · · · · ·
West Germany		;		:	- : \$5,895 :\$4,589 : \$23,087
Netherlands	•: <u>\$383</u>	:	-	:	<u> </u>
Total	: 383	:	-	:	- : 5,895 : 4,589 : 23,087 : : :
Source: Compiled f	rom of	ri	cial s	t	atistics of the U.S. Department

Ammonium silicofluoride: U.S. imports for consumption, by source, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

In recent years United States exports of ammonium sulfate have increased threefold and, in 1966, amounted to 1.6 million short tons; at the same time imports decreased about one-third and, in 1966, amounted to 160,000 short tons. Exports in 1966 accounted for more than half of United States production and consisted largely of AID shipments.

Description and uses

Although ammonium sulfate is provided for by name under item 417.38, if it is an importation of a grade chiefly used for fertilizer or chiefly as an ingredient in the manufacture of fertilizer, it is included under item 480.65 since the use provision prevails over the eo nomine (by name) designation. The chief use of an article, as defined in General Headnote 10(e)(i) of the tariff schedules, is the use which exceeds all other uses combined. Practically all imports of ammonium sulfate have been of "fertilizer" grade. This summary discusses all ammonium sulfate whether or not of a grade chiefly used for fertilizer or as a fertilizer ingredient.

Ammonium sulfate is a highly soluble salt, and when pure, is a white crystalline material containing 21.2 percent nitrogen. The commercial salt varies in color from white to grayish tan and contains 20.5 to 21.0 percent nitrogen. It is produced mainly by the direct reaction of atmospheric ammonia with sulfuric acid, but is also obtained as a byproduct of other industrial processes, principally by the reaction of the ammonia-containing effluent from coke plants with sulfuric acid.

The major use of ammonium sulfate is as fertilizer or as an ingredient in the manufacture of fertilizer. The continued use of ammonia sulfate as a fertilizer in the United States, despite the trend to higher analysis nitrogenous fertilizers, is attributed partly to the growing awareness in certain areas of the country, especially in the Pacific States, of the need for sulfur in a balanced plant food. January 1968

125

The nitrogen content of ammonium-sulfate fertilizer is about 20.6 percent compared with 80.2 percent nitrogen in anhydrous ammonia, 45 percent in urea, and 33.5 percent in ammonium nitrate. Non-fertilizer uses include water treatment, fermentation, fireproofing, and tanning.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
417.38 480.65	Ammonium sulfate Nitrogenous fertilizer and fertilizer	8.5% ad val.	4% ad val.
	material: Ammonium sulfate	Free	Free 1/

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

The rate effective January 1, 1972, for ammonium sulfate of a grade not chiefly used for fertilizer nor in the manufacture of fertilizer, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The duty-free treatment of ammonium sulfate of a grade chiefly used for fertilizer or in the manufacture of fertilizer was provided for in the Tariff Act of 1930 and in the TSUS, effective August 31, 1963, and has been bound since January 1, 1948, as a concession granted by the United States in the GATT.

U.S. consumption and production

During 1961-66 total apparent consumption of ammonium sulfate in the United States fluctuated between 1.4 million short tons in 1962 and 2.0 million short tons in 1964. Consumption decreased in both 1965 and 1966. It is estimated that ammonium sulfate used for fertilizer purposes accounted for about 95 percent of consumption during the period.

AMMONIUM SULFATE

Total annual production of ammonium sulfate in the United States increased in each year during the period 1961-66, and in 1966 totaled nearly 2.9 million tons (table 1). The output of byproduct ammonium sulfate from coke-oven plants has not increased as rapidly as that from other manufacturing processes which include ammonium sulfate produced by direct manufacture as well as that which is a byproduct of caprolactam plants (table 2).

U.S. producers

In 1965, ammonium sulfate was produced at 75 plants in the United States. Byproduct material from coke-oven plants, largely connected with the iron and steel industry, was made and sold by 49 plants located in about 18 States. Other byproduct material and that manufactured directly from atmospheric ammonia and sulfuric acid was produced in 26 plants located in 11 States, with 8 in Texas and 7 of the plants in California.

U.S. exports and imports

Exports of fertilizer ammonium sulfate amounted to about 150,000 tons in 1961; 500,000 tons annually from 1962-64; and then increased to over 900,000 tons in 1965 and 1.6 million in 1966 (table 3) when they accounted for 56 percent of U.S. production. Shipments under the AID program of the U.S. Department of State have accounted for a significant part of the U.S. exports. Countries participating in this program received 79 percent of the ammonium sulfate exported in 1966. Exports of ammonium sulfate for other than fertilizer uses are not separately classified but are believed to be nil.

In 1961-66 imports of ammonium sulfate accounted for about 10 to 15 percent of U.S. consumption. Imports amounted to about 240,000 short tons annually in 1961-62 and declined in each succeeding year to 160,000 short tons in 1966 (table 1). Virtually all imports were for fertilizer use. Canada was the major source of such imports in each of these years (table 4) and in 1966 accounted for more than 97 percent.

Foreign production and trade

The world production of ammonium sulfate for the year ended June 30, 1963, is estimated at 14 million short tons. The major use of this material is as fertilizer; therefore, world statistics are customarily given for crop years rather than calendar years. The major producing countries in the year ended June 30, 1964, were Japan, the United States, the U.S.S.R., Italy, the United Kingdom, East Germany, West Germany, Spain, India, France, and Belgium.

World trade in fertilizer ammonium sulfate totaled about 5.3 million tons in the year ended June 30, 1964, and accounted for over 30 percent of world exports of all nitrogenous fertilizer in terms of contained nitrogen. Japan, West Germany, and Italy were the major exporting countries and supplied nearly half the exported material (table 5). The U.S.S.R. was the fourth largest exporter, with the United States fifth. Table 1.--Ammonium sulfate: U.S. production, imports for consumption,

	(In short tons)								
Year :1	Production	: :Imports :	::	Exports	::	Apparent con- sumption	:1 : :	Ratio (percent) of imports to consumption	
: 1961: 1962: 1963: 1964: 1965: 1966:	1,545,439 1,607,467 1,823,137 2,306,050 2,706,588 2,872,714	: 242,866 : 240,998 : 234,507 : 207,964 : 180,904 : 159,862	• • • • • •	144,450 538,514 490,349 483,784 961,601 1,610,059	: : : : : : : : : : : : : : : : : : : :	1,643,855 1,399,951 1,567,295 2,030,230 1,925,891 1,422,517	•	14.8 17.2 15.0 10.2 9.4 11.2	

exports of domestic merchandise, and apparent consumption, 1961-66

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Agriculture.

Table 2.--Ammonium sulfate: U.S. production, by processes, 1961-66

(In short tons)								
Year	:As : : c	a byprod- uct of coke ovens	::	Other processes	:	Total		
1961 1962 1963 1964 1965 1966		623,504 594,955 620,821 679,869 708,923 746,486	• • • • • • • • •	921,935 1,102,512 1,202,316 1,626,181 1,997,665 2,126,228	• • • • • •	1,545,439 1,697,467 1,823,137 2,306,050 2,706,588 2,872,714		

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce.

Market	1961	1962	1963	1964	1965	1966		
:		Quant	ity (1,000	ty (1,000 short tons)				
:	•	- /	:		•	•		
Mexico:	5:	<u>1</u> /	: 6:	11	: 32	: 52		
Canada:	2:	2 :	: 3:	6	: 11	: 14		
Other Western :	:	. :	: :		:	:		
Hemisphere:	40 :	11 :	: 30 :	116	: 130	: 112		
India:	- :	226 :	: 250 :	260	: 639	: 860		
Pakistan:	1/ :	- :	66 :	_	: 22	: 406		
South Viet-Nam:	⁻ 26 :	56 :	100 :	31	: 9	: 7		
South Korea:	69 :	192 :	- :	. 19	: 2/	: -		
All other:	2 :	52 :	: 35 :	41	: 119	: 159		
.Total:	144 :	539	490 :	484	: 962	: 1,610		
:		Val	Lue (1,000) dollars) .	-		
				•••••••	•	•		
Mexico:	246	וו	151 :	130	. 1.247			
Canada:	100 .	104		573 273	. 358	·		
Other Western :	100 :	. 104		245	: 570	: ->>		
Hemisphere:	1,198 :	333	810 :	4,905	: 4.890	. 3.835		
India:	- :	6.241	7.627 :	8,261	: 27,251	:41.621		
Pakistan:	3/ :	-	2.708 :		: 1.247	:14.296		
South Viet-Nam:	970 :	1.768	3.961 :	1,598	: 545	: 263		
South Korea:	2.508	6.899		861	: 21	: _		
All other:	31 :	1,224	822 :	1,174	· <u><u><u></u></u>,005</u>	: 5.839		
Total:	5.053 :	16,580	16.196 :	17,481	: 39,543	:68,306		
	;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	,,			:	:		

Table 3.--Ammonium sulfate for fertilizer: U.S. exports of domestic merchandise, by principal markets, 1961-66

 $\frac{1}{2}$ Less than 500 tons. $\frac{2}{2}$ Included in all other. $\frac{3}{2}$ Less than \$500.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Source	1961	:	1962	:	1963	:	1964	:	1965	:	1966
			Quanti	lt	y (1,000) (short to	on	в)		
.:		:		:		:		:		:	
Canada:	143	:	153	;	159	:	188	:	173	:	156
West Germany:	20	:	63	:	44	:	18	:	· 2	:	2
Trinidad:	-	:	-	:		:	-	:	2	:	2
All other:	80	:	25	:	32	:	2	:	4	:	1/
Total:	243	;	241	;	235	:	208	:	181	:	160
:			٦	/a	lue (1,0	00	0 dolla	rs)	-	
		:		:		:		:		:	
Canada:	\$5,132	:	\$4,457	:	\$3,900	:	\$4,230	:	\$5,617	:	\$5,128
West Germany:	522	:	1,632	:	1,212	:	498	:	56	:	61
Trinidad:	-	:	_	:	· •	:	_	:	53	:	57
All other:	2,505	:	692	:	876	:	28	:	94	:	. 1
Total:	8,159	:	6,781	:	5,988	:	4,756	:	5,820	:	5,247
		:		:		:	· <u>·</u>	:		:	

Table 4.--Ammonium sulfate for fertilizer: U.S. imports for consumption, by principal sources, 1961-66

1/ Less than 500 tons.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 5.--Ammonium sulfate: Exports of major exporting countries by areas of destination, year ended June 30, 1964

Destination	Japan	: I	taly	:	West Germany	:	Soviet	Unior
		<u>:</u>		:		:		
North America:	1/	:	-	:	30	:		-
Central South America:	ī/	:	-	:	242	:		206
West Europe:	ī/	:	366	:	298	:		-
East Europe:	ī/	:	50	:	-	:		22
Asia:	605	:	281	:	108	:		164
Africa:	i/	:	157	:	174	:		26
Oceania:	ī/	:	-	:	3	:		-
Undistributed:	451	:	26	:	-	:		34
Total:	1,056	:	880	:	855	:		452
•		:		:		:		

(In thousands of short tons)

1/ Area destination not available but major recipients include Australia, South Africa, and Mexico.

Source: Compiled from statistics of The British Sulphur Corp., Ltd., and the Food and Agriculture Organization of the United Nations.

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	TSUS
Commodity	item

Ammonium compounds not elsewhere enumerated--- 417.44

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Domestic consumption is estimated to be in the range of \$8 to \$15 million. Exports are believed to be small. Imports in 1966 amounted to 4.8 million pounds, valued at \$562,000, up from 3.2 million pounds, valued at \$330,000, in 1965.

Comment

This summary covers some 110 to 115 miscellaneous inorganic ammonium compounds of minor industrial importance not specially provided for in the TSUS. The ammonium compounds specially provided for in the TSUS are included in summaries on items 417.20-.42, inclusive, and the appropriate parts of items 480.65 and 480.80. Examples of the compounds covered here are: ammonium bifluoride, used in wood preservation; ammonium persulfate, a bleaching agent; ammonium sulfide, employed in coloring brasses and bronzes; and zinc ammonium chloride, used in soldering flux.

The compounds under consideration are produced by about 25 chemical companies of varying size, both for sale and for their own use in the production of other chemical compounds and products. The large chemical companies usually produce several of these compounds, the production of which amounts to a small part of their total output of chemical compounds and products. The medium and small companies generally produce a single compound or in a few cases two or three of the compounds, the production of which usually represents a substantial part of their total output. The majority of the producing plants are located east of the Mississippi River, with Michigan, New Jersey, New York, and Pennsylvania accounting for about two-thirds of the total. The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
417.44	Ammonium compounds not elsewhere enumerated.	8.5% ad val.	4% ad val.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

The compounds under consideration were first separately provided for under the TSUS effective August 31, 1963. The accompanying table shows imports by country for 1964-66. In 1966, 4.8 million pounds, valued at \$562,000, was imported, chiefly from the Netherlands, Belgium, and West Germany. The bulk of the 1966 imports consisted of ammonium bifluoride from West Germany, ammonium persulfate from the Netherlands, and zinc ammonium chloride from Belgium and West Germany.

Official statistics on the production and exports of the compounds under consideration are not reported; however, it is estimated that domestic consumption currently is between \$8 and \$15 million. Domestic production is believed to be substantially greater than imports.

11344

AMMONIUM COMPOUNDS NOT ELSEWHERE ENUMERATED

Source	1964	:]	1965	1966
	Quantit	у ((1,000 :	pounds)
Netherlands Belgium West Germany United Kingdom	715 1,509 312 83 11 110 <u>46</u> 2,786 Val	: : : : : : ue	818 : 1,695 : 468 : 50 : - : 105 : 77 : 3,213 : (1,000	1,240 2,255 613 142 265 87 <u>172</u> 4,774 dollars)
Netherlands Belgium West Germany United Kingdom Japan Italy All other	96 96 59 25 1 18	:	: 107 : 111 : 78 : 8 : - : 18 : 8 :	193 157 83 45 28 13 43
Total	302	:	330 :	562

Ammonium compounds not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1964-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

1.35

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ANTIMONY COMPOUNDS

Commodity

 $\frac{\text{TSUS}}{\text{item}}$

Antimony compounds:	
Oxide	417.50
Sulfide	417.52
Other	417.54

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Both production and imports of antimony compounds increased sharply between 1961 and 1966. During this period, production rose from 11 million to 18 million pounds per year (estimated), and imports increased from 5 million to 11 million pounds per year. Exports are believed to be less than 500,000 pounds annually.

Description and uses

This summary pertains to antimony oxide, antimony sulfide, and 15 to 20 other inorganic antimony compounds not elsewhere enumerated in the TSUS. The most important chemical considered here is antimony oxide, the most common form of which is the trioxide, a white powder formed when antimony burns. It is used chiefly for fireproofing fabrics and plastics, in porcelain enamels and glass, and in preparing other antimony compounds. There are two antimony sulfides, the trisulfide and the pentasulfide; these have important uses in vulcanizing and coloring rubber, and in the manufacture of safety matches, percussion caps, and fireworks. The other inorganic antimony compounds (item 417.54), such as the bromide, chloride, fluoride, and iodide, are used in ceramics, glass, medicine, flameproofing of fabrics and plastics, as mordants in dyeing, and in the manufacture of color lakes, pharmaceuticals, explosives, and antimony compounds, as well as in the chlorination and fluorination of certain organic compounds.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
•	Antimony compounds:		
417.50	Oxide	0.6¢ per 1b.	0.3¢ per 1b. 1/
417.52	Sulfide	0.5¢ per lb. + 12.5% ad val.	0.25¢ per lb. + 6% ad val.
417.54	0ther	0.8¢ per lb. + 20% ad val.	0.4¢ per lb. + 10% ad val.

1/ This rate, as well as those for 1970 and 1971, is contingent; see footnote 1 to Staged Rates and Historical Notes to Pt. 2 of schedule 4 of the TSUSA-1968, as shown in appendix A to this volume.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalents of the specific or combined rates of duty in effect prior to January 1, 1968, based on imports in 1966, on antimony oxide, antimony sulfide, and other antimony compounds, were 1.6, 13.9, and 20.2 percent, respectively.

U.S. consumption

U.S. consumption of antimony oxide, estimated to be about 13 million pounds in 1961, increased to about 26 million pounds in 1966. Consumption of antimony sulfide, estimated to be 100,000 pounds in 1961, increased to about 220,000 pounds in 1966. The consumption of the other inorganic antimony compounds is estimated to be not more than 200,000 pounds annually.

Increased use of inorganic antimony compounds in flameproofing products has been the main factor in the growth of consumption of these compounds.

U.S. producers

Inorganic antimony compounds are produced in the United States, chiefly from imported raw materials (antimony ore, item 601.03) by both large and small concerns whose output of these products represents a small portion of their annual total production of chemicals and chemical products. Antimony oxide is produced by about six companies with one plant in Ohio and the rest in New Jersey. Antimony sulfide is produced by about four companies with plants in New Jersey, Ohio, and Pennsylvania. The remaining inorganic antimony compounds are produced by about 10 companies with plants in Missouri, New Jersey, New York, Ohio, and Pennsylvania. The usual practice is for one company to make no more than a few of such antimony compounds. It is not uncommon for one compound to be the only antimony compound produced by a company and in no case does one company make them all.

U.S. production

Domestic production of antimony oxide, estimated to be 11 million pounds in 1961, increased to an estimated 18 million pounds in 1966. Production of antimony sulfide, estimated to be 228,000 pounds in 1961, increased to an estimated 342,000 pounds in 1966. The production of the other inorganic antimony compounds is estimated to be not more than 300,000 pounds annually. The value of shipments of antimony compounds was reported as \$3.4 million in 1961 and \$7.1 million in 1966.

U.S. exports and imports

Domestic exports of inorganic antimony compounds are not separately reported in official statistics; however, it is estimated that exports are less than 500,000 pounds annually. Imports of inorganic antimony compounds, shown in the accompanying table, increased from 4.7 million pounds, valued at \$1 million, in 1961 to 10.8 million pounds, valued at \$4.1 million, in 1966. Antimony oxide accounted for the bulk of the imports, 80 percent or more annually. Belgium and the United Kingdom have been the chief suppliers, with West Germany and France prominent secondary sources. Imports of antimony sulfide have been small, with Sweden being the only consistent supplier. Imports of the remaining inorganic compounds increased through 1964 followed by decreases in 1965 and 1966, with West Germany and the United Kingdom being the dominant suppliers.

World production and trade

Economic deposits of antimony ore, the raw material from which inorganic antimony compounds are derived, are widely distributed. In 1966, mainland China was the chief producer, followed closely by the Republic of South Africa and Bolivia. Other important producers include the U.S.S.R., Mexico, and Yugoslavia. Countries without adequate antimony ore deposits, such as the United States, the United Kingdom, and West Germany, have to obtain their ore supplies elsewhere. This results in considerable international trade in both antimony ore and antimony oxide.

ANTIMONY COMPOUNDS

Antimony compounds: U.S. imports for consumption, 1961-66

Year	Quantity	• Value
	: <u>1,000</u> : pounds	: <u>1,000</u> : <u>dollars</u>
1961 1962 1963 1964 1965 1966	4,707 6,680 5,230 7,807 4,625 10,809	: 1,018 1,503 1,202 3,388 2,013 4,133
	8	:

Source: Compiled from official statistics of the U.S. Department of Commerce.

ARSENIC COMPOUNDS

	TSUS
Commodity	item

Arsenic	acid	416.05
Arsenic	sulfide	417.60
Arsenic	trioxide	417.62
Other ar	senic compounds	417.64

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. output of the arsenic compounds listed above has varied between 20 to 25 million pounds in recent years and is believed to have supplied about half of U.S. consumption. There probably have been no exports.

Comment

Arsenic trioxide, the most common compound of arsenic, in commerce is frequently called white arsenic. It is a highly poisonous, white, amorphous powder, and is produced as a byproduct of copper smelting. Its main use is in the production of other arsenic compounds, including arsenic acid and arsenic sulfide. It is also used, however, in wood preservatives, lead shot, and glass, and for weed control. Calcium arsenate, arsenic acid, lead arsenate, and sodium arsenate are, in that order, the principal outlets for arsenic trioxide.

Arsenic acid, a poisonous, white, translucent, crystalline compound, is also used as an intermediate, but finds major application as a defoliant for cotton plants. It is also used in glass making.

Arsenic sulfide occurs as both the pentasulfide and the trisulfide. The former is a yellow-to-orange powder, and is used as a paint pigment. The trisulfide appears as a yellowish powder or crystals, and is also used as a paint pigment as well as in special types of glass. Both forms are poisonous, and both are of relatively minor commercial importance.

Of the other inorganic arsenic compounds, calcium arsenates and lead arsenates are used as insecticides. Because the cotton boll weevil has developed a resistance to chlorinated organic insecticides, calcium arsenate is regaining much of its former market lost to these chlorinated products. The use of lead arsenate in apple orchards, however, continues to decline. Sodium arsenate is used to control weeds along highways and railroad right-of-ways.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
1tem		Jan. 1, 1968	Jan. 1, 1972
416.05	Arsenic acid	3¢ per 1b.	1.5¢ per lb.
417.60	Arsenic sulfide	Free	Free <u>l</u> /
417.62	Arsenic trioxide	Free	Free <u>l</u> /
417.04	elsewhere enumerated	10% ad val.	5% ad val.

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

The rates effective January 1, 1972, on arsenic acid and arsenic compounds not elsewhere enumerated represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

The duty-free status on arsenic sulfide and arsenic trioxide was provided for in the Tariff Act of 1930 and in the TSUS, effective August 31, 1963, and on arsenic sulfide has been bound since January 1, 1948, as a concession granted by the United States in the GATT. The duty-free rate on arsenic trioxide has not been bound.

Until mid-1965, arsenic trioxide was produced by two copper smelting companies in Montana and Washington, as a byproduct from their metal processing. The smelter located in Montana discontinued production of arsenic trioxide in mid-1965. U.S. output statistics are not available, but it is believed that annual production has ranged from 20 to 25 million pounds in recent years. There are no data available on output of the other arsenic compounds included in this summary, but, since most of them are derived from arsenic trioxide, the above production estimate is believed to be indicative of the total production of the four tariff items covered.

ARSENIC COMPOUNDS

Exports are not separately classified but are believed to be nil. Imports of the inorganic arsenic compounds included in this summary in the period 1961-66 ranged from 29 million pounds to 39 million pounds, and in 1966 totaled 37 million pounds. The imports, nearly all arsenic trioxide, originated mainly in Mexico, with smaller amounts coming from France and Sweden (see accompanying table). Imports of arsenic sulfide from 1961 through 1966, nearly all from Belgium, ranged from 36,000 pounds to 92,000 pounds and amounted to 61,000 pounds, valued at \$5,000, in 1966.

Free world production of arsenic trioxide (white arsenic) was reported in 1966 in more than 13 countries and totaled over 132 million pounds. The major producing countries were Sweden, Mexico, and France, in addition to the United States. Smaller producing countries include Portugal, Peru, Brazil, Japan, and Southern Rhodesia. .

Source	1961	1962	:	1963	:	1964	:	1965	:	1966
		Quantity (1,000 pounds)								
Mexico France Sweden U.S.S.R Canada All other Total	28,116 8,376 2,084 384 7 38,967	: 21,870 : 8,006 : 1,608 : - : - : 31 : 31,516	: : : : : : : : : : : : : : : : : : : :	21,282 4,231 3,600 - 5 - 29,118		23,720 6,860 5,694 26 70 		20,575 6,893 3,383 198 - 31,049	•	23,657 8,629 5,051 - - - 37,350
:	Value (1,000 dollars)									
Mexico:	1,068	: : 799	:	812	:	938	:	889	:	945
Sweden:	205	: 221	:	116	:	209	:	136	:	201
U.S.S.R:	-	: -	:		:	1	:	8	:	
Canada:	12	: -	:	<u>1</u> /	:	4	:	-	:	-
All other:	4	$\frac{1}{1077}$	<u>:</u>		:	-	:		:	1 1.00
TOTAL	⊥,422	: 1,0//	:	1,059	:	1,303	:	1,2(1	:	⊥,477

Arsenic trioxide (arsenous acid) (white arsenic): U.S. imports for consumption, by principal sources, 1961-66

1/ Less than \$500.

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Source: Compiled from official statistics of the U.S. Department of Commerce.

GENERAL STATEMENT ON INORGANIC BARIUM COMPOUNDS

The following eight summaries cover the two naturally occurring barium minerals (items 472.02-.04 and 472.10-.12 of the Tariff Schedules of the United States), as well as the inorganic barium compounds derived from them (items 417.70-.80, 472.06, and 472.14). The barium sulfate mineral, barite (barytes), occurs far more widely than the barium carbonate mineral, witherite.

In addition to serving as raw materials for the production of barium chemicals, both of the minerals enter commerce in ground as well as in crude form. Some grades of the barium sulfate and carbonate minerals are of sufficient purity to be directly competitive with the corresponding chemically prepared (precipitated) products. Two of the barium compounds provided for by name in the TSUS, the nitrate and the dioxide, are of very minor commercial importance.

In the United States, barite is mined by 16 companies, most of which also make the ground material. Witherite is not mined in the United States. At least 12 companies manufacture the various barium chemicals but all but two of them purchase barite for use as a raw material. One of the barium chemical producers makes only barium chloride and consumes it captively, i.e., in its own operations; all of the other companies produce many barium chemicals, in addition to certain byproducts, in the same plant.

The total supply of barite (crude natural barium sulfate) in the United States in 1966 amounted to 1.65 million short tons, of which 947,000 short tons was produced domestically and 699,000 tons, imported. In 1966, 85 percent of the natural barite produced was consumed in mixtures, with clay, water, and other substances (drilling muds), for use in drilling for minerals, principally petroleum. The remaining 15 percent was used mainly to produce various barium chemicals, including barium sulfate, carbonate, oxide, hydroxide, chloride, nitrate, and dioxide.

The flow-chart on the following page illustrates the relationship between the raw materials, intermediate products, and the various more advanced barium compounds.

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Flow-chart showing the relationship of barium mineral raw materials and the major barium chemicals manufactured from them,

	TSUS
Commodity	item

Barium chloride----- 417.70

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Barium chloride is one of the major barium chemicals produced from barite, and appreciable quantities enter international trade. U.S. annual output for the past several years has been valued at slightly less than \$2 million. Imports have averaged about 10 percent of consumption; exports, if any, are not reported separately.

Description and uses

Barium chloride, a water-soluble, white, crystalline, poisonous compound, is produced in two commercial grades--crystalline and anhydrous. It is produced principally from the mineral barite (items 472.10-.12); smaller quantities are produced from witherite (items 472.02-.04).

The main use of anhydrous barium chloride is as an ingredient in case hardening baths for steel. The more important uses of crystalline barium chloride are as a raw material in the manufacture of organic chemicals, photographic paper, and lubricating oil additives; as a flux in the manufacture of magnesium metal; and as a laboratory reagent.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate	prior to	Rate effective
item	Commodity	Jan.	1, 1968	Jan. 1, 1972
417.70	Barium chloride	1.6¢	per lb.	$0.8 \notin$ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for

the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 31 percent.

U.S. consumption, production, and foreign trade

Consumption and production of barium chloride generally have been increasing slightly each year since 1961. In 1966, they totaled 13,600 and 12,400 short tons, respectively (see accompanying table). U.S. production of barium chloride during 1961-66 amounted to nearly \$2 million annually. Four concerns reported output of barium chloride in 1965 from plants located in Georgia, Louisiana, New Jersey, and West Virginia. One of the producers is a large diversified chemical and industrial corporation; one is a petroleum company that consumes all its own production; and the other two producers are small chemical companies, one diversified, and the other, limited to various barium chemicals and related byproducts.

Imports of barium chloride remained fairly stable during the period 1961-65, averaging about 1,000 tons per year; they originated mainly in France and West Germany. Exports are not separately classified but are believed to have been small or negligible.

Barium chloride is made in several countries, notably France, Germany, the United Kingdom, Italy, Belgium, and the Netherlands, but no statistical data on their output are available.

BARIUM CHLORIDE

Barium chloride: U.S. production, imports for consumption, and apparent consumption, 1961-66

Year	Production	Imports	Apparent consumption	Ratio (percent) imports to consumption
: 1961: 1962: 1963: 1964: 1965: 1966:	10,891 : 10,888 : 11,100 : 11,425 : 11,214 : 12,373 :	1,019 1,150 1,152 1,133 890 1,237	11,910 12,038 12,252 12,558 12,104 13,610	9 10 9 9 7 7

(Quantity in short tons)

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce.

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Commodity Item

Barium dioxide----- 417.72

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Barium dioxide, the U.S. production of which in 1966 is estimated at no more than 100 tons, is one of the less important barium chemicals. Because it is a dangerous cargo, international trade is not substantial. U.S. trade with foreign countries has been negligible for many years.

Description and uses

Barium dioxide (peroxide), a poisonous, grayish-white powder, is a strong oxidizing agent. Barite is the raw material for the manufacture of barium dioxide. It is used principally as an ingredient of explosives, pyrotechnics, tracer bullets, as an oxidant in metal purification, as a starch modifier for adhesives and paper sizing, in welding, glass manufacture, textile dyeing, printing, and bleaching.

U.S. tariff treatment

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The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
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417.72 Barium dioxide----- 4.8¢ per lb. 2.4¢ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, was not representative as imports have been negligible in recent years.

U.S. production and trade

Production of barium dioxide in the United States is believed to have been fairly stable in recent years and output in 1966 is estimated at slightly less than 100 tons. Barium dioxide was produced in 1965 by two companies in plants located in California and Ohio. One company is a large, diversified industrial chemical corporation, while the other is a small concern producing mainly barium chemicals. Exports are not separately classified but are believed to be nil. Except in 1959, there have been no imports of barium dioxide for many years. In 1959, 2 tons, valued at \$631, were imported from the United Kingdom.

Although no statistical data are available, it is believed that barium dioxide is made in several countries.

Commodity	item

TSUS

Barium hydroxide----- 417.74

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Although barium hydroxide is one of the major barium chemicals produced from barite (item 472.10), it is not an important commodity in international trade. U.S. output generally has been increasing for the past several years and in 1966 amounted to 30,000 short tons.

Description and uses

Barium hydroxide is a poisonous, white, crystalline, watersoluble compound. It is produced principally from naturally occurring barium sulfate (item 472.10), with smaller quantities made from natural barium carbonate (item 472.02). The principal uses of barium hydroxide are as an ingredient in high-temperature oil and grease and in barium soaps, a descumming agent in ceramic and brick manufacture, a depilatory, water sof ener, and carbonizing agent for steel, and as an intermediate in the production of certain other barium compounds.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS 1tem		Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
417.74	Barium	hydroxide	1.25¢ per lb.	0.6¢ per 1b.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 13.9 percent.

U.S. production and trade

The U.S. output of barium hydroxide has been increasing since 1961 and in 1966 totaled 30,000 short tons (see accompanying table). The increased output resulted largely from its growing use in barium soaps and in oil and grease. For 1965, five concerns reported production from plants located in California, Colorado, Kansas, Ohio, and New Jersey. Two of the producers, large diversified corporations, consumed nearly all of their own output. Of the three remaining producers, one is a large industrial chemical concern, one is a small diversified chemical manufacturer, and the third is a small company whose business is limited mainly to barium chemicals.

In the period 1961-66, imports were negligible, and amounted to only 11 tons, all from West Germany, in 1966. Exports of barium hydroxide are not separately classified and are believed to have also been negligible. It is believed that barium hydroxide is made in several foreign countries.

BARIUM HYDROXIDE

(Quantity in short tons)							
Year	Production :	Imports	Apparent consumption	Ratio (percent) imports to consumption			
:	1	:		:			
1961:	13,715 :	11 :	13,726	: .08			
1962:	16,328 :	11 :	16,339	: .07			
1963:	18,746 :	- :	18,746	: –			
1964:	23,384 :	5:	23,389	.02			
1965:	30,211 :	5:	30,216	: .02			
1966:	29,604 :	11 :	29,615	: .04			
:	:	:	-	:			

Barium hydroxide: U.S. production, imports for consumption, and apparent consumption, 1961-66

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce.

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157

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BARIUM NITRATE

Commodity Item

Barium nitrate----- 1,17.76

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Barium nitrate is one of the less important barium chemicals and is not an important commodity in international trade. The U.S. output in 1966 is estimated to have been equivalent to about 50 percent of imports which totaled 1,000 short tons.

Description and uses

Barium nitrate is a poisonous, white, crystalline, water-soluble compound that burns with a brilliant green flame. It is used principally in pyrotechnics (fireworks and flares); smaller quantities are used in ceramic glazes and primers and in detonators for explosives. Barium nitrate is made chiefly by the reaction of barium carbonate, barium oxide, or barium hydroxide, with nitric acid and subsequent crystallization.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate p	prior to	Rate	effective
item	Commodity	Jan. 1	, 1968	Jan.	1, 1972
417.76	Barium nitrate	l¢ per	· lb.	0.5¢	per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports in 1966, was 11.6 percent.

U.S. production and trade

The last year in which production statistics for barium nitrate were published was 1958 when 394 tons were reported. Production of barium nitrate for the period 1959-66 is believed to have ranged from 300 to 600 tons annually. Output in 1965 was reported by one large and one medium-sized diversified chemical companies at plants located in New Jersey, and by one small concern in Ohio producing mainly barium chemicals.

Exports are not separately classified but are believed to be small. Imports, during the period 1961-66, ranged from 568 tons to 1,004 tons and were chiefly from West Germany (see accompanying table). The U.S.S.R. has been the second most important supplier in most recent years. In addition to the countries making shipments to the United States, several other foreign countries also produce barium nitrate.

BARIUM NITRATE

Source	1961	:	1962	:	1963	:	1964	:	1965.	:	1966
	:		Quant	;i	ty (sł	10:	rt tor	18)		
	:	:		:		:	·	:		:	
West Germany	: 730	:	758	:	490	:	367	:	445	:	674
U.S.S.R	: 77	:	33	:	207	:	150	:	92	:	223
Netherlands	: -	:	-	:	245	:	35	:	18	:	20
East Germany	: -	:	-	:		:	45	:	-	:	2
All other	:	:	16	:	6	:	3	:	13	:	85
Total	: 807	:	807	:	948	:	600	:	568	:1	L,004
	:		Val	Lue	e (1,0	00	0 doll	.a.ı	·s)		
	•	:		:		:		:		:	
West Germany	: 118	:	120	:	78	:	58	:	67	:	116
U.S.S.R	: 10	:	3	:	28	:	19	:	12	:	36
Netherlands	: -	:	-	:	39	:	5	:	3	•	3
East Germany	: -	:	-	:	-	:	7	:	-	:	1/
All other	:	:	2	:	. 1	:	1/	:	2	:	<u> </u>
Total	: 128	:	125	:	2/145	:	<u>2</u> /90	:	84	:	170.

Barium nitrate: U.S. imports, by principal sources, 1961-66

1/ Less than \$500.

 $\overline{2}$ / Figures do not add to totals shown because of rounding.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Com	nodity	<u>1505</u> item

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Barium oxide----- 417.78

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

Barium oxide, which is not an important item of international trade, is largely consumed by the producers in the manufacture of other barium chemicals. U.S. consumption in 1966 is estimated at 30,000 tons, all supplied by domestic production.

Description and uses

Barium oxide is a white, crystalline, highly hygroscopic, poisonous material that is readily converted to barium hydroxide and barium carbonate upon exposure to air, generating large quantities of heat and creating a dangerous fire hazard. Barium oxide usually is made by heating a mixture of barium carbonate and carbon. The predominant use is as an intermediate in the production of other barium compounds-mainly barium dioxide and hydroxide. Small quantities are used as ingredients in the manufacture of glass, enamel, ceramics, water softeners, greases, plastics, and as a dehydrating agent.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
item		Jan. 1, 1968	Jan. 1, 1972
417.78	Barium oxide	2¢ per lb.	l¢ per lb.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, is not representative as the imports have been negligible in recent years.

U.S. production and trade

U.S. production is estimated to have totaled about 30,000 short tons in 1966 and was by two companies at plants situated in California and Ohio. Most of the production was consumed by the producers themselves in the manufacture of other barium compounds.

Exports, if any, are not separately reported in official statistics. Imports of barium oxide have been nearly nonexistent. In each of the years 1959 and 1960, 6.5 tons were received from the United Kingdom; in 1966, 1 ton was received from Japan. There have been no imports in any other recent year.

Although statistical data are not available, it is probable that barium oxide is made in several of the major barite-producing countries other than the United States.

Commodity

TSUS item

Barium carbonate, natural, crude----- 472.02 Barium carbonate, natural, ground----- 472.04 Barium carbonate, precipitated----- 472.06

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United Kingdom is the only known producer of crude natural barium carbonate. In the United States, ground natural barium carbonate is made entirely from imported crude natural material and amounted to about 2,000 tons in 1966. The U.S. output of precipitated barium carbonate, one of the most important barium chemicals, amounted to 94,000 tons in 1966, and supplied all but about 1 percent of domestic consumption of precipitated barium carbonate.

Description and uses

Natural barium carbonate occurs as witherite, a brittle, white or yellow-white, dense, mineral. Precipitated barium carbonate is a chemically prepared product. Both the ground mineral and the precipitated product are dense, water-insoluble, white powders; their chemical composition is identical, but the latter appears in commerce as a much purer product. Small quantities of crude natural barium carbonate are used as a fluxing agent by the ceramics and glass industries, but the most of it is converted to the ground product, which, in turn, is used entirely as an intermediate in the production of other barium chemicals. The natural ground barium carbonate differs from the natural crude barium carbonate only in particle size. Precipitated barium carbonate is used principally as an intermediate in the production of other barium compounds (which use accounted for 35 percent of consumption of precipitated barium carbonate in 196h). It also is used as a purification medium to remove sulfates from aqueous solutions, as a flux in ceramics, as an ingredient in optical glass, and in the case-hardening of steel.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS item	Commodity	Rate prior to Jan. 1, 1968	Rate effective Jan. 1, 1972
472.02	Barium carbonate,	Free	Free <u>l</u> /
472.04	Barium carbonate, natural, ground.	12.5% ad val.	6% ad val.
472.06	Barium carbonate, precipitated.	1.2¢ per 1b.	0.6¢ per 1b.

1/ Rate not affected by the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade.

The duty-free treatment was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and has been bound since January 1, 1948, as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

The rates on ground natural barium carbonate and precipitated barium carbonate effective January 1, 1972, reflect the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the GATT. The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rate of duty in effect prior to January 1, 1968, based on imports of precipitated barium carbonate in 1966, was 37.1 percent.

U.S. consumption and production

There has been no commercial production of crude natural barium carbonate in the United States for many years; thus, total U.S. consumption has been supplied by imports. Statistics on imports of the crude indicate that the annual production of ground natural barium carbonate ranged between 1,400 and 2,500 tons during 1961-66. Consumption and production of precipitated barium carbonate was relatively stable during 1961-66 and amounted to 94,400 and 95,500 tons, respectively, in 1966 (table 1).

U.S. producers

There are no U.S. producers of crude natural barium carbonate, but there are two or three concerns that produce ground natural barium carbonate from imported crude material. These concerns have plants in the South and West. Nearly all this barium carbonate is consumed by the producers in producing other barium chemicals. In 1965, there were seven producers of precipitated barium carbonate, operating plants in California, Colorado, Georgia, Illinois, Kansas, New York, and West Virginia. Two producers are large diversified corporations, while the others, based on all operations, are considerably smaller.

U.S. foreign trade

Total U.S. exports of barium carbonate are not separately reported in official statistics. Official Canadian statistics, however, indicate that Canada imported 248 tons of barium carbonate from the United States in 1965.

Imports of crude natural barium carbonate, all from the United Kingdom, in 1961-66 ranged from 1,400 short tons in 1962 to 2,700 in 1963 and totaled 2,100 tons in 1966 (table 2). The 250 tons imported from Canada in 1965 are believed to have originated in the United Kingdom. Imports of the ground material ranged from 71 to 90 tons per year during 1961-63, amounted to 25 tons per year in 1964 and 1965, and increased to 90 tons in 1966 (table 3). During 1962-66, the United Kingdom was the principal source of ground natural barium carbonate. In 1961-66, imports of precipitated barium carbonate, which supplied about 1 percent of U.S. consumption in 1966, ranged from 826 short tons, valued at \$53,000, in 1965 to 1,501 short tons, valued at \$103,000, in 1962 (table 1). West Germany was the major source of the imports, with occasional shipments from Belgium, France, the United Kingdom, and Spain.

Crude natural barium carbonate (witherite) is produced only in the United Kingdom, but statistics on the production of witherite are not reported separately. There is small production of the ground material in several countries. Precipitated barium carbonate is produced in many of the major barite-producing countries, but no statistics on foreign production are available.

Year	Production	:	Imports	: :	Apparent : consumption: :	Ratio of imports to consumption
:	Short tons	:	Short tons	:	Short : tons :	Percent
1961:	78,665	:	1,190	:	79,855 :	1.5
1962	79,313	:	1,501	•	80,814 :	1.9
1963:	78,411	:	838	:	79,249 :	1.1
1964	81,018	:	1,041	:	82,059 :	1.3
1965	85,609	:	826	:	86,435 :	1.0
1966:	94,369	• • •	1,150	•	95,519 :	1.2

Table 1.--Barium carbonate, precipitated: U.S. production, imports for consumption, and apparent consumption, 1961-66

1/Includes 250 tons, valued at \$12,000, imported from Canada believed to have originated in the United Kingdom. Source: Compiled from official statistics of the U.S. Bureau of

Mines and the U.S. Department of Commerce.

Year	Quantity	Value
	Short tons	: 1,000 :dollars
: 1961:	1,706	: 67
1962	1,431	: : 59
1963:	2,690	: : 114
1964	2,407	: : 98
: 1965:	<u>1</u> / 2,569	: <u>1</u> / 112
1966	2,138	: : 100

Table 2..--Barium carbonate, natural, crude: U.S. imports for consumption from the United Kingdom, 1961-66

1/ Includes 250 tons, valued at \$12,000, imported from Canada believed to have originated in the Unived Kingdom.

Source: Compiled from official statistics of the U.S. Department of Commerce.

BARIUM CARBONATE

Year	Quantity	: Value
1	Short	1,000
1961:	88	22
1962:	71	5
: 1963:	9 0	6
1964	25	2
: 1965:	25	r r 2
1966:	9 0 s	8
source. Compiled from official statistics of the		t

Table 3.--Barium carbonate, natural ground: U.S. imports for consumption, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

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Commodity	item

TSUS

Barium sulfate, natural, crude---- 472.10 Barium sulfate, natural, ground-- 472.12 Barium sulfate, precipitated----- 472.14

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States, the world's largest producer and consumer of crude natural barium sulfate (barite), reported production in 1966 at 947,000 short tons, valued at \$11 million. U.S. imports, which supplied 40 to 55 percent of total domestic consumption of barium sulfate during 1961-66, amounted to nearly 700,000 short tons, valued at \$6 million, in 1966. About 1 million tons of the crude barium sulfate was converted annually during 1961-66 to the ground product. Probably less than 10,000 short tons of precipitated barium sulfate is produced annually. U.S. annual imports of the ground natural and the precipitated barium sulfate did not exceed 7,000 and 3,000 short tons, respectively, during 1961-66. U.S. exports of barium sulfate are not separately classified, but are believed to be small.

Description and uses

Natural barium sulfate occurs as the mineral barite, which in various localities is called barytes, tiff, cawk, or heavy spar. When pure, the mineral is white, but it does occur in all colors from white to black. Its most outstanding characteristic is its high density; the pure mineral has a specific gravity of 4.5.

Crude barite is recovered by both open pit and underground mining. In some deposits the mineral occurs as a relatively high-grade material that can be used directly. In other deposits, the ore must be beneficiated to obtain a commercial product.

Precipitated barium sulfate (blanc fixe) is a water-insoluble, fine, white powder. It is produced from natural barium sulfate by first converting the natural material to barium sulfide (black ash) and then oxidizing the sulfide back to barium sulfate. Small quantities of crude barite are used in the manufacture of lithopone (items 473.72-.74) and other barium compounds (items 417.70-.80), but the crude is principally used to produce the ground barite. The ground, in turn, is used mainly (about 90 percent) as a weighting agent in oil-well drilling muds. Other applications of ground barite are as an additive in glass melt fluxes; as a filler or extender in paint, ink, and rubber; and as an intermediate in the manufacture of other barium compounds. Precipitated barium sulfate is used primarily as a pigment extender in paints, and as a filler in linoleum, printing inks, and rubber. Smaller quantities are used as a filler in photographic paper and in roentgenography.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

15US	Commodity	Rate prior to	Rate effective
item		Jan. 1, 1968	Jan. 1, 1972
472.10	Barium sulfate,	\$2.55 per long	\$1.27 per long
	natural, crude.	ton l/	ton 1/
472.12	Barium sulfate,	\$6.50 per long	\$3.25 per long
	natural, ground.	ton 1/	ton 1/
472.14	Barium sulfate, precipitated.	0.625¢ per 1b.	$0.3 \notin per lb.$

1/ The rates of duty for natural barium sulfate are stated in the TSUS in terms of long tons; however, discussion in this summary is in terms of short tons inasmuch as the industry uses this unit of measure and available statistics are usually in short tons.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS. The ad valorem equivalent of the specific rates of duty in effect prior to January 1, 1968, based on imports in 1966 of crude natural barium sulfate, ground natural barium sulfate, and precipitated barium sulfate, were 27.6, 12.2, and 11.1 percent, respectively.
U.S. producers

In the United States, crude natural barium sulfate is mined principally in three areas--the southern, centered about northern Georgia and eastern Tennessee; the midwestern, in which Missouri and Arkansas are the major States; and the Pacific, comprised chiefly of central California and Nevada. In 1965, the midwestern area accounted for 68 percent of the output. About 35 concerns produced crude natural barium sulfate from 44 mines. Three of the producers are large diversified chemical corporations, and they accounted for over 50 percent of the output in 1965. The remaining producers are medium-to-small companies which derive a substantial part of their income from the mining and processing of crude natural barium sulfate.

Ground natural barium sulfate was manufactured in 1965 by 17 companies operating 33 plants located in 13 States as follows: California, 7; Missouri, 6; Texas, 4; Louisiana, 4; Arkansas, 3; Nevada, 2; and one each in Georgia, Illinois, Montana, New Mexico, South Carolina, Tennessee, and Utah. Thirteen of the producing companies obtain all or part of the crude material from their own mines and the balance from other domestic mines or imports. Three of the producers of ground material are large diversified chemical corporations and none of them obtain a major share of their income from the sale of ground natural barium sulfate. The other 13 producers are medium-to-small companies, and for some of them the sale of natural ground barium sulfate is an important source of income.

The production of precipitated barium sulfate in 1965 was reported by four companies operating plants in California, Missouri, New Jersey, and West Virginia. All of the producing companies manufacture various other products and for none of them is precipitated barium sulfate a major source of income.

U.S. consumption, production, and exports

During the years 1961-66, U.S. consumption of barium sulfate (based on the supply of domestic crude and imported) ranged between about 1.4 and 1.7 million short tons annually (table 1). U.S. production of crude natural barium sulfate supplied from 54 to 59 percent of consumption during this period and fluctuated yearly between 797,000 short tons, valued at \$9 million, in 1961 and 947,000 short tons, valued at \$11 million, in 1966. The U.S. output of ground natural barium sulfate, produced from both domestic and imported crude material, amounted to slightly more than 1 million tons per year in 1961-66. U.S. production of precipitated barium sulfate, statistics for which are not published, is about 1 percent of the

January 1968 4:2 size of the natural produced and is estimated at 8,500 short tons for 1965. U.S. exports of barium sulfate, for which official statistics are not published, are believed to account for 1 percent of U.S. production.

U.S. imports

The U.S. imports of barium sulfate, predominantly crude natural material, in 1961-66, ranged from 579,000 short tons to 739,000 tons, and amounted to 702,000 tons in 1966 (table 1). Mexico, Canada, and Peru were the major sources of imports of the crude (table 2), and in 1966 accounted for 70 percent of these imports.

Imports of ground natural barium sulfate in 1961-66 ranged from a high of 6,968 tons in 1961 to a low of 41 tons in 1966 (table 3). During these years imports were mainly from Canada, Mexico, and West Germany. Occasional shipments came from Italy, Algeria, and Spain.

In the same years, imports of precipitated barium sulfate ranged from 1,378 tons to 2,705 tons, and mainly were from West Germany, France, and the Netherlands (table 4). Occasional shipments came from the United Kingdom, Belgium, and Italy.

World production and trade

The world production of crude natural barium sulfate, or barite, has been increasing in recent years and in 1966, as reported by over 30 countries, totaled 4.0 million short tons. In addition to the United States, which is the largest producer, other major producing countries in descending order of output were West Germany, Mexico, the U.S.S.R., Canada, Peru, Yugoslavia, Mainland China, and Morocco.

Appreciable quantities of crude natural barium sulfate enter international trade. The major exporting countries are Peru, Mexico, West Germany, Morocco, and Yugoslavia.

BARIUM SULFATE

Table 1.--Barium sulfate: U.S. production, imports for consumption, and apparent consumption, 1961-66

Year :	Production <u>1</u> /	Imports	Apparent consumption	:Ratio (percent) : of imports :to consumption
1961	797,000	616,506	1,413,506	: : 44
1962	860,000	738,591	1,598,591	4 6
: 1963:	824,000	579,996	1,403,996	: 41
1964	830,000	603,324	1,433,324	: : 42
1965	852,000	714,336	1,566,336	: : 46
1966	947,000	701,750	1,646,750	: 42
1				:

(Quantity in short tons)

1/ Production as measured by quantity of crude barite sold or used by producers (ground and precipitated barium sulfate are produced from the crude).

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce.

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Source	1961	:	1962	:	1953	:	1964	:	1965	:	1966
:			ς)u:	antity (s	sho	ort tons)				
: Mexico:	133,733	:	243,138	:	159,964	:	188,635	:	243,195	:	212,136
Canada:	145,043	:	221,070	:	150,881	:	141,845	:	155,736	:	180,942
Peru: Ireland:	109,986	:	105,560	:	91,295 10,183	:	117,937 63.5hl	:	104,012	:	94,601 115.58b
Morocco:	58,240	:	44,934	:	51,784	:	33,179	:	48,160	:	44,707
All other-:	$\frac{161,158}{608,162}$	<u>:</u>	$\frac{122,026}{736,728}$	<u>:</u>	$\frac{113,691}{578,098}$	<u>.</u>	54,812 500 01.0	:	80,761	<u>:</u>	51,034
:	Nelvo (1 000 dellera)										
:			······								
: Mexico:	1.077	:	1.716	:	1.082	:	1.220	1	1.488	:	1.501
Canada:	1,233	:	1,883	:	1,187	:	1,205	:	1,277	:	1,541
Peru:	1,039	:	979	:	903	:	1,137	:	1,066	:	868
Morocco:	- 529	:	-)179	1)130	:	316	:	000)172	:	074
All other -:	1,307	:	1,012	:	965	:	437	:	642	:	435
Total:	5,186	:	6,009	:	4,637	•	4,796	:	5,553	:	5,764
:	0	:		:	1 of of d	:		:	TI C Dem	:	

Table 2.--Barium sulfate, natural, crude: U.S. imports for consumption, by principal sources, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

176

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Source	1961	1	1962	:	1963	:	1964	:	1965	1 1	1966
	: :		Quan	t:	ity (s	h	ort to	m	s)		
Canada	6,935	1	18	1	13	1	997	:		:	20
West Germany	3 3	:	32	:	23	1	64	:	21	:	21
Mexico	: : –	I I	89	1 1	243	1 1	_	::	449	:	-
All other	: :	:		:	17	:		:		:	
Total	6,968	1	139	:	296	:	1,061	:	470	:	41
	:		Va	11	ue (l,	00	00 dol	1	ars)		
Canada	503	:	1	:	<u>1</u> /	:	38	1	_	:	1
West Germany	2	:	l	:	l	: :	3.	:	l	1 1	l
Mexico	: -	: :	1	:	4	:	-	:	8	:	-
All other	: :	:		:	1/	:		:	_	:	
Total	505	:	3	:		::	41	:	9	1	2
				-		-		-		-	

Table	3Barium	sulfate,	natural,	ground:	U.S.	imports	for
	consum	otion, by	principal	Sources	, 196	L-66	

1/ Less than \$500.

Source: Compiled from official statistics of the U.S. Department of Commerce.

January 1968 4:2

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Source	1961	1962	: 1963 :	: 1964 :	: 1965 :	: 1966 :
:		Qua	ntity (s	hort ton	s)	
: West Germany:	1,283	: :1,520	: : 1,399	: : 2,081	: : 1,329	: : 1,971
: France:	23	3 2	: : 84	: : 110	: : 156	: : 267
: Netherlands:	39	: : 51	: 111	: : 114	: : 128	: : 207
All other:	33	121	: : 8	: : <u>9</u>	: : 11	: : 260
: :Total:	1,378	: : 1,724	: : 1,602	: : 2,314	: : 1,624	: : 2,705
		V.	alue (l,	000 dolla	ars)	
: Wêst Germany:	102	118	: : 108	: : 156	: : 102	: 162
: France:	10	: 13	: : 35	: : 46	: : 67	: : 108
Netherlands:	4	4	: : 8	: : 9	: : 11	: 17
All other:	6	17	: : 6	: :6	: :2_	: 17
: Total:	122	152	: : 157	217	: : 182	: 304

Table 4.--Barium sulfate, precipitated (blanc fixe): U.S. imports for consumption, by principal sources, 1961-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

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	TSUS
Commodity	item

Inorganic barium compounds not elsewhere enumerated------ 417.80

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The barium chemicals covered by this summary are not important items of international trade. U.S. annual production of these chemicals is believed to be less than 150,000 short tons; imports supply less than 1 percent of U.S. consumption. More than 99 percent of the quantity consumed in 1966 consisted of barium sulfide (black ash); most of it was consumed in the production of other barium compounds.

Description and uses

The barium compounds provided for here are those not named or otherwise more specifically provided for elsewhere in the TSUS, such as the compounds covered by items 417.70-.78 and 472.02-.14. Although about 30 inorganic barium compounds are within the scope of this summary, more barium sulfide (black ash) is produced than all the others combined; however, all but a few percent of this output is consumed in the in-plant production of other barium compounds. Some of the other compounds are barium chlorate, barium fluoride, barium iodide, and barium titanate. All of these compounds, except barium titanate, are water-soluble and poisonous. The principal uses of barium sulfide other than its use as an intermediate in the production of other barium compounds, is in vulcanizing, as a weighting agent, a depilatory, and as a source of hydrogen sulfide. Barium chlorate is used as an ingredient in pyrotechnics and explosives, as a textile mordant, and as an intermediate in the manufacture of other chlorates. Barium fluoride is used as an ingredient in enamels and in embalming fluids. Barium iodide is used chiefly as an intermediate in the production of other iodides. Barium titanate is being used in increasing quantities in electronic components and instruments because of its piezoelectric and ferroelectric properties, and its high dielectric constant.

INORGANIC BARIUM COMPOUNDS NOT ELSEWHERE ENUMERATED

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
item		Jan. 1, 1968	Jan. 1, 1972
417.80	Inorganic barium com- pounds not elsewhere enumerated.	10% ad val.	5% ad val.

The rate effective January 1, 1972, represents the final stage of a reduction resulting from a concession granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reduction became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. production and foreign trade

The production of barium sulfide ranged from 105,000 short tons in 1961 to 132,000 tons in 1966, with over 90 percent of the output consumed captively each year in the production of other barium chemicals. Eight companies in 1964 produced barium sulfide in one plant each. The plants were situated in California, Georgia, Illinois, Kansas, Missouri, Ohio, and in two plants in West Virginia. Production statistics are not available for the other barium chemicals covered here, but it is believed that output has been increasing and totaled about 500 tons in 1966. These chemicals are produced by about eight chemical companies, about half of which are large diversified chemical concerns.

U.S. exports, if any, are not separately reported. U.S. imports of inorganic barium compounds not elsewhere enumerated ranged from 96 tons to high tons during the period 1961-66 (see accompanying table). The United Kingdum was the major source of imported material until 1964 when Japan became the leading supplier. Italy, Switzerland, West Germany, the Netherlands, and France have supplied small amounts at various times during 1961-66. The imports mainly have consisted of barium chlorate, barium fluoride, barium titanate, and barium cyanide.

Several barite-producing countries (see summary on barium sulfate-items 472.10-.14), in addition to those exporting to the United States, probably produce some of the barium chemicals covered by this summary.

180

Source	1961	1962 :	1963 :	1964 :	1965 1	1966
- 1		Quant	ity (shor	t tons)		
*	3	:	:	1	1	
Japan:	1/ :	- 1	10 ::	30 :	270 :	390
United Kingdom:	- 145 :	102 :	78 :	21 :	6:	1/
Switzerland:	8:	7:	9 :	9 :	10 :	- 12
West Germany	- :	13 :	8:	8:	5:	1
All other:	7:	4 :	2 :	28 :	÷ :	41
Total:	160 :	126 :	107 :	96 :	291 :	444
1		Value	(1,000 d	ollars)		
Japan:	2/ :		6:	17 :	154 :	226
United Kingdom:	- 106 :	83 :	62 :	14 :	5 :	1
Switzerland:	3 :	2 :	3:	11 :	<u> </u>	5
West Germany:	- :	8:	6:	·3 :	2:	2/
All other:	3:	3:	1:	3:	- :	17
Total:	112 :	96 :	78 :	48 :	165 :	249
:	•	\$	·	:	:	

Inorganic barium compounds not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1961-66

 $\frac{1}{2}$ Less than 500 pounds. 2/ Less than \$500.

Source: Compiled from official statistics of the U.S. Department of Commerce.

	TSUS
Commodity	item

Beryllium compounds: Oxide or carbonate----- 417.90 Other----- 417.92

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

U.S. production of beryllium compounds is chiefly from imported beryllium ore. Exports are estimated to be about 30 percent of the total value of sales. Imports, which have been small in recent years, amounted to 2,520 pounds, valued at \$17,832, in 1966.

Comment

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This summary covers approximately 20 inorganic beryllium compounds derived chiefly from imported beryllium ore (item 601.09) and includes beryllium carbonate, chloride, fluoride, nitrate, oxide, and sulfate. The most important compound considered here is beryllium oxide. It is used principally in the manufacture of beryllium-copper and other alloys, and in the production of special ceramic products. Other beryllium compounds are used as chemical reagents, as gas mantle hardeners, as catalyst carriers, in optical alloys, electrical switch parts, watch springs, shims, cams, and bushings, and in atomic energy, electronic, and missile applications.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS		Rate prior to	Rate effective
item	Commodity	Jan. 1, 1968	Jan. 1, 1972
	Beryllium compounds:		
417.90	Oxide or carbonate	10% ad val.	5% ad val.
417.92	Other	10.5% ad val.	5% ad val.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from

> January 1968 4:2

which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

The great bulk of the domestic production of beryllium compounds is by two large integrated producers who both mine and purchase beryllium ore, derive crude beryllium compounds therefrom, and further process the crude products into refined compounds. Their output for sale consists of both crude and refined beryllium compounds. The production of beryllium compounds accounts for a small part of all beryllium products by these two concerns. In addition to the two large producers, there are five other producers of beryllium compounds, all of which use the compounds in the manufacture of further advanced products for sale to others. One of these concerns is engaged principally in the production of special ceramic products made from beryllium oxide, and derives most of its income from this activity. Sales of beryllium compounds account for only an insignificant part of the total income of each of the other concerns.

Data on the total domestic consumption and production of beryllium compounds may not be published since publication would reveal information on the operations of the two large integrated producers. It is estimated that consumption is growing due to the use of the compounds in materials utilized in Government space programs.

Export data on beryllium compounds are not separately classified in official statistics, but it is estimated that they are equivalent to about 30 percent of the total value of sales of all beryllium compounds by the domestic producers. It is believed that the bulk of the export shipments goes to Western Europe.

Annual imports of beryllium compounds, which were not separately reported in official statistics before September 1963, consisting principally of beryllium chloride from France, are shown in the following tabulation:

Year	Quantity Pounds	Value
1964	- 3,994	\$20,147
1965	- 2,037	10,915
1966	- 2,520	17,832

Production of beryllium compounds is known to occur in Canada, France, Italy, Japan, the United Kingdom, and West Germany. The United States probably is the world's most important producer.

BISMUTH COMPOUNDS AND MIXTURES

Commodity <u>TSUS</u> <u>item</u> Bismuth compounds----- 418.00

Mixtures in chief value of bismuth----- 423.80

Note.--For the statutory description, see the Tariff Schedules of the United States Annotated (TSUSA-1968) (pertinent sections thereof are reproduced in appendix A to this volume).

U.S. trade position

The United States produces the bulk of the inorganic bismuth compounds needed for industrial uses from source materials, about one-half of which is imported. The value of U.S. production probably exceeds \$1 million annually. Exports, if any, are estimated to be small and imports are valued at less than \$30,000 annually.

Comment

There are included in this summary about 20 inorganic bismuth compounds, such as bismuth chloride, hydroxide, iodide, nitrate, sulfate, sulfide, and subcarbonate (item 418.00), and mixtures of two or more inorganic compounds in chief value of bismuth (item 423.80). The principal one, bismuth subcarbonate, is used in x-ray work. The others are used in medicinals and in a variety of other products, including face powder, perfumery and cosmetics, ceramic colors, and luminous paints and enamels.

The column 1 rates of duty applicable to imports (see general headnote 3 in the TSUSA-1968) are as follows:

TSUS	Commodity	Rate prior to	Rate effective
1tem		Jan. 1, 1968	Jan. 1, 1972
418.00 423.80	Bismuth compounds Mixtures in chief value of bismuth.	28% ad val. 28% ad val.	14% ad val. 14% ad val.

The rates effective January 1, 1972, represent the final stage of reductions resulting from concessions granted by the United States in the sixth (Kennedy) round of trade negotiations under the General Agreement on Tariffs and Trade (GATT). The first of five annual stages of the reductions became operative January 1, 1968. Rates of duty for the individual stages are given in the TSUSA-1968, an excerpt from which is reproduced as appendix A to this volume. The rates

> January 1968 4:2

shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

There are 12 producers of inorganic bismuth compounds, 3 of which are large chemical firms. Bismuch compounds comprise only a small part of the output of any one firm. About one-third of the production is estimated to consist of bismuth subcarbonate, and the remainder of other bismuth compounds. During 1961-66, bismuth subcarbonate production increased from 74,000 pounds to 238,000 pounds. Producers' shipments of bismuth subcarbonate increased during 1961-66 and those of the other bismuth compounds increased during 1961-63 as shown in the tabulation below (in thousands of dollars) from statistics of the U.S. Department of Commerce.

Commodity	1961	<u>1962</u>	<u>1963</u>	1964	<u>1965</u>	<u>1966</u>
Bismuth subcarbonate	315	331	277	232	465	789
Other bismuth compounds	<u>556</u>	<u>537</u>	<u>665</u>	<u>1/</u>	<u>1/</u>	<u>1</u> /
Total	871	868	942	1/	1/	1/

1/ Not available.

The United States imports about one-half of its bismuth ore requirements, the source material from which bismuth compounds are derived. In 1966, the following countries were important sources of bismuth ore: Bolivia, Canada, China, Japan, Mexico, and Peru.

Imports of bismuth compounds and of bismuth mixtures were first reported separately in official statistics in late 1963. Imports for 1964-66 are shown in the accompanying table; these have consisted entirely of the bismuth compounds (as distinguished from mixtures of compounds in chief value of bismuth). West Germany was the principal supplier in all three years, and Japan was a major supplier in 1965 only. Italy, France, and the United Kingdom have also been sources of bismuth compounds. Analysis of import documents indicates that imports from West Germany were largely bismuth aluminate, imports from Italy were bismuth oxide, and imports from the United Kingdom consisted of bismuth oxide and bismuth oxychloride. Some oxychloride has also been imported from West Germany. The 1965 imports from Japan consisted of a single shipment with a unit value lower than the average for any other import source.

Exports of bismuth compounds or of bismuth mixtures, if any, are small.

Source	1964	1965	1966
······································	Quar	tity (pour	nds)
West Germany Italy France United Kingdom Japan Total	2,205 : 66 : - : 98 : - : 2,369 :	4,221 176 991 413 2,500 8,301 Value	: 4,032 : 506 : 441 : 22 : - : 5,001
West Germany Italy France: United Kingdom Japan: Total	\$5,500 365 785 6,650	\$12,125 1,083 3,815 2,991 5,324 25,338	: \$14,563 : 3,514 : 2,380 : 934 : : 21,391

Bismuth compounds: U.S. imports for consumption, by sources, 1964-66

Source: Compiled from official statistics of the U.S. Department of Commerce.

Note.--There were no imports reported for TSUS item 423.80 (Mixtures in chief value of bismuth) during 1964-66.

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Tariff Schedules of the United States Annotated (1968): General headnotes and rules of interpretation, and excerpts relating to the items included in this volume.

NOTE: The shaded areas in this appendix cover headnotes and TSUS items not included in the summaries in this volume. . . . ,

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

GENERAL HEADNOTES AND RULES OF INTERPRETATION

Page 3

1. Tariff Treatmont of Imported Articles. All articles Imported into the customs territory of the United States from outside thereof are subject to duty or exempt therefrom as prescribed in general headnote 3.

2. <u>Customs Territory of the United States</u>. The term "customs territory of the United States", as used in the schedules, includes only the States, the District of Columble, and Paetto Rico.

3. <u>Rates of Duty</u>. The rates of duty in the "Rates of Duty" columns numbered I and 2 of the schedules apply to articles imported into the customs territory of the United States as hereinafter provided in this headnote:

(a) Products of Insular Possessions.

(1) Except as provided in headnote 6 of schedule 7, part 2, subpart E, [and] except as provided in headnote 4 of schedule 7, part 7, subpart A articles imported from insular possessions of the United States which are outside the customs territory of the United States are subject to the rates of duty set forth in column numbered I of the schedules, except that all such articles the growth or product of any such possession, or manufactured or produced in any such possession from materials the growth, product, or manu-facture of any such possession or of the customs territory of the United States, or of both, which do not con-tain foreign materials to the value of more than 50 percent of their total value, coming to the customs terri-tory of the United States directly from any such possession, and all articles previously imported into the customs territory of the United States with payment of all applicable duties and taxes imposed upon or by reason of importation which were shipped from the United States, without remission, refund, or drawback of such duties or taxes, directly to the possession from which they are being returned by direct shipment, are exempt from duty.

- (11) In determining whether an article produced or manufactured in any such insular possession contains foreign materials to the value of more than 50 percent, no material shall be considered foreign which, at the time such article is entered, may be imported into the customs territory from a foreign country, other than Cuba or the Philippine Republic, and entered free of duty.

duty. (b) <u>Products of Cuba</u>. Products of Cuba imported into the customs territory of the United States, whether imported directly or indirectly, are subject to the rates of duty set forth in column numbered I of the schedules. Preferential rates of duty for such products apply only as shown in the said column 1. I/

(c) Products of the Philippine Republic.

(1) Products of the Philippine Republic Imported into the customs territory of the United States, whether Imported directly or indirectly, are subject to the rates of duty which are set forth in column numbered I of the schedules or to fractional parts of the rates in the sald column I, as hereinatter prescribed in subdivisions (c)(II) and (c)(III) of this headnote.

(ii) Except as otherwise prescribed in the schedules, a Philippine article, as defined in subdivision (c)(lw) of this headnote, imported into the customs territory of the United States and entered on or before July 3, 1974, is subject to that rate which results

 $\underline{1}$ By virtue of section 401 of the Tariff Classification Act of 1962, the application to products of Cuba of either a preferential or other reduced rate of duty in column 1 is suspended. See general headnote 3(e), \underline{infra} . The provisions for preferential Cuban rates continue to be reflected in the schedules because, under section 401, the rates therefor in column 1 still form the bases for determining the rates of duty applicable to certain products, including "Philippine articles". from the application of the following percentages to the most favorable rate of duty (i.e., including a preferential rate prescribed for any product of Cuba) set forth in column numbered I of the schedules:

(A) 20 percent, during calendar years 1963 through 1964,

(B) 40 percent, during calendar years 1965 through 1967,

(C) 60 percent, during calendar years 1968 through 1970,

(D) 80 percent, during calendar years 1971 through 1973.

 (E) 100 percent, during the period from January 1, 1974, through July 3, 1974.
 (iii) Except as otherwise prescribed in the sched-

(iii) Except as otherwise prescribed in the schedules, products of the Philippine Republic, other than Philippine articles, are subject to the rates of duty (except any preferential rates prescribed for products of Cuba) set forth in column numbered 1 of the schedules

of Cuba) set forth in column numbered I of the schedules. (iv) The term "Philippine article", as used in the schedules, means an article which is the product of the Philippines, but does not include any article produced with the use of materials imported into the Philippines which are products of any foreign country (except materials produced within the customs territory of the United States) if the aggregate value of such imported materials when landed at the Philippine port of entry, exclusive of any landing cost and Philippine duty, was more than 20 percent of the appraised customs value of the United States.

(d) Products of Canada.

(1) Products of Canada Imported into the customs territory of the United States, whether imported directly or Indirectly, are subject to the rates of duty set forth in column numbered 1 of the schedules. The rates of duty for a Canadian article, as defined in subdivision (d)(11) of this headnote, apply only as shown in the said column numbered 1.

(ii) The term "Canadian article", as used in the schedules, means an article which is the product of Canada, but does not include any article produced with the use of materials imported into Canada which are products of any foreign country (except materials produced within the customs territory of the United States), if the aggregate value of such imported materials when landed at the Canadian port of entry (that is, the actual purchase price, or if not purchased, the export value, of such materials, plus, if not included therein, the cost of transporting such materials to Canada but exclusive of any landing cost and Canadian duty) was --

(A) with regard to any motor vehicle or automobile truck tractor entered on or before December 31, 1967, more than 60 percent of the appraised value of the article imported into the customs territory of the United States; and

(B) with regard to any other article (including any motor vehicle or automobile truck tractor entered after December 31, 1967), more than 50 percent of the appraised value of the article imported into the customs territory of the United States.

APPENDIX A TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

General Headnotes and Rules of Interpretation

Page 4

(e) Products of Communist Countries. Notwithstanding any of the foregoing provisions of this headnote, the rates of duty shown in column numbered 2 shall apply to products, whether imported directly or indirectly, of the following countries and areas pursuant to section 401 of the Tariff Classification Act of 1962, to section 231 or 257(e)(2) of the Trade Expansion Act of 1962, or to action taken by the President thereunder: Albania Bulgaria China (any part of which may be under Communist domination or control) Cuba 1/ Czechos lovak i a Estonia Germany (the Soviet zone and the Soviet sector of Berlin) Hungary Indochina (any part of Cambodia, Laos, or Vietnam which may be under Communist domination or control) Korea (any part of which may be under Communist domination or control) Kurile Islands Latvia Lithuania Outer Mongolla Rumanla Southern Sakhalin Tanna Tuva Tibet Union of Soviet Socialist Republics and the area in East Prussia under the provisional administration of the Union of Soviet Socialist Republics. ules. (f) Products of All Other Countries. Products of all countries not previously mentioned in this headnote imported into the customs territory of the United States are subject to the rates of duty set forth in column numbered I of the schedules. (g) Effective Date; Exceptions - Staged Rates of Except as specified below or as may be specified Duty. elsewhere, pursuant to section 50(a) of the Tariff Classi-fication Act of 1962 (P.L. 87-456, approved May 24, 1962), the rates of duty in columns numbered 1 and 2 become effective with respect to articles entered on or after the 10th day following the date of the President's proclamation provided for in section 102 of the said Act. If, in column numbered i, any rate of duty or part thereof is set forth in parenthesis, the effective date shall be governed as follows: (i) If the rate in column numbered I has only one part (i.e., 84 (104) per 1b.), the parenthetical rate (viz., 104 per 1b.) shall be effective as to articles entered before July 1, 1964, and the other rate (viz., 84 per 1b.) shall be effective as to articles entered on or after July 1, 1964. (ii) If the rate in column numbered I has two or more parts (1.e., 5¢ per 1b. + 50% ad val.) and has a parenthetical rate for either or both parts, each part of the rate shall be governed as if it were a one-part rate. For example, if a rate is expressed as "4¢ (4.5¢) per ib. + 8\$ (9\$) ad val.", the rate applicable to articles entered before July 1, 1964, would be "4.5¢ per 1b. + 9\$ ad val."; the rate applicable to articles entered on or after July 1, 1964, would be "4¢ per 1b. + 8\$ ad val.". (III) If the rate in column numbered I is marked with an asterisk (#), the foregoing provisions of (1) and (11) shall apply except that "January 1, 1964" shall be substituted for "July 1, 1964", wherever this latter date appears. 1/ In Proclamation 3447, dated February 3, 1962, the President, acting under authority of section 620(a) of the Foreign Assistance Act of 1961 (75 Stat. 445), as umended,

prohibited the importation into the United States of all goods of Cuban origin and all goods imported from or through Cuba, subject to such exceptions as the Secretary of the Treasury determines to be consistent with the effective operation of the embargo.

4. Modification or Amendment of Rates of Duty. Except as otherwise provided in the Appendix to the Tariff Schedules --

 (a) a statutory rate of duty supersedes and termi-nates the existing rates of duty in both column numbered I and column numbered 2 unless otherwise specified in the amonding statute:

(b) a rate of duty proclaimed pursuant to a concession granted in a trade agreement shall be reflected in column numbered i and, if higher than the then existing rate in column numbered 2, also in the latter column, and shall supersede but not terminate the then existing rate (or rates) in such column (or columns);

(c) a rate of duty proclaimed pursuant to section 336 of the Tariff Act of 1930 shall be reflected in both column numbered I and column numbered 2 and shall supersede but not terminate the then existing rates in such columns; and

(d) whenever a proclaimed rate is terminated or suspended, the rate shall revert, unless otherwise provided, to the next intervening proclaimed rate previously superseded but not terminated or, if none, to the statutory rate.

- accompanying flowers, (b) currency (metal or paper) in current circu
 - lation in any country and imported for monetary purposes.
 - (c) electricity,
 - (d) securities and similar evidences of value, and
 (e) vessels which are not "yachts or pleasure boats"
 - within the purview of subpart D, part 6, of schedule 6.

are not articles subject to the provisions of these sched-

6. Containers or Holders for Imported Merchandise. For the purposes of the tariff schedules, containers or holders are subject to tarlff treatment as follows:

(a) <u>imported Empty</u>: Containers or holders if im-ported empty are subject to tariff treatment as imported articles and as such are subject to duty unless they are within the purview of a provision which specifically exempts them from duty.

(b) Not imported Empty: Containers or holders if imported containing or holding articles are subject to tariff treatment as follows:

(1) The usual or ordinary types of shipping or transportation containers or holders, if not designed for, or capable of, reuse, and containers of usual types ordinarily sold at retail with their contents, are not subject to treatment as Imported articles. Their cost, however, is, under section 402 or section 402a of the tariff act, a part of the value of their contents and If their contents are subject to an ad valorem rate of duty such containers or holders are, in effect, dutiable at the same rate as their contents, except that their cost is deductible from dutiable value upon submission of satisfactory proof that they are products of the United States which are being returned without having been advanced in value or improved in condition by any means while abroad.

(11) The usual or ordinary types of shipping or transportation containers or holders, if designed for, or capable of, reuse, are subject to treatment as Imported articles separate and distinct from their contents. Such holders or containers are not part of the dutlable value of their contents and are separately subject to duty upon each and every importation into the customs territory of the United States unless within the scope of a provision specifically exempting them from duty.

(iii) In the absence of context which requires otherwise, all other containers or holders are subject to the same treatment as specified in (11) above for usual or ordinary types of shipping or transportation containers or holders designed for, or capable of, reuse,

A-4

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

General Headnotes and Rules of Interpretation

Page 5

7. Commingling of Articles. (a) Whenever articles sub-Ject to different rates of duty are so packed together or mingled that the quantity or value of each class of articles cannot be readily ascertained by customs officers (without physical segregation of the shipment or the contents of any entire package thereof), by one or more of the following means:

(1) sampling,

(II) verification of packing lists or other documents filed at the time of entry, or

(III) evidence showing performance of commercial settlement tests generally accepted in the trade and filed in such time and manner as may be prescribed by regulations of the Secretary of the Treasury,

the commingled articles shall be subject to the highest rate of duty applicable to any part thereof unless the consignee or his agent segregates the articles pursuant to subdivision (b) hereof.

(b) Every segregation of articles made pursuant to this headnote shall be accomplished by the consignee or his agent at the risk and expense of the consignee within 30 days (unless the Secretary authorizes in writing a longer time) after the date of personal delivery or mailing, by such employee as the Secretary of the Treasury shall designate, of written notice to the consignee that the articles are commingled and that the quantity or value of each class of articles cannot be readily ascertained by customs officers. Every such segregation shall be accomplished under customs supervision, and the compensation and expenses of the supervising customs officers shall be reimbursed to the Government by the consignee under such regulations as the Secretary of the Treasury may prescribe.

(c) The foregoing provisions of this headnote do not apply with respect to any part of a shipment if the consignee or his agent furnishes, in such time and manner as may be prescribed by regulations of the Secretary of the Treasury, satisfactory proof --

(i) that such part (A) is commercially negligible, (B) is not capable of segregation without excessive cost, and (C) will not be segregated prior to its use in a manufacturing process or otherwise, and (ii) that the commingling was not intended to avoid the payment of lawful duties.

Any article with respect to which such proof is furnished shall be considered for all customs purposes as a part of the article, subject to the next lower rate of duty, with which it is commingled.

(d) The foregoing provisions of this headnote do not apply with respect to any shipment if the consignee or his agent shall furnish, in such time and manner as may be prescribed by regulations of the Secretary of the Treasury,

satisfactory proof --(1) that the value of the commingled articles is less than the aggregate value would be if the shipment were segregated:

(11) that the shipment is not capable of segregation without excessive cost and will not be segregated prior to its use in a manufacturing process or otherwise; and

(iii) that the commingling was not intended to avoid the payment of lawful duties.

Any merchandise with respect to which such proof is furnished shall be considered for all customs purposes to be dutlable at the rate applicable to the material present in greater quantity than any other material. (e) The provisions of this headnote shall apply only

In cases where the schedules do not expressly provide a particular tariff treatment for commingled articles.

8. Abbreviations. In the schedules the following symbols and abbreviations are used with the meanings respectively indicated below

	\$	-	dollars
	¢	-	cents
•	1	-	percent
	• ·	-	plus
-	ad val.	-	ad valorem
	bu.	-	bushel
	cu.	-	cubic
	doz.	-	dozen
	ft.	•	feet.
	gal.	•	gallon
	in.	-	inches
	1b.	-	pounds
	OI.	• '	ounces
	sq.	-	square
	wt.	-	weight
	yd.	-	yard
	pcs.	-	pieces
	prs.	-	pairs
	lin.	-	linear
	I.R.C.	-	Internal_Revenue_Code

For the purposes of the schedules, 9. Definitions. unless the context otherwise requires ---

(a) the term "entered" means entered, or withdrawn from warehouse, for consumption in the customs territory of the United States;

(b) the term "entered for consumption" does not include withdrawals from warehouse for consumption; (c) the term "withdrawn for consumption" means with-

drawn from warehouse for consumption and does not include articles entered for consumption;

(d) the term "rate of duty" includes a free rate of. duty; rates of duty proclaimed by the President shall be referred to as "proclaimed" rates of duty; rates of duty enacted by the Congress shall be referred to as "statutory" rates of duty; and the rates of duty in column numbered 2 at the time the schedules become effective shall be referred to as "original statutory" rates of duty;

(a) the term "ton" means 2,240 pounds, and the term "short ton" means 2,000 pounds; (f) the terms "of", "whoily of", "almost wholly of",

"In part of" and "containing", when used between the de-scription of an article and a material (e.g., "furniture of wood", "woven fabrics, wholly of cotton", etc.), have the following meanings; (i) "of" means that the article is wholly or in

chief value of the named material;

(11) "wholly of" means that the article is, except for negligible or insignificant quantities of some other material or materials, composed completely of the named

material; (iii) "almost wholly of" means that the essential character of the article is imparted by the named material, notwithstanding the fact that significant quantities of some other material or materials may be present; and

(Iv) "In part of" or "containing" mean that the article contains a significant quantity of the named material.

With regard to the application of the quantitative concepts specified in subparagraphs (ii) and (iv) above, it is intended that the <u>de minimis</u> rule apply.

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

General Headnotes and Rules of Interpretation

Page 6

10. <u>General Interpretative Rules</u>. For the purposes of these schedules --

(a) the general, schedule, part, and subpart headnotes, and the provisions describing the classes of imported articles and specifying the rates of duty or other import restrictions to be imposed thereon are subject to the rules of interpretation set forth herein and to such other rules of statutory interpretation, not inconsistent therewith, as have been or may be developed under administrative or judicial rulings;

 (b) the titles of the various schedules, parts, and subparts and the footnotes therein are intended for convenience in reference only and have no legal or interpretative significance;

(c) an imported article which is described in two or more provisions of the schedules is classifiable in the provision which most specifically describes it; but, in applying this rule of interpretation, the following considerations shall govern:

 (i) a superior heading cannot be enlarged by inferior headings indented under it but can be limited thereby:

(ii) comparisons are to be made only between provisions of coordinate or equal status, i.e., between the primary or main superior headings of the schedules or between coordinate inferior headings which are subordinate to the same superior-heading;
 (d) if two or more tariff descriptions are equally

(d) if two or more fariff descriptions are equally applicable to an article, such article shall be subject to duty under the description for which the original statutory rate is highest, and, should the highest original statutory rate be applicable to two or more of such descriptions, the article shall be subject to duty under that one of such descriptions which first appears in the schedules;

(a) In the absence of special language or context which otherwise requires --

(1) a tariff classification controlled by use (other than actual use) is to be determined in accordance with the use in the United States at, or immediately prior to, the date of importation, of articles of that class or kind to which the imported articles belong, and the controlling use is the chief use, i.e., the use which exceeds all other uses (if any) combined;

(ii) a tariff classification controlled by the actual use to which an imported article is put in the United States is satisfied only if such use is intended at the time of importation, the article is so used, and proof thereof is furnished within 3 years after the date the article is entered;

 (f) an article is in chief value of a material if such material exceeds in value each other single component material of the article;

(g) a headnote provision which enumerates articles not included in a schedule, part, or subpart is not necessarlly exhaustive, and the absence of a particular article from such headnote provision shall not be given weight in determining the relative specificity of competing provisions which describe such article;

(h) unless the context requires otherwise, a tariff description for an article covers such article, whether assembled or not assembled, and whether finished or not finished;

(ij) a provision for "parts" of an article covers a product solely or chiefly used as a part of such article, but does not prevail over a specific provision for such part. 11. <u>Issuance of Rules and Regulations</u>. The Secretary of ' the Treasury is hereby authorized to issue rules and reguiations governing the admission of articles under the provisions of the schedules. The allowance of an importer's claim for classification, under any of the provisions of the schedules which provide for total or partial relief from duty or other import restrictions on the basis of facts which are not determinable from an examination of the article itself in its condition as imported, is dependent upon his complying with any rules or regulations which may be issued pursuant to this headnote.

12. The Secretary of the Treasury is authorized to prescribe methods of analyzing, testing, sampling, weighing, gauging, measuring, or other methods of ascertainment whenever he finds that such methods are necessary to determine the physical, chemical, or other properties or characteristics of articles for purposes of any law administered by the Customs Service.

General statistical headnotes:

1. <u>Statistical Requirements for Imported Articles</u>. Persons making customs entry or withdrawal of articles imported into the customs territory of the United States shall complete the entry or withdrawal forms, as provided herein and in regulations issued pursuant to law, to provide for statistical purposes information as follows:

(b) the name of the carrier or the means of transportation by which the articles were transported to the first port of unloading in the United States;

(o) the foreign port of lading;

(d) the United States port of unlading;

(e) the date of importation;

(f) the country of origin of the articles expressed in terms of the designation therefor in Statistical Annex B of these schedules;

(g) a description of the articles in sufficient detail to permit the classification thereof under the

proper statistical reporting number in these schedules; (h) the statistical reporting number under which the articles are clearing that are shown in the statistical reporting the statistical reporting

articles are classifiable; (ij) gross weight in pounds for the articles avvered by each reporting number when imported in vessels or aircraft;

(k) the net quantity in the units specified herein for the classification involved;

(1) the U.S. dollar value in accordance with the definition in Section 402 or 402a of the Tariff Act of 1930, as amended, for all merchandise including that free of duty or dutiable at specific rates; and

(m) such other information with respect to the imported articles as is provided for elsewhere in these schedules.

A-6

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

General Headnotes and Rules of Interpretation

Page 7

8. Statistical Annotations. (a) The statistical annotations to the Tariff Schedulce of the United States consist of --

(i) the 2-digit statistical suffixes, (ii) the indicated units of quantity,

(iii) the statistical headnotes and annexes, and

(iv) the italicised article descriptions.

(b) The legal text of the Tariff Schedules of the United Statcs consists of the remaining text as more specifically identified in headnote 10(a) of the general headnotes and rules of interpretation.

(c) The statistical annotations are subordinate to the provisions of the legal text and cannot change their scope.

3. <u>Statistical Reporting Number</u>. (a) <u>General Rule</u>: Except as provided in paragraph (b) of this headnote, and in the absence of specific instructions to the contrary elsewhere, the statistical reporting number for an article consists of the 7-digit number formed by combining the 5-digit item number with the appropriate 2-digit statistical suffix. Thus, the statistical reporting number for live monkeys dutiable under item 100.95 is "100.9520".

(b) Wherever in the tariff schedules an article is classifiable under a provision which derives its rate of duty from a different provision, the statistical reporting contrary elecuhere, the 7-digit number for the basic pro-vision followed by the itam number of the provision from which the rate is derived. Thus, the statistical reporting number of mixed apple and grape juices, not containing over 1.0 percent of ethyl alcohol by volume, is "165.6500-165.40".

4. <u>Abbreviations</u>. (a) The following symbols and abbrevi-ations are used with the meanings respectively indicated below:

s. ton	-	short ton
C. ,	-	ona hundrad
Ost	-	100 lba.
m.7.	-	milliaram
м.	-	1.000
hd ft	_	board feet
M 54 64.	_	1 000 board feat
	_	milliourie
and	_	198 mbio fact
0014	-	
equare	-	anount to sober 100
		square jest of
		surjace
εup. ft.	-	superficial foot
02.	-	ounces avoirdupois
fl. 03.	-	fluid ownce
os. trou	-	troy ownce
nf. ml.	-	proof callon
An "X" appearin	a in th	e column for units of

(b) quantity means that no quantity (other than gross weight)

 (c) Whenever two separate units of quantity are shown for the same article, the "v" following one of such units means that the value of the article is to be reported with that quantity.

PROVISIONS

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

HISTORICAL NOTES

Notes p. 1 General Headnotes

Amendments and Hodifications

PROVISIONS

-Language "Except as provided in headnote 6 of schedule 7, part 2, subpart B," added; language "except that all articles" deleted and language "except that all such articles" insorted in lieu thereof. Pub. L. 89-805, Socs. 1(a). (c), Nov. 10, 1966, 80 Stat. 1521, 1522, effective date Jan. 1, 1967. Language "Except as provided in headnote 4 of schedule 7, part 7, subpart A," added. Pub. L. 89-806, Socs. 2(b), (c), Nov. 10, 1966, 80 Stat. 1523, effective date March 11, 1967. Gen Hdate-3(4)(1)

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- Cen Hdnte--Headnotes 3(d), (e), and (f) redesignated as 3(d), (e), headnotes 3(e), (f), and (g), respectively, (f) and (g) and new headnote 3(d) added. Pub. L. 87 283, Secs. 401(a), 403, Oct. 21, 1965, 79 Stat. 1021, 1022; entered into force Oct. 22, 1965, by Pres. Proc. 3682, Oct. 21, 1965, 3 CPR, 1965 Supp., p. 68.
- Gen Hdnto--Language "and containers of usual types ordi-6(b)(1) narily sold at retail with their contents," added. Pub. L. 89-241, Secs. 2(a), 4, Oct. 7, 1965, 79 Stat. 933, 934, effective date Dec. 7, 1965.

SCHEDULE L.- CHEMICALS AND RELATED PRODUCTS

A-9

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

 Part 1 - Demonoid Chemicals and Products A. Organic Chemical Curdes F. Industrial Organic Chemical Products Part 2 - Chemical Elements, Inorganic and Organic Compounds, and Mixtures A. Chemical Elements Hoorganic Chemical Compounds C. Chemical Elements C. Organic Chemical Compounds C. Organic Chemical Compounds C. Organic Chemical Compounds C. Organic Acids C. Chamical Mixtures Part 3 - Drugs and Related Products A. Natural Drugs, Grude or Advanced A. Matolids, Antibiotics, Barbiterates, Itoraones, Vitamias, and Other Drugs and Related Products C. Other Drugs Part 4 - Synthetic Resins and Plastics Materials, Rubber A. Synthetic Resins and Plastics Materials B. Rubber Part 5 - Flavoring Extracts, Easential Olis A. Fravoring Extracts, and Profit Plavors, Essances, Esters, and Olis B. Essential Olis Part 6 - Glue, Gelatin, and Related Products Part 7 - Aromatic and Odor Herous Substances, Preparations A. Surface-Active Agents Soaps and Synthetic Delengents Part 9 - Dysing and Tanning Products; Pigments and Plaints, and Related Products Part 9 - Dysing and Tanning Products; Pigments and Plaints, and Related Products Part 9 - Dysing and Tanning Products; Planons, and Related Products Part 10 - Petroloum, Matural Gas, and Plouterlas Part 11 - Fertilizers and Plauting, Products Part 12 - Explosives	 Part 13 - Katty Substances, Camphor, Chars and Carbons, Isotopes, A. Taity Substances B. Camphor, Chars and Carbons, Isotopes, Waxes, and Olher Products C. Miscelfancous Medical Supplies Schedule 4 headnoles: 1. This schedule does not include (i) any of the milneral products provided for in schedule 5; (ii) metal-bearing ores and other metal-bearing materials, provided for in part 1 of schedule 6; (ii) any of the milneral products provided schedule 6; (ii) metal-bearing ores and other metal-bearing materials, provided for in part 2 of schedule 6; (ii) consisting of the ormore elements, (iii) consisting of the ormore elements, (iii) consisting of the ormore elements, (iii) always consisting of the same, elements united in the same proportions by weight with the same internal argument. The presence of impurities which occur naturally or as an internal argument. (b) The ferm "argument", as used in this schedule, includes a solution of a single compound in water, and, in determing the age of the same proportions by weight with the same internal argument. (b) The ferm "argument", as used in this schedule, includes a solution of a single compound in water, and, in determing the age of the same proportions by weight with the same internal argument. (b) The ferm "argument", as used in this schedule, includes a solution of a single compound in water, and, in determing the age of the compound subject to dury in this schedule at a specific rate; an allownee in weight or compound subject to dury in this schedule. A fail The term "arktnerg", as used in this schedule, includes a solution of a single compound in which may have been in the compound. 3. (a) The term "arktnerg", as used in this schedule, includes, provided of the or more ingredients (i.e., provided a solution, provided in the ingredients (i.e., provided a solution, accept asolution, the orgument is an allo
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TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 2. - Chemical Elements, Inorganic and Organic Compounds, and Mixtures

4 - 2 - A, B 415.05 - 416.45

Page 231

Item	Stat.	at. Articles	Units	Rates of Duty			
	fix		Quantity	1	2		
		PART 2 CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES					
		Part 2 headnotes:					
		 This part covers chemicals, except those provided for elsewhere in this schedule and those specially provided for in any of the other sched- ules. 					
		2. For the purpose of this part, <u>inorganic</u> <u>compounds</u> (including salts) are compounds not containing carbon, except carbides and such carbon-containing compounds as inorganic cyanides and cyanates, metailic carbonates, and oxides of carbon which are inorganic in nature.					
		3. For the purpose of this part, organic com- pounds are compounds containing carbon except such carbon-containing compounds as carbides, inorganic cyanides and cyanates, metallic carbonates, and oxides of carbon.					
		Subpart A Chemical Elements					
		Chemical elements in any physical form:					
415.05 415.10 415.15 415.20	00 00 00 00	Bromine Cesium, potassium, and sodium Carbon Chlorine	Lb Lb Lb Lb	9¢ per 1b. 15% ad val. 4% ad val. 9% ad val.	10¢ per 1b. 25% ad val. 20% ad val. 25% ad val.		
415.25 415.27 415.30 415.35 415.40 415.45 415.50	00 00 00 00 00 00 00	Crude Crude Resublimed. Lithium. Phosphorus. Rubidium. Sulfur. Other.	Lb Lb Lb Lb Ton Lb	Free 9¢ per 1b. 22% ad val. 3.5¢ per 1b. 9% ad val. Free 9% ad val.	Free 10¢ per 1b. 25% ad val. 8¢ per 1b. 25% ad val. Free 25% ad val.		
		Subpart B Inorganic Acids					
		Subpart B headnote:			1		
		 This subpart covers monobasic, dibasic, and polybasic inorganic acids. Salts and anhydrides of these acids are provided for in subpart C of this part. 					
416.05 416.10 416.15 416.20	00 00 00 00	Inorganic acids: Arsenic. Boric. Hydrochloric. Hydrofluoric.	Lb Lb Lb Lb	2.7¢ per lb. 0.4¢ per lb. Free Free	3¢ per 1b. 1¢ per 1b. Free Free		
416.25 416.30	00 00	Nitric. Phosphoric.	Lb Lb	Free 0.9¢ per 1b.	Free 2¢ per 1b.		
416.35	00	Sulfuric. Tungstic Lungsten contant.	Lb Lb Lb	Free 37# per 1b. on tungsten content + 18% ad val.	Free 60+ per 1b. on tungstet content + 40% ad val.		
416.45	20 40	Other Sulfamic acid Other	 Lb. Lb.	11% ad val.	25% ad val.		
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TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS - Chemical Elements, Inorganic and Organic Compounds, and Mixtures Do at 9

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- 1	41	7.80					•			
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	Stat.	t.		Rates o	f Duty
Item	fix	Articles	Quantity	1	2
		Gebeuret C. Technologia Chemical Country de	•		
	[Suppart C Inorganic Chemical Compounds			
		Subpart C headnote:			
		 This subpart does not include any organic com- pounds. For the purposes of this subpart, inorganic 			
		compounds containing only one kind of cation are		· · · · · ·	й. Н
		indicated in the alphabetical listing set forth in			
		or more different kinds of cations are classifiable			
		named in the alphabetical listing in this subpart.		-	
		Inorganic compounds, having no cations or nome of the cation constituents of which are named in this			
	{ ·	subpart, are covered by the provision for other inorganic compounds (item 423,00).			
		Aluminum compounde:			
417.10	00	Anmonium sulfate (ammonia alum)	Lb	0.27¢ per 1b.	0.75¢ per 1b.
417.12	00	Potassium sulfate (potash alum)	Lb	0.5¢ per 15.	0.5¢ per 10.
417.16	00	Other	Lb Lb	0.09¢ per 15. 7.5% ad val.	0.375¢ per 15. 25% ad val.
		Ammonium compounds:			
417.20	00	Ammonia, aqua Ammonia, liquid anhydrous	Lb Lb	7.5% ad val. 1.12¢ per 1b.	25% ad val. 2.5¢ per 1b.
417.24	00	Carbonate and bicarbonate Chloride	Lb Lb	0.45¢ per 1b. 0.47¢ per 1b.	2¢ per 1b. 1.25¢ per 1b.
417.28	00	Molybdate	Lb Dh v	18¢ per 1b. on malwhdenes content +	504 per 15. on molybdenum content +
417 30	00	Nitrate	Lb.	St ad val.	15% ad val.
417.32	00	Perchlorate.	Lb	0.6¢ per 1b.	1.5¢ per 1b.
417.34	00	Silicofluoride	Lb	9% ad val.	25% ad val.
417.38	00	Tungstate	LD Lb	7.5% ad val. 574 per 1b. on tungsten	60¢ per 10, on tangsten
417.42	00	Vanadate	10. V 15	28.5% ad val.	content + 40% ad val. 40% ad val.
417.44	00	Uther	LD	7.5% ad val.	25% ad val.
417.50	00	Antimony compounds: Oxide	Lb	0.5¢ per 1b.	2¢ per lb.
417.52	00	Sulfide	Lb	0.4¢ per 1b. + 11% ad val.	1¢ per 1b. + 25% ad val.
417.54	00	Other	Lb	0.4¢ per 1b. + 18% ad val.	1¢ per 1b. + 25% ad val.
		Arsenic compounds:			
417.60	00 00	Sulfide Trioxide (arsenious acid)	Lb Lb	Free	Free Free
417.64	00	Other	Lb	9% ad val.	25% ad val.
417 70	00	Barium compounds:	Ib	1 444 per lb	24 ner 1h
417.70	00	Dioxide	ιь	4.3¢ per 1b.	6¢ per 1b.
417.74	00	Nitrate	Lb Lb	1.1¢ per 15. 0.9¢ per 15.	1.25¢ per 1b. 2¢ per 1b.
417.78 417.80	00 00	Oxi de	Lb Lb	1.8¢ per lb. 9% ad val.	2.5¢ per lb. 25% ad val.
		1/ The duties on aluminum oxide (alumina) imported			
		for use in producing aluminum are temporarily sus- nended. See Appendix to Tariff Schedules			
		Print Appendix to faith occountes,			
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Page 232

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 2. - Chemical Elements. Inorganic and Organic Compounds, and Mixtures

Page 233 4 - 2 - C 417.90 - 419.22

Ttem	Stat.	Årtioleg	Units	Rates of Duty		
1.000	fix	NI CIGIGO	Quantity	1	2	
417.90 417.92	00 00	Beryllium compounds: Oxide or carbonate Other	Lb Lb	9% ad val. 9% ad val.	25% ad val. 25% ad val.	
418.00	00	Bismuth compounds	Lh,	25% ad val.	35% ad val.	
418,10 418,12 418,14	00 00 00	Calcium compounds: Arsenate Borate, crude Carbide Chilaride	Lb 1b Lb	Free Free G. Se per 15.	Free Free It par Ib.	
413.16 413.18 413.20 413.22 415.24	00 00 00 00 00	Crude Other. Cyanide. Hypochiorite. Lime, chiorinated, containing not more than	1.b 1.b 1.b	Privi ON od vals Inso 116 od vals	Free 25% ad val. Free 25% ad val.	
418.26	00	Molybdate		18 per 18. 18 per 15. en malybdenum contant	50.50 per 10. 50e per 10. on molybdesin/content	
418,28 418,30	00 00	Phosphate, datalcium Tungstate		 s ad vai. t ad vai. Ma per lb. an tangsten contont - 15 ad val. 	 + How an walk 25% ad walk 60% per 35% on Tung Top condent + 40% ad walk 	
418,32	60	Other	· · · · · ·	9% ad val.	25% ad vat	
418.40 418.42 418.44	00 00 00	Chloride Oxide	·····	27% 20 val. 27% ad val. 27% ad val.	355 ad val SAV ad val 334 ad val	
418.50 418.52	00 00	Cusium compounds: Chloride	to 19	11% ad val. W ad val.	25% ad val: 25% ad val.	
418.60 418.62 418.68	00 00 00	Gobart compounds Oxide Sulfate	15 15 15	1.3e per 15. 1.3e per 15. 10.55 nd val.	20c per 16. 10é per 16. 505 ad val.	
418.69	00	Copper compounds: Cyanide Todide: Crudo	Lb	Free	Frog Frog	
413.72	00	Other	u	1.14¢ per 15. * 95 ad vol.	3¢ per 1b. + 25; ad val.	
418.74	00	Sulfate	1	<pre>1.14f per los + 9% ad vdl. 1.5c per lbs on copper.</pre>	25% ad val. 4; per lb. on copper	
418,78	00	corper.com (ζ υ	Contont 1.14c por 1b. 4 9% ad val.	aphtent 34 cer lb 25, ad val.	
418.80	00	Gold compounds	ü	9% ad val.	25% od val.	
418.90 418.92 418.94	00 00 00	Iron compounds: Sulfide (pyrites) Sulfate (ferrous) (copperas)	Ton Lb Lb	fred Fred 75 ad yal.	Prec Prec Zau ad Val	
419.00 419.02 419.04	00 00 00	Lead compounds: Arsonato	1 1 1	1.37 per 10. 1.35 per 10. 135 ad val.	34 per 15. 38 per 15. 30% ad vill	
419.10	00	Lithium compounds	Lþ	9% ad val.	25% ad val.	
419.20 419.22	00 00	Magnasium :compounde: Carbonate Not presipitated Precipitated	56 15	7.5% nd yal. 8.34 per 10.	25% ad val. 1.5* per 15.	

A-14

APPENDIX A

Page 234

4 - 2 - C

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 2. - Chemical Elements, Inorganic and Organic Compounds, and Mixtures

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

419.4		20, 10			
Tten	Stat. Suf-	Articles	Units of	Rates o	f Duty
	fix		Quantity	1	2
		Magnesius compounds (con.)			
419,24	:00	Arbydraus	lb	0.9¢ per lb. C 1774 per lb	le per 16. 0.675e per 16
419.32	80	Oxide (calcined mognesia)	üb	1.82 per ID.	7¢ per 15.
419,34	00	buists	Lb	0.3354 per lb.	0.75¢ per 15.
419.36 419.38	00. 80	Eicserite (except taicided).	LD LD	7.5% ad val.	ist ad val.
		Nanganese compounds:			
419,40 419,42	00 60	Borste	ib Lb	9% ad val. 9% ad val.	25% ad val. 15% ad val.
419.44	60	GtBrez	LD	12.5% ad vsl.	254 ad val.
		Mercury compounds: Digenta:			
4:9.58	90	Morcuric (corresive sublimate)	ω	iot per 15. + 115 ad val.	22: per 15. • 25% ad val.
412152	24	Merturess (talorel)	(h	low per 15. +	72¢ per 1b. *
419.55	00	Sympletic sector	Ю	Free the second s	Free The second
(9		4.0.22	GM	115 pi 12.	25% ad val.
413.60	6.01	shiyasenna companda	ų	184 per 10, ce	504 per 16. on
		231.00323027 02512421.1	2a). V	St ad val.	15% sd val.
		stievel approxide;			
419.70 419.72	96 96	Chiaride	10 12	9% ad val. Free	25% ad val. Free
419.72 819.76		Sulfate	15 16	9% ad val. 3% ad val.	758 ad val. 254 ad val.
		investorie szczedat			
319 4	. 60	September	to	2.74 per 10. 5.44 mer 15.	or per 15. Se per 15.
4)3.54	17	Bitter	3.m.,,	es al vet.	258° ad v31.
413.00	201	Platiner corrected.	IJ	95 ad val.	251 ad vol.
200 64		Patasius compands: Estrighte	34	0.94 cet 14.	1.54 per lb.
420.02	00 66	Bromide	1.b 376	3.54 per 16. 0.556 mer 18.	10¢ per 1b. 0 75; per 1b.
440,04	- 21	Chiptate Chromate and disbroate	16 18	1.35; per B. 24 cor 16.	1.54 per 15. 2.254 per 15.
A26 12	60	Cyan de	14	Free Lines Its	Pree 78 per ib.
120.16		Forregardide	105	1.14 per 10. D 15a xxer 35	4¢ per 10. Le per 15
423-25	8.0	foliate	18	224 per 18.	25 r per 1b. S0 a per 1b pp
440000		moliticium content	1.k. p	nolekslemun content +	molybdenum content •
439.24	- 60	Niteste	1h	0.754 per lb.	it per lb.
420.31	19.	Portellarale	()))))))))))))))))))))))))))))))))))))	1, 14 per 10 5, 43 per 10	Arad per in.
420.33	001 (24)	Percontate	10 10	SZ4 per lu, on tunessen	edt per 16. en tungsten
420.34		twijster comfert. Vokalatt.	100, 0	content + 188 ad val. 28.54 ad val.	unitent + 40% ad val.
420.36	60	beber	Liensee	1.55 ed 541.	25% ad val.
420.40	44	Phodies cospond:	44	24. 81 VAL.	25% ad val.

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 2. - Chemical Elements, Inorganic and Organic Compounds, and Mixtures

Page 235

4 - 2 - C 420.50 - 421.86

Fits Quentity 1 2 400 00 00 Statistic Company 1000000000000000000000000000000000000	Stat. Item Suf-		Articles	Units	Rates of Duty		
Arts 20 OP Section of Super-Ampoints Disk Frame Fram		fix		Quantity	1	2	
440.8 00 1000 Adv			Selening compands				
10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00 12.2.00 10.1.1.00 10.1.1.00 10.1.1.00 10.1.1.00	420.53 420.57	00 00	bioride salts	tb	l por Espec	free Free	
Selfer companies Organics Organics <thorganics< th=""> Organics Organics</thorganics<>	420.60	00	sener Silyer tamponada	18	95 ad val.	255 au vai	
4.10.10.00 0.10.10.10.10.10.10.10.10.10.10.10.10.10			Sodius compande:				
120.74 00 bisinfate (note (state (st	420.88 420.70 430.72	490 00 00	Aisoingte. Arsonate. Bicarbonate	137 149	0.74 par 10. Dree	la por 16. True	
Solution Construction Direction Procession Procession 10.1.5 0.0 Foreiners 0.0 <td< td=""><td>420.74</td><td><u>58</u></td><td>Bisulfate (miter cake)</td><td>LD</td><td>tree</td><td>Fren</td></td<>	420.74	<u>58</u>	Bisulfate (miter cake)	LD	tree	Fren	
All Bit Weith States Description States <thdescription states<="" th=""> Descri</thdescription>	420.76 420.78 420.82	-00 -00	Crude	101 100	Free S.14 per 19. 94 per 15.	0.1254 per 1b.	
10. 0. <t< td=""><td>420.84</td><td>.00</td><td>Carlonate: Ealested (seds ash)</td><td>10</td><td>0.225 por 1b</td><td>0.25s mr Bb.</td></t<>	420.84	.00	Carlonate: Ealested (seds ash)	10	0.225 por 1b	0.25s mr Bb.	
120.32 00 In brise	420.85	-144 Q19	Burstes and Sesquicarposts (19 19	0.652 per 19	1. of per lb.	
4.1. 92 00 11 001	420.92	50	in brins	5. t.m.	9% ad ys1.	205 ad +41.	
421.22 Could demonstration Disc. Proc. Proc. 421.64 00 Derrory antide	420.94 420.96 420.99	00 20 20	m nulk Other Chromate and dichromate	LD	1.54 per 10 2.54 per 100 Be 1.557 per 10	11 per 199 19 11 per 199 19 1.757 per 18	
At. 16 00 Dynamic 112 01 Diameter	421.07 421.04	60 60	Cyanide. Ferreganide	10 Maria	free 0 St per D.	free Zripet di	
421.14 00 Nirrite. 12	421.08	20 20 20	hyurosu file Hudroxyde Kolybdate	0 0 0	0.23 per 15 18: per 15, on	0.50 per 16. Sou per 16.	
421.16 00 Thick, except prophosphates 00 1.52 part 10 1.52 part 10 421.16 00 Containing by explit not ever 350 of water 10 0.55 part 10 1.52 part 10 421.16 00 Containing by explit not ever 350 of water 10 0.55 part 10			antipalaner antoni	18. y	solyidenis content + 5% pl val	nolybdenics content + 15% nd val	
321.16 33 containing by weight over 45 of sater 35 36 0.47 per 35 0.57 per 35 321.22 40 Fyrephraphetes 36 37 <	421.16	00	Thosphate, except prophesphates Containing by weight not pwer #5% of water			*	
421.22 36 Providing fails 11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	421.16	ço	of crystallization. Containing by weight over 45% of water	135	0,4* par 15	1.54 per ib	
421.35 00 Silitofluoride	421.22 421.34	00 00	Pyrophosphates Silicates	μ	55 ga wal. B.25e per 16	25% ad vel 0.4758 per ib.	
423.47 10 Anhydraue. Ton 12 per ton 13 per tin 421.48 00 Crystallized (Glauber's calt). Ton 12 per ton 13 per tin 421.51 00 Sulfide. 15 0.57 per tin 0.75 per tin 0.75 per tin 421.51 00 Sulfide. 15 0.67 per tin 0.75 per tin 0.75 per tin 421.52 00 Tonstate. 15 0.75 per tin 0.75 per tin 0.75 per tin 421.52 00 Tonstate. 15 0.75 per tin 0.75 per tin 0.75 per tin 421.52 00 Tonstate. 15 0.75 per tin 0.75 per tin 0.75 per tin 421.53 00 Tonstate. 15 0.75 per tin 0.75 per tin 0.75 per tin 421.54 00 Tonstate. 15 0.75 per tin 0.75	421.30	00 01	Silicofluoride. Sulfare. Frude (sulf sulf)	10 5 ton	0.55c par 15	1 St per 10.	
441.32 60 Sulfite, bisuifite, setabisuifite, mad 0. 0.337 per 10 0.577 per 10 <td< td=""><td>421,44 421 45</td><td>40 00</td><td>Ardydraus Crystallized (Glaub+r's sait)</td><td>Топ Топ</td><td>454 per ton 904 per ton</td><td>\$1 per tun \$1 per tun</td></td<>	421,44 421 45	40 00	Ardydraus Crystallized (Glaub+r's sait)	Топ Топ	454 per ton 904 per ton	\$1 per tun \$1 per tun	
421.55 00 Dargetate 10 <td>421.52 421,54</td> <td>60 00</td> <td>Sulfice Sulfice, bisulfite, metableutfite, and thissulfate.</td> <td>μο</td> <td>0.164 net 10.</td> <td>9.2754 per 15</td>	421.52 421,54	60 00	Sulfice Sulfice, bisulfite, metableutfite, and thissulfate.	μο	0.164 net 10.	9.2754 per 15	
411 58 00 Dramate	421.56	00	Tungstate	15 15	57e per 18. on tungsten trotent *	60e per 15. an tungsten montant *	
421.62 Other Other Structive performate Structive compounds: 66 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.72 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.72 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.72 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.73 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.74 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.75 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.85 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.85 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.85 Structive compounds: Structive compounds: Structive compounds: Structive compounds: 421.85	421.58 421.60	00 00	Uranate. Vanadate	Eb	Brose 26.55 ad val	Free 40% ad val	
421.70 Struttium stempounds: Larbowsts: 15 Tree Free 421.70 00 Kot precipitated, fucluding structurits 15 115 ad val. 25 ad val. 421.70 00 Freeipitated, fucluding structurits 15 115 ad val. 25 ad val. 421.71 00 Freeipitated, fucluding structurits 16 115 ad val. 25 ad val. 421.72 00 Witrgts 115 ad val. 25 ad val. 25 ad val. 421.72 00 Outde 115 ad val. 25 ad val. 25 ad val. 421.72 00 Outde 113 ad val. 25 ad val. 25 ad val. 421.72 00 Mineral (celestite) 10 113 ad val. 25 ad val. 421.82 00 Other 11 11 25 ad val. 25 ad val. 421.88 00 Other 11 11 25 ad val. 25 ad val.	421,62	SC 44	Other octum performate		b's ad val.	so val	
421.70 00 Free			Strontium compounds:				
421.74 00 Witzers	421.70 421.72	00 DQ	Not precipitated, including strontlamite Precipitated.	u	Free 115 ad val	free 255 ed val	
421.42 60 Himeral (celestite) Line Free Free Free 421.24 90 Other	421.74 *421.76	00 00	Nitrate	1.h 1.þ	11% ad val. 11% ad val.	20% ad val. 23% ad val.	
421.65 90 Other	421.82 421.84	60 00	Mineral (cleasite)	Lb	Free 95 od val	Proc 25% ad Vr1.	
	421.86	90	Other	La	9% ad val.	298 ad 281	

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

Page 236

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 2. - Chemical Elements, Inorganic and Organic Compounds, and Mixtures

4 - 2 - C 421.90 - 423.96

Loss Ex. Loss Consistion Consistion <t< th=""><th>Ttom</th><th colspan="2">Stat.</th><th>Units</th><th colspan="3">Rates of Duty</th></t<>	Ttom	Stat.		Units	Rates of Duty		
Action Action on comparison File Out and the second se	Icem	fix	Ar (JULES	Quantity	1	2	
Annu Processor	102.00			1.		251 ad eat	
42.238 AT Marine complete AT	421.90	00	The Little compounds	1.9 1h	Us ad val	25% ad val	
12.2.17 07 XiringLe			Tharium compounds:				
42.10 10	422.10 422.12	90 00	Nitrato	10	31 ad val. 31 ad val.	35% ad val. 35% ad val.	
422.00 00 11 d. vol. 25 d. vol. 25 d. vol. 422.00 00 Derra, vol. vol. 15 d. vol. 15 d. vol. 25 d. vol. 422.00 00 Derra, vol. vol. 15 d. vol. 15 d. vol. 25 d. vol. 422.00 00 Derra, vol. vol. 16 d. vol. 25 d. vol. 55 d. vol. 422.01 10 Exprise contaction 10 d. vol. 25 d. vol. 50 d. port 10 d. vol. 422.02 00 Expression 20 d. vol. 10 d. vol. 10 d. vol. 50 d. port 10 d. vol. 422.02 00 Expression 10 d. vol. 10 d. vol. 10 d. vol. 10 d. vol. 50 p. port 10 d. vol. 50 p.	422.14	00	Cther.	1.0	51 (6.08).	35% 80 VAL.	
12. 10 10 Theorem 1. 10 <td>422.20 422.24</td> <td>00 00</td> <td>Bidorice</td> <td>16 15</td> <td>11° ad val. 13° ad val.</td> <td>25% ad val. 25% ad val.</td>	422.20 422.24	00 00	Bidorice	16 15	11° ad val. 13° ad val.	25% ad val. 25% ad val.	
422.40 0 Function company. 0 10 10 10 10 10 422.40 0 Employee company. 0 10	422,26	- 00	Otrez.	Lb	11 ad val.	25% ad val.	
422.43 33 Largensis 20	462	- uu .	faresten compounds	1 10	13 (0 %).	50 * 111 VAL.	
10 Otions 10 10 10 10 10 100<	422.40	00	Carbide	Lb Lb. v	37 per 15, on in sten content +	604 per 1b. on tungsten content +	
427, 50 00 00 states composingle 10. <td>422.42</td> <td>90</td> <td>Others</td> <td>1.b</td> <td>d eni. per lb. on</td> <td>50% nd val. 60% per 1b. en</td>	422.42	90	Others	1.b	d eni. per lb. on	50% nd val. 60% per 1b. en	
422.50 00 Diddom			Display of the second		i ad vals	40°, ad val.	
422.3 00 Windows and sample data 0	422.50	00	Thranzum epimpolitides Dei desserverses en entre en exercise en entre	15	Proc	Free	
122 as 122 as 122 as 122 as 122 as 122 as12 ad wal percentation and a second and a se	422,52	1.60	What we can all the	10	1 se	i pec	
G22.5290Other9192.5 ad vel.92.5 ad vel.94.4 ad ad. 427.72 00Arronstes	422.58 422.60	00 00	Garbide	16 16	115 ud val. 28 Stad val.	255 ad val. 40% ad val.	
422.70 00 Arsenta 11. of yol. 25. ad yol. 422.72 00 Arsenta 11. of yol. 25. ad yol. 422.72 00 Arsenta 11. of yol. 15. of yol. 422.72 00 Arsenta 11. of yol. 15. of yol. 422.77 00 Bit fact. 11. of yol. 15. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. 25. of yol. 422.77 00 Bit fact. 11. of yol. <td< td=""><td>422.62</td><td>00</td><td>Other pressure receive a present and contract of the second second</td><td>""·····</td><td>28.05 ad val.</td><td>40% ad val.</td></td<>	422.62	00	Other pressure receive a present and contract of the second	""·····	28.05 ad val.	40% ad val.	
422, 73 00 Cynit Bar,, array a	422.70	00 00	Arsentle	11	11% ad val. 0.55¢ per 15.	25% ad val. 1.3e per 16.	
422.79 00 Strikter. Dr. 20, rate. Dr. 20,	422.73 422.74	00 00	Cyana des. hydrosul Site	15 15	ree 51% ad val.	Free 35% ad val.	
222 80 00 21 reactive compounds: bi	422,76	00	Others	(b)	0.257 per 10. 9% ad val.	0,756 per 16. 25% ad val.	
422.22 00 Other	422,80	00	Zircoulum compoundst Oxide	Lb	9% ed val.	25% ad val.	
422.90 00 boron carbide	422.32	00	Other Program of compands.	10	9% ad Valt.	25% nd val,	
422,94 00 Sulfue dioxide Sulfue dioxide 25% ad val. 423,00 00 Diber	422.90 422.92	00 00	Boron carbide.	1b 1b	5.5% ad val. 11% ad val.	25% ad val. 25% ad val.	
60 Other weides, hydrowidns, or: percent des 1 423,80 00 Mixtures of two or more inorganic compounds: In chief value of bismuth	422.94 423.00	00 40	Sulfur dioxide	S. ten.	115 od val. 9% ad val.	25% ad val. 25% ad val.	
423.80 00 Mixtures of two or more inorganic compounds: In chief value of bismuth 1b 25% ad val. 35% ad val. 423.82 00 In chief value of compounds which are free of duty under the foregoing provisions of this subpart 1b Free Free 423.83 00 In chief value of hydrogulfite compounds, sulfoxylate compounds, or both 1b 31% ad val. 35% ad val. 423.84 00 In chief value of moreury 1b 1b 1b 25% ad val. 423.85 00 In chief value of moreury 1b 1b 1b 25% ad val. 423.85 00 In chief value of molybdenum 1b 1b 15% ad val. 35% ad val. 423.85 00 In chief value of nickel oxide 1b 1b 1b 15% ad val. 423.96 00 In chief value of nickel oxide 1b 1b 37% par lb. on tunestan molybdenum content + 5% ad val. 35% ad val. 423.96 00 In chief value of van/dium		60 30	Other crides, hydroxidus, and peroxidus Other				
423.32 00 In chief value of cynned compounds which are free af duty under the foregoing provisions of this subpart,	423 80	00	Mixtures of two or more inorganic compounds; In chief value of bismuth	Lb	25% ad val	35% ad val	
423.84 00 in chief value of hydrosulfile compounds, sulfoxiate compounds, solf ad val, sulfoxiate compounds, ero both	423.82	00	In thief value of cyanide compounds which are free of duty under the foregoing provisions			oor av tur.	
423.85 00 In chief value of moreury 10 10 10 10 21. by ad val. 22. by ad val. 423.85 00 In chief value of moreury 10 10 10 10 22. by ad val. 423.85 00 In chief value of molyhdenum, 10 10 10 10 22. by ad val. 423.95 00 In chief value of nickel oxide 10 10 10 50. per 1b. * 25. ad val. 423.92 00 In chief value of nickel oxide 10 10 10 50. per 1b. on molyhdenum content * 423.92 00 In chief value of nickel oxide 10 10 10 50. per 1b. on tungsten 423.94 00 In chief value of vanadium	423,84	00	of this subpart In chief value of hydrosulfite compounds,	tb	Free	Free	
423.88 00 In chief value of molybdenum 10 13 per 3b. on molybdenum content + 53.ad val. 50 per 3b. on molybdenum content + 15b 50 per 3b. on molybdenum content + 15b 50 per 3b. on molybdenum content + 15b 15b 15b 10b	423.86	00	Sulfoxylate compounds, or both In chief value of morcury	10 10	bis ad val. 16¢ per 16, + 115 of val	25% ad val. 22c per 15. + 25% ad val	
423.90 00 In chief value of nickel oxide	423.88	00	In chief value of molyhdenummolybdenum content	$b \dots b$	18¢ per 15, on molybdenum content +	50¢ per lb. on molybdenum content +	
423.94 00 In chief value of vanidium	423,90	00	In chief value of nickel oxide	Lb	S% ad v#1. Free	15% ad yal. Free	
423.96 00 Other	423.94	00	in chief value of vangdium. In chief value of vangdium.	1.0	content + 18% ad va 28,5% ad val.	content + 40% ad val. 40% ad val.	
	423,96	00	Other	tb	viad val.	25% ad val.	

A-16

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 1 Schedule 4,

Part	2
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Modia p. 85, us	leations of column modified by Pres. F	l rates of duty by roc.3818 , Bow. 6.	<u>Staged</u> Pres. Proc. 3694 (C 1967 , 32 F.R. 1349	<u>Rates</u> anadian Compensation 7 :	i). Dec. 27, 1965, 3	CPR, 1965 Supp.,	
1845 1 ton		Rate of duty, effective with respect to articles entered on and after January 1					
	Prior rate*	1960	1967	1968	1969	1970	
418.94 + 419.76 420.54	10.5% ad val. 10.5% ad val. 10.5% ad val.	9% od val. 9% ad val. 9% ad val.	85 ad val. 84 ad val. 84 ad val.	7% ad val. 7% ad val. 7% ed val.	6% ad val. 6% ad val. 6% ad val.	5% ad val. 5% ad val. 5% ad val.	

Modifications of column 1 mates of duty by Pres. Proc. 3822 (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002:

TSUS Prior		Rate of duty, effective with respect to articles entered on and after January 1					
item	rate	1968	1969	1970	1971	1972	
415.05	10¢ per 1b.	9¢ per 1b.	8¢ per 1b.	7¢ per 1b.	6¢ per lb.	5¢ per lb.	
415.10	17% ad val.	15% ad val.	13.5% ad val.	11.5% ad val.	10% ad val.	8.5% ad val.	
415.15	5% ad val.	4% ad val.	3% ad val.	2% ad val.	1% ad val.	Free	
415.20	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.	
415.27 <u>1</u> /	10¢ per 1b.	9¢ per 1b.	8¢ per 1b.	7¢ per 1b.	6¢ per lb.	5¢ per lb.	
415.30	25% ad val.	22% ad val.	20% ad val.	17% ad val.	15% ad val.	12.5% ad val.	
415.35	4¢ per 1b.	3.5¢ per lb.	3¢ per 1b.	2.8¢ per lb.	2.4¢ per lb.	2¢ per lb.	
415.40	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.	
415.50	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.	
416.05	3¢ per 1b.	2.7¢ per lb.	2.4¢ per 1b.	2.1¢ per lb.	1.8¢ per lb.	1.5¢ per lb.	
$\begin{array}{r} 416.10 \ \frac{1}{4} \\ 416.30 \ \frac{1}{4} \\ 416.40 \end{array}$	0.5¢ per 1b.	0.4¢ per 1b.	0.4¢ per 1b.	0.3¢ per 1b.	0.2¢ per 1b.	0.2¢ per 1b.	
	1¢ per 1b.	0.9¢ per 1b.	0.8¢ per 1b.	0.5¢ per 1b.	0.5¢ per 1b.	0.5¢ per 1b.	
	42¢ per 1b. on	37¢ per 1b. on	33¢ per 1b. on	29¢ per 1b. on	25¢ per 1b. on	21¢ per 1b. on	
	tungsten con*	tungsten con-	tungsten con-	tungsten con-	tungsten Con-	tungsiten con-	
	tent + 20%	tent + 18%	tent + 16%	tent + 14%	tent + 12%	tent + 10%	
	ad val.	ad val.	ad val.	ad wal.	ad Val.	ad val.	
416.45	12.5% ad val.	11% ad val.	10% ad val.	8.5% ad val.	7% ad val.	6% ad val.	
417.10	0.3¢ per 1b.	0.27¢ per 1b.	0.24¢ per 1b.	0.2¢ per lb.	0.18¢ per 1b.	0.15¢ per 1b.	
417.12	0.25¢ per 1b.	0.22¢ per 1b.	0.2¢ per lb.	0.17¢ per 1b.	0.15¢ per lb.	0.12¢ per lb.	
417.14	0.6¢ per 1b.	0.5¢ per 1b.	0.4¢ per lb.	0.4¢ per 1b.	0.3¢ per lb.	0.3¢ per lb.	
417.16	0.1¢ per 1b.	0.09¢ per 1b.	0.08¢ per lb.	0.07¢ per 1b.	0.06¢ per lb.	0.05¢ per lb.	
417.18	8.5% ad val.	7.5% ad val.	6.5% ad val.	5.5% ad val.	5% ad val.	4% ad val.	
417.20	8.5% ad val.	7.5% ad val.	6.5% ad val.	5.5% ad val.	5% ad val.	4% ad val.	
417.22	1.25¢ per 1b.	1.12¢ per 1b.	l¢ per lb.	0.87¢ per 1b.	0.75¢ per lb.	0.62¢ per lb.	
417.24	0.5¢ per 1b.	0.45¢ per 1b.	0.4¢ per lb.	0.35¢ per 1b.	0.3¢ per lb.	0.25¢ per lb.	
417.26	0.53¢ per 1b.	0.47¢ per 1b.	0.42¢ per lb.	0.37¢ per 1b.	0.31¢ per lb.	0.26¢ per lb.	
417.28	20* per 1b. on molybdenum content + 6% ad val.	18; per 15, on molybdenum content' + 5% ad val.	164 per lb. on molybdomum content + 4.53 ad val.	147 per 15. on molybdenum content + 4% ad val. 1	124 per 15. 68 molybdenum content + 3,5% ad val.	nolybicnum content * 3 as val	
417.30	0.5¢ per 1b.	0.45¢ per 1b.	0.4¢ per lb.	0.35¢ per 1b.	0.3¢ per lb.	0.25¢ per 1b.	
417.32 <u>1</u> 417.34 417.36 417.38	0.75¢ per 10. 0.6¢ per 1b. 10% ad val. 8.5% ad val.	0.54¢ per 15. 0.54¢ per 15. 9% ad val. 7.5% ad val.	0.45¢ per 15. 0.45¢ per 15. 8% ad val. 6.5% ad val.	0.4¢ per 1b. 7% ad val. 5.5% ad val.	0.35¢ per lb. 6% ad val. 5% ad val.	0.3¢ per 1b. 5% ad val. 4% ad val.	
417.40	42¢ per 1b. on tungsten con- tent + 20% ad val.	374 per 1b. on tungsten con- tent + 18% ad val.	537 per 1b. on tungsten con- tent + 16% ad val.	292 per 10, on tungsten con- tent + 14% ad val.	tungsten con- tent + 12% ad val.	tungstan con- tunt + 105 ad val.	
417,42	52% ad val.	28.5% ad val.	25.5% ad val.	22% ad val.	19% ad val.	16% ad yal.	
	8.5% ad val.	7.5% ad val.	6.5% ad val.	5.5% ad val.	5% ad val.	4% ad val.	
417.50 <u>1</u> 417.52	0.6¢ per lb. 0.5¢ per lb. +	0.5¢ per 1b. 0.4¢ per 1b. +	0.3¢ per lb. 0.4¢ per lb. + 10% ad val	0.3¢ per lb. 0.3¢ per lb. + 8.5% ad val.	0.3¢ per 1b. 0.3¢ per 1b. + 7% ad val.	0.3¢ per 1b. 0.25¢ per 1b. + 6% ad val.	
417.54	0.8¢ per 1b. +	0.4¢ per 1b. +	0.4¢ per 1b. +	0.4¢ per lb. +	0.4¢ per lb. +	0.4¢ per lb. +	
	20% ad val.	18% ad val.	16% ad val.	14% ad val.	12% ad val.	10% ad val.	
417.64	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.	
417.70	1.6¢ per 1b.	1.44¢ per lb.	1.28¢ per 1b.	1.1¢ per lb.	0.95¢ per 1b.	0.8¢ per 1b.	
417.72	4.8¢ per 1b.	4.3¢ per lb.	3.8¢ per 1b.	3.3¢ per lb.	2.8¢ per 1b.	2.4¢ per 1b.	
417.74	1.25¢ per 1b.	1.1¢ per lb.	1¢ per 1b.	0.85¢ per lb.	0.75¢ per 1b.	0.6¢ per 1b.	
417.76	1¢ per 1b.	0.9¢ per lb.	0.8¢ per 1b.	0.7¢ per lb.	0.6¢ per 1b.	0.5¢ per 1b.	

 $\underline{1/}$ See footnote 1 at the end of this list of Staged Rates.

Notes p. 2 Schedule 4, Part 2

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APPENDIX A

STAGED RATES AND HISTORICAL NOTES

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3822 (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002 (con.):

TSUS	Prior	Rate of duty, effective with respect to articles entered on and after January 1				
item	rate	1968	1969	1970	1971	1972
417.78 417.80 417.90 417.92 418.00	2¢ per'lb. 10% ad val. 10% ad val. 10.5% ad val. 28% ad val.	1.8¢ per 1b. 9% ad val. 9% ad val. 9% ad val. 25% ad val.	1.6¢ per lb. 8% ad val. 8% ad val. 8% ad val. 22% ad val.	1.4¢ per lb. 7% ad val. 7% ad val. 7% ad val. 19.5% ad val.	1.2¢ per lb. 6% ad val. 6% ad val. 6% ad val. 6% ad val. 16.5% ad val.	1¢ per lb. 5% ad val. 5% ad val. 5% ad val. 14% ad val.
418.14 418.18 418.22 418.24 <u>1</u> / 418.25	0.425¢ pur 16, 10.5% ad val. 12.5% ad val. 0.25% per 10. 20% yer 15. of moly*denum con- tent + 6% ad val.	0.384 por 1b. 9% ad val. 11% ad val. 0.224 por 1b. 18, per 1b. on molybdemum con- rent + 5% ad val.	0.344 per 1b. 8% ad val. 10% ad val. 0.4 per 1b. 14 per 1b. 15 per 1b. 15 per 1b. 15 per 1b. 15 per 1b. 16 per 16 per	0.20¢ per Hs. 7% ad val. 8.5% ad val. 0.17¢ per Hs. 14¢ per Hs. of 101/bde num con- tent + 4% ad val.	0.25¢ per 1b. 6% ad val. 7% ad val. 0.15¢ per 1b. on molybdynum con- tent $+$ 5.5% ad val.	0,214 per 1b. 5% ad val. 6% ad val. 0.12c per 1b. 104 per 1b. on molybdenum.con- tent + 3% ad val.
418.28 418.30 418.32 418.40 418.42	9.5% ad yel. 42% yer 15. on tungston con- tent - 20% ad wal. 10.5% ad wal. 30% nd wal. 30% nd wal.	8.5% ad vol. 37% per 16. on tungsten con- tent + 18% ad vol. 9% ad vol. 27% ad vol. 27% ad vol.	7.5% ad vul. 35% por 15, on tunesten con- tent * 10% ad val. 5% ad val. 24% ad val. 24% ad val.	6.5% ad val; 29g per 1b. on tungsten con- tent + 14% ad val; 7% ad val; 21% ad val; 21% ad val;	5.5% ad val. 254 per 10. on tungsten con- tont + 12% ad val. 6% ad val. 18% ad val.	4.5% ad val. 21e per 1b. on tungston con- tent + 10% ad val. 5% ad val. 15% ad val.
418,44 418,50 438,52 418,56 1/ 418,57 1/	50% ed val. 12.3% ad val. 10.5% ad val. 1.5% per 15. 1.5% per 15.	27% ad val. 11% ad val. 9% ad val. 1.34 per 36. 1.34 per 36.	24% ad val. 10% ad val. 5% ad val. 1.2% per 10. 1.2% per 10.	215 ad val. 8.55 ad val. 75 ad val. 14 per 15. 14 per 15.	181 ad val. 7% ad val. 6% ad val. 0.9e por 10. 0.9e por 10.	155 ad val. 65 ad val. 55 ad val. 55 ad val. 0.74 per 15. 0.74 per 15.
418,68 418,72 418,74 418,75 <u>1</u> 7 418,75 <u>1</u> 7	12% od vnl, 1.27% per 15 10.5% ac v1. 1.27% per 15. * 10.5% ac v1. 1.7% per 16. on copper content 1.27% per 15. * 1.25% per 15. *	10 51 nd val 1 14* per 10. + 9 vad val. 1 14* per 15. + 9 ad val. 1 5* per 15. on copper content 1 5* per 15. * 95 ad val.	9.5% and wark. 1.024 over 10. + 5% ad wark. 1.024 per 10. + 5% ud wark. 1.5% ver 10. on copper content 1.024 per 10. + 5% ad wark.	 ad val. b) of per lh. + ad val. c) of per b. + ad val. c) or lb. on con ber content on ber vontent of ad val. 	7% ad vat: 0.7%; per fb 6% ad vat: 0.7%; per fb 6% ad vat. 14 per fb. on copper content 0.7%; per fb 6% ad vat.	 c's ad val. 0.637¢ per lh. + 5% ad val. 0.637¢ per lb. + 5% ad val. 0.5¢ per lh. on copper Content 0.637¢ per lb. + 5% ad val.
418.00 419.00 L/ 419.00 419.00 419.10	10% ad val. 1.5% per 1b. 1.5% per 1b. 15% ad val. 10.5% ad val.	9% ad val. 1.3e per 15. 1.3e per 15. 13% ad val. 9% ad val.	8% ad val. 1.2% per 15. 1.2% per 10. 12% ad val. 8% ad val.	7% ad val. 14 per 18. 14 per 18. 14 per 18. 10% ad val. 7% ad val.	6% ad val. 0.9; per 15. 0.9; per 15. 9% ad val. 6% ad val.	5% ad val. 0.74 per Ib. 0.74 per Ib. 7.5% ad val. 5% ad val.
$\begin{array}{c} 419.20\\ 419.22\\ 419.22\\ 419.24\\ 419.28\\ 419.32\\ 419.32\\ \end{array}$	8.5% ad val. 0.35% per 1b. 1% per 1b. 0.42% per 1b. 2% per 1b.	7.55 ad val. 0.35 per 15. 0.96 per 16. 0.3784 per 15. 1.85 per 15.	6.5% ad val. 0.25¢ per 1b. 0.8¢ per 1b. 0.53¢ per 1b. 1.6¢ per 1b.	5.5% ad val. 0.24¢ per lb. 0.7¢ per lb. 0.29¢ per lb. 1.4¢ per lb.	5% ad val. 0.174 per 16. 0.64 per 16. 0.354 per 16. 1.24 per 16.	4% ad vol. 0.17; per 1b. 0.5; per 1b. 0.21; per 1b. 1; per 1b.
419,34 419,38 419,40 419,42 419,44	0.375; per lh. 8.5% ad val. 10% od val. 10% ud val. 14% od val.	0.335; per lb. 7.5% ad val. 9% ad val. 12.5% ad val.	0.3t per 15. 6.5% ad val. 8% ad val. 8% ad val. 11% ad val.	0.264 per 16. 5.35 ad val. 75 ad val. 75 ad val. 9.55 ad val.	0:225¢ per 1b. 5% nd val. 6% ad val. 6% ad val. 8% ad val.	0.187¢ per 1b. 4% ad val. 5% ad val. 5% ad val. 7% ad val.
419.50 419.52 419.54 419.60 419.70	13.54 per 15. + 12.54 ad vol. 18.54 per 15. + 12.55 ad val. 18.54 per 15. + 12.55 ad val. 20¢ per 15. on molybdenum con- tent * 65 ad val. 10.55 ad val.	Number 15. 1 11% ad vol. 16% per 16. * 11% ad vol. 16% per 16. * 11% ad vol. 18% per 16. on melybdenum con- tent + 6% ad vol. 9% ad vol.	 14r per B., * 10% ad vai. 14s per B., * 10% ad vai. 14s per B. * 104 ad vai. 16s per B. on molyhdemas content * 4.55 ad vai. 8% ad vai. 	12. " per 1b. t 8. " ad val. 12. per 1b. + 8. ad val. 12. cer 1b. + 8. ad val. 13. cer 1b. con 145 eigen con- ten + 15. ad val. 7. ad val.	 11.14 par 15. * 75 ad val. 11.16 par 15. * 76 ad val. 11.14 par 15. * 76 ad val. 124 par 15. on molybdenum content * 3.55 ad val. 65 ad val. 	94 per 10. • 64 ad val. 94 per 10. • 64 ad val. 94 per 10. • 65 ad val. 104 per 10. on molybdenua con- tent + 3% ad val. 5% ad val.

A-19

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 3 Schedule 4, Part 2

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3812 (Kennedy Round), Dec. 16, 1967. 32 F.R. 19002 (con.);

TSUS	Prior	Rate of duty,	luty, effective with respect to articles entered on and after January 1				
item	rate	1968	1969	1970	1971	1972	
419,74 419,80 415,82 419,84 419,90	10.55 ad val. Se per 10. Se per 10. Je 56 ad val. 1036 ad val.	975 ad vet 2. % ver 16 5. % per 16. 97. ad vet 95. ad vet.	8% ad vat 2.44 per B. 4.89 per B. 6% ad vat 8% ad vat	75 ad val. 2.14 per B. 4.24 per B. 75 ad val. 75 ad val.	65 ad voj 1.85 per 76. 1.65 per 70. 65 ad vuj. 65 ad vuj.	55 ad val . Se per lb. 14 per lb 15 ad val 15 ad val	
420.00 420.02	le per lb. 4∉ per lb. B 575* ner lb.	0.94 per 15. 3.54 per 15. 8.554 per 15.	0.84 per 15. 34 per 15. B.54 per 15.	0.7e per 15. 2.8e per 15. 9.43e mer 15.	0.6; per 35. 2.4; per 15. 0.37; per 15.	0.94 per 18 24 per 16. 0 36 per 16.	
420.06 420.08	1.54 per 16. 2.25e per 16.	1.354 per 15. 24 per 15	1.24 per 16. 1.84 per 16.	1.054 per 15. 1.554 per 15.	0.0* per 16. 1.35t per 16.	0.75† pet 15. 1.14 per 15.	
440,14 1/ 420,18 420,18 1/ 420,20 420,27	2.34 per 10 1.64 per 10 0.25 per 10 254 per 10 254 per 10, on metalements (con- tent * 5% ad vol.	2e per lh. 1. As per lb. 0. 15 e per lb. 22 e per lb. 18 e per lh. on mailybdoust 20 m pent + Si ad val	1.84 per B 1.34 per B 0.154 per B 204 per B 184 per B 184 per B 184 per B 184 per B 185 per B 185 per B 185 per B 185 per B 185 per B	1.54 per B. 1.14 per B. 0.14 per B. 174 per B. 144 per B. un malydown con- tent + 45- md rat.	1.3s per 15 0.3s per 15 0.1s per 15 15s per 15. 13s per 15. 13s per 15. 14s per 15. 15 of the second	le per th 0.4e per th 1. te per th 1.2 per th 10 per th at 10 per th at 10 per th at 10 per the st 10 per th at 10 per the st 10 per the st 10 per the st	
4201,24 4201,26 4401,28 4401,50 4201,33	o Bis per Ib. 1. Se per Ib. de per Ib. 8. Sis ad val. 42; per Ib. on tangsten con- tent + 20% ad val.	0.75c per lb. 1.3c per lb. 5.4c per lb. 7.5% ad val. 37c per lb. on rungsten con- tunt + 155 ad val.	D.588 per 15 1.42 per 15, 4.35 per 15, 6.55 ad val. 35e per 16, on tangeten con- tent + 165 ad val.	 b. 194 per 1b 1. 24 per 1b 5. 36 ad val. 204 per 1b. en 204 per 1b. en tungsten pon- tungsten pon- tong + 1d bd val. 	b Sk per lb. " o de par la Ske per lb. Sk per lb. of togster con- tent + 12k od onl	0 Ale per lh. 0 Ale per lh 10 per lh 10 per lh an tongrien call- tent + 103 ad val	
420.34 430.36 420.40 420.60 420.60	375 ml val. 8.55 sd val. 105 md val. 105 md val. 8.55 md val.	28.5% ad yel. 7.5% ad yel. 9% ad yel. 9% ad yel. 7.5% ad yel.	25.55 ad val. 6.33 ad val. 85 ad val. 85 ad val. 6.53 ad val.	25 ad val 5 35 ad val 75 ad val 75 ad val 5 35 ad val	195 ad vit. 55 ad vit. 64 ad vit. 55 ad vit. 55 ad vit.	16k ad val. 4k ad val. 5k pd vak. 5% ad val. 4k ad val.	
420.70 420.78 420.82 <u>1</u> /	0.8; per 1b. 0.125¢ per 1b. 10¢ per 1b.	0.70 per 10. 0.14 per 10. 9¢ per 15.	0 6¢ per 10. 0 1¢ per 10. 8¢ per 1b.	0.03¢ per 10. 0.03¢ per 10. 7¢ per 1b.	0.071 per 1b. 6¢ per 1b.	5¢ per 1b.	
420:54 420:86 1/ 420:88 420:92 420:94 420:96 420:98	0.25; per b. 0.25; per b. 0.75; per b. 10; mi val 1.7; per 100 b. 2.5; per 100 b. 1.75; per b.	0.22* per 1b. 0.25 per 1b. 0.65; per 1b. 0.65; per 1b. 1.5* per 100 1b. 2.5* per 100 1b. 1.55; per 100 1b.	0.24 per 10. 0.24 per 10. 0.04 per 10. 1.34 per 100 10. 24 per 100 10. 1.44 per 10.	0.17; per 16. 0.15; per 16. 7.5; per 16. 7.5; per 10. 1.15; per 100.15. 1; per 100.15. 1; 2; per 16.	Color per 0 Color per 0 Color per 0 Color per 10 Color per 100 10 Color per 100 10 Color per 10	<pre>b.is per ib b.is per ib c.if per ib, is ad val c.is per 100 fb, Free 0.076 per 10.</pre>	
421,04 1/ 421,05 423,08 1/ 421,10 421,14	C.te per 15 33 ad val. 5 25s per 15. 25 per 15. ad val. 3.6s per 15	0.54 per 15. 315 ad vil 0.27 per 15. 18. per 15. 18. per 15. 19. per 15. 19. per 15. 19. per 15. 20. per 15. 3. 241 per 15.	0 454 per lu. 265 ad val 8.74 per lb 14. per lb on belyudente con- tent + 4.18 ad val 2.854 per lb	duste per ll 266 aut val 6.156 per 16 16 per 16 nelpidenum com- tent + 45 ad val 1.55 per 16	 34 per LB 34 per LB 34 per LB 34 per LB 36 per LB 36 per LB 36 per LB 36 per LB 37 per LB 37 per LB 38 per LB 38 per LB 	o secon R 17 Starval. Lis per B 16 per B. 20 salyodoum con- tent + St ad val 1. St per B	
421.16 1/ 421.18 1/ 421.22 421.22 421.34 421.34 421.36	0.50 per 35. 0.250 per 35. 10.35 ad val. 0.34 per 35. 0.4250 per 35.	0.47 per 10. 0.74 per 10. 98 ad vol 0.254 per 10. 0.554 per 10.	0.4e per 15. 8.2e per 15. % nd yst 0.24e per 15. 8.5e per 15.	0.34 per D. 6.154 per D. 7. 46 ver D. 7. 46 ver D. 6.454 per D.	8.5: per 15. 6.15: per 15. 6: sd val. 9.15: per 15. 9.33: per 15.	0.22 per 15 0.12 per 15 35 ad wel. 0.15, per 15 0.32 per 15	
421 44 3/ 421 46 3/ 421,52 421,52 421,54 3/ 421,36	Sug per ton \$1 per ton \$.755 per 15. 0.1830 per 15. 432 per 15. un tungston con- tont + 20. ad val	45e per ten Sue per ten 6 57e per 1k 6.15e per 1k 57e per 15 su tungstin con- text + 125 ad val.	Abe per ton 50 s pir ton 0 se per 15 0.15 t per 15 Se per 15 so turgstim con- tent + 15 ad Val.	St per ten DS per ten 0.124 per 3 3,131 per 3 24 per 10 cen tengeten cen tenge e 14 ad egi	Not per ton Oit per 100 0.15: per 10. 1.1: per 10. 2.1: per 10. m tulgelen cub- tent = 125 ad >31	De per tan So per tan D. De per th So per th So per th So per th or the so tanget e con- tent = 105 mi val	

1/ See footnote 1 at the end of this list of Staged Rates.

282-084 O - 67 - 23

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 4 Schedule 4, Part 2

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3822 (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002 (con.):

TSUS	Prior	Rate of duty, effective with respect to articles entered on and after January 1					
item	item rate	1968	1969	1970	1971	1972	
421,60 421,62 421,72 421,72 421,74 421,76	52% ad wal. 10.5% ad wal. 12.5% ad wal. 12.5% ad wal. 12.5% ad wal. 12.5% ad wal.	 78.55 ad val. 95 ad val. 111 ad val. 113 ad val. 114 ad val. 	25.5% ad val. 8% ad val. 10% ad val. 10% ad val. 10% ad val.	24 ad val. ad val. 55 ad val. 55 ad val. 55 ad val.	19% ad val. 6% ad val. 7% ad val. 7% ad val. 7% ad val.	16% ad val. 3% ad val. 6% ad val. 6% ad val. 6% ad val.	
421,84 421,86 421,90 422,00 422,10	10.55 ad val. 10.55 ad val. 105 mt val. 10.55 ad val. 555 mt val.	9% ad wel. 9% ad val. 9% ad val. 9% ad val. 8% ad val.	<pre>%% ad val. 6% ad val. 8% ad val. 5% ad val. 2%% ad val.</pre>	 ad val. ad val. ad val. ad val. ad val. ad val. 	6% ad val. 6% ad val. 6% ad val. 6% pd val. 21% ad val.	5% ad val. 5% ad val. 5% ad val. 5% ad val. 17.5% ad val.	
422,12 422,34 422,20 422,20 422,24 422,26	55% od val. 55% od val. 12,5% ad val. 12,5% ad val. 12,5% ad val. 12,5% ad val.	51% ed vol. 31% ed vol. 11% e vol. 11% ed vol. 11% ed vol.	23% ad val. 26% ad val. 10% ad val. 10% ad val. 10% ad val.	45 gd val. 45 gd val. 555 gd val. 8.55 gd val. 8.55 gd val.	21% ad val. 21% ad val. 7% ad val. 7% ad val. 7% ad val.	17.5% ad val. 17.5% ad val. 6% ad val. 6% ad val. 6% ad val.	
422,30 422,40 422,42	15% nd val; 42. per 15. on sungsten content + 25% ad val; 42e per 15. on	15% ad val. 57.8% par 15. on caresten content + 221 ad val. 37% por 15. on	173 ad val. 33; per 15, on tungsten content + 205 od val. 53; per 15, on	10% ad val, 29.44 per 10, on tungsten content • 17% ad val. 29¢ per 10, on	95 ed val. 25¢ per 1b. on tungsten content + 155 od val. 25¢ per 1b. on	 7.5% ad val. 21s per lb. on tungston content 12.5% ad val. 21s per lb. on 	
422,58 422,60	<pre>> 201 nd val. 12.55 nd val. 32 nd val.</pre>	tuneston contont + 16% ad val. 11% rd val. 28.5% ad val.	+ lo% ad val. 10% ad val. 25.5% ad val.	 14% ad val. 8.5% ad val. 22% ad val. 	+ 12% ad val. 7% ad val. 19% ad val.	fungsten dontent + joù ad val. 6% ad val. 16% ad val.	
$\begin{array}{c} 412,69\\ 422,70\\ 422,72, \underline{1}^{\prime}\\ 422,74\\ 422,76, \underline{1}^{\prime}\end{array}$	325 83 val. 12 55 ad val. 0.654 nem 15 385 ad val. 0.55 per 16.	28.5% ad val. 11% ad val. 6.55% per 15. 31% nd val. 0.25¢ per 15.	25.54 nd val. 103 gd val. 0.56 per 15. 28% nd val. 0.24c per 15.	72% ad val. 8.5% ad val. 0.4% ad val. 9.2% ad val. 9.2% per 15.	195 ad val. 7% ad val. 0.35t per 10. 21% ad val. 0.18t per 10.	16% ad val. 6% ad val. 0.3e per 1b. 17.5% ad val. 0.15¢ per 1b.	
422.78 422.80 422.82 422.90 <u>1</u> / 422.92	10.84 ad val. 10.55 ad val. 10.55 ad val. 0.855 ad val. 12.55 ad val.	9% ad val. 9% ad val. 9% ad val. 5.5% ad val. 11% ad val.	8% ad val. 8% ad val. 8% ad val. 5% ad val. 10% ad val.	7% ad val. 7% ad val. 7% ad val. 4% ad val. 8.5% ad val.	6% ad val. 6% ad val. 6% ad val. 3.5% ad val. 7% ad val.	5% ad val. 5% ad val. 5% ad val. 3% ad val. 6% ad val.	
422,94 423,00 423,80 423,84 423,84	12.5% ad val. 10.5% ad val. 28% ad val. 55% ad val. 18.5¢ per lb. + 12.5% ad val.	11% ad val. 9% ad val. 25% ad val. 31% ad val. 16% per 10. + 11% gd val.	105 ad val. 8% ad val. 22% ad val. 28% ad val. 14e per 15. + 10% ad val.	8.5% ad val. 7% ad val. 19.5% ad val. 24% ad val. 12.5% per 10. + 8.5% ad val.	7% ad val. 6% ad val. 16.5% ad val. 21% ad val. 11.1¢ per 10. + 7% ad val.	6% ad val. 5% ad val. 14% ad val. 17.5% ad val. 94 por 15. + 6% ad val.	
423,88 423.92	20g per the on molybdenim con- tent + 6% ad val. 42% per the on tungston content	184 per 15. on molybdenim con- tent + 5% ad Val. 374 per 15. on Eusgeten Contont	164 per 15. on molyidenim con- tent + 4.5% ad val. 338 per 15. on lungsten content	144 per lb. on molybdenum con- tent + 4% ad val. 294 per lb. on temgston cortout	12r per lb. on molybdenum con- tent + 3.5% ad val. 25s per lb. on tungsten content	10; per lb. on molybdenum con- tent * 3% ad val. 21; per lb. of tungsten content	
423.94 423.96 425.00	* 20% ad val. 32% ad val. 10.5% ad val. 2.5% pdr.15 * 12.3% ad val.	+ 18% od val. 28.55 nd val. 9% ad val. 2.28 per 16. + 11% ad val.	+ 16% ad val. 25.5% ad val. 3% ad val. 2% per 25. + 10% ad val.	 A% ad val. 2% ad val. 2% ad val. 1.7% per lh. + 8.5% ad val. 	+ 12% ad yni 19% ad yai 16% ad yai 1.5g per 10. + 7% ad yai	 10% ad val. 16% ad val. 5% ad val. 1.254 per lb. + 6% ad val. 	
425.02 425.04 425.08 425.08 425.09	54 per lb. + 155 ad val. 12.55 ad val. 10.555 ad val. 10.55 ad val. 8.55 ad val.	2.75 per db+ 135 ed val. 115 ed val. 25 ed vel. 25 ed vel. 7.55 ed val.	2.44 per 1b. + 12% ad val. 10% ad val. 8% ad val. 8% ad val. 8% ad val.	2.1e per 15. + 194 ad val. 8.55 ed val. 7% ad val. 7% ad val.	1.8e par 1b. + 9% ad val. 7% ad val. 0% ad val. 6% ad val. 5% ad val.	1.54 per lb. + 7.5% ad val. 6% ad val. 5% ad val. 5% ad val. 4% ad val.	

14 20
TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 8 Schedule 4, Part 2

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 9922 (Kennedy Round), Dec. 16, 1967, 32 P.R. 19002 (con.):

TSUS	Prior	Rate of duty, e	Rate of duty, effective with respect to articles entered on and after January 1									
item	rate	1968	1969	1970	1971	1972						
123 42 1/ 123 44 123 18 125 18	7.53 of val. 2.55 per 10 12.58 ad val. 2.55 of val. 2.55 of val. 12.55 of val. 13.57 of val. 15.58 of val. 10.58 of	 c.3% ad wat. c.2% pay H. + 1% ad wat. 7% pay H. + 1% ad wat. 2% pay H. + 1% ad wat. 9% ad wat.	St ad rel. 20 per th. 105 ad vel. 21 per th. 105 ad vel. 24 per th. 105 ad vel. 25 ad vel. 25 ad vel. 25 ad vel. 26 ad vel.	 st ad yes to poor the set to poor the set<th> A set sai J. From B. J. J. J. From B. J. J. J</th><th> 5.5% ad wal. 1.2% per lb 5% ad val. 1.2% per lb 5% ad val. 1.5% per lb 7.5% ad val. 1.5% ad val. 1.6% ad val</th>	 A set sai J. From B. J. J. J. From B. J. J. J	 5.5% ad wal. 1.2% per lb 5% ad val. 1.2% per lb 5% ad val. 1.5% per lb 7.5% ad val. 1.5% ad val. 1.6% ad val						
	wateriel mox combourant	acerial	ady component material	any comprisest material	any component material	sny component material						

1/ In accordance with general note 3(f) to Schedule XX (Geneva - 1967), the rates of duty for this item in the columns headed 1970, 1971, 1972 will become effective unless the European Economic Community and the United Kingdom do not proceed with certain reductions provided for in their respective schedules annexed to the Geneva (1967) Protocol to the GATT. If these two participants do not so proceed, the President shall so proclaim, and the rate of duty in the column headed 1969 will continue in effect unless or until the President proclaims that they have agreed so to proceed. See related footnote 1 to Kennedy Round Staged Rates at the end of schedule 4, parts 3, 4, 5, 7, 8, 9, and 13; schedule 5, part 1; schedule 6, part 2; and schedule 7, parts 2, 9, 12, and 13.

Other A	endsonts s	nd Modification	<u>ت</u>
PROVIDEN		PROVISION	
 425 33 Lien 425,40 (cutoms 1 rate15, 25 at sai ; 435,40 cutom 2 rate134 as sai, 1 deleted and 425 41 trues 425 35 and 825 43 and brasing truedistry preceding true 425 50 addes in the District Press Press. (true add Round), 12 Dis effective date tan 1, 1563 425 42Chigan 1 and 2 rates as due thereased From 12 1 	•	628,53 428,53 428,54 428,54 428,54 428,54 428,56 428,56 428,56 428,56 428,55	angungs "and erganic or inorganic scale (except hydrogen sufficie and hydrogen holide antal)" added to beading imagistaly preceding item 428.55, Pub. 1, 86 241, Sees Tray, 23 Oes T. 1965, 79 Star 935, 938, effective same Dec. 7, 1985.
 ad val, and dat if (s), (h)part(s), (s) to a set (s) and (s) a set (s), respectively, (s), (s), (s), (s), (s), (s), (s), (s)		429,35 429,35 429,35 429,35	<pre>tes 427.50 (Cashingan compounds column 1 repre- fet par 16., column 2 rates Air per 16.) dollate pub. 1 30.241 /ess 7(a).24(a) Oct 7, 1965. 71 Gian, 923, 936, affective date Dec. 7, 1965. 10m 429.00 Feedimen 1 rates 10.35 ad val. rolumn 2 rate 754 ad val.) deleted and 1 temp 429.85 and 439.55 added to Airco Antrophy Press Proc. [temmady Naund]</pre>
	Statistic	cal Notes	
PROVISION 416.45 00Disc.(transferred to 416.4520 & 40)Jan 20Estab.(transferred from 416.4500pt) 40Estab. 40Estab. 40Estab. 00Alumina femdments and Modifications (item 907.15) 00Alumina imported for use in producing aluminum temporarily transferred to 907.1500	Effective date 1, 1967 do do	200/75.00 (19.54 22014 23014 25014	Bifratina 1978 d. forma forma dia 1430 a.a.,

API PNDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 9. - Dyeing and Tanning Products; Pigments and Pigment-Like Materials; Inks, Paints, and Related Products

Page 259

4 - 9 - A 470.05 - 470.57

Ttom	Stat.	Articles		Rates of Duty				
л сеш	fix	AF GUGLEB	Quantity	1	2			
		PART 9 DYEING AND TANNING PRODUCTS; PIGMENTS AND PIGMENT-LIKE MATERIALS; INKS, PAINTS, AND RELATED PRODUCTS						
	A very set of the second s	Part 9 headnote: I. Any product described in this part and also In part I of this schedule is classifiable under said part I, except varnishes, inks, and artists', stu- dents', and chlidren's pigments or paints.						
	والمراجع	Subpart A Dyeing and Tanning Products						
		This subport covers only natorials, estruits, descriptions, and other preparations suitable for coloring tinctucing opening and stallings or for famping. All the products previded for any of mogetanic origin except continent inter (75,03) which is of animal origin:						
		(a) the term "trues or processed" means materi- ets which are crude or which have been processed by shredding, grinding, chipping, crushing, or one simi- tar process, put not otherwise processed, and (b) the term "crich" refers to products offelned from the Appela category Anda category trues.						
470.05	-00	Annato, grobil, cothinael, cudhear, and lithus Brasil wood, cutch, fustic, henna, ingword, madder, Brasil wood, cutch, fustic, henna, ingword, madder,	tb	Free	Fran			
470.18 470.13 470.20	00 00 00	Crute or processed Other Canaigre, chestnot, compay, divisedivi, eucalyptus, hestock, larch, and targs Crute or processed.	15 15 15	Pres 4.53 nd val: Pres	Prove 159 ad ys:: From			
470,23 479,25 470,30 470,40	00 00 00	Chesinet, divi-diri, and healock Other	15 18 15 10	YS all val. 1/ ob ad val. 1/ free Free	134 ad mi 1/ 133 ad mi 1/ Free Free			
470,50	30 39 72	<pre>Mangerrug aprobatan max, quabrach, sumar, orunday, and warthe: Crude or protected quabracha gatrena gatrena comer. comer.</pre>	144- 145- 147- 147-	Pane	Pres			
470,57	40 40 40 90	dy roomston and stands. Other Customston Wittle Other	10 14. 14. 14. 14.	b.5% ad yat. I	199 ar yan y 191 al yai <u>1</u>			
		1/ Lity temperatily supported by legislation. See Appendix to Tabliff Sibedules.						

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part 9. - Dyeing and Tanning Products; Pigments and Pigment-Like Materials; Inks, Paints, and Related Products

Page 260

Ttom	Stat.	A-43-7-00	Units	Rates of	of Duty
ltem	fix	Articles	Quantity	1	2
/9.60	26	Phietial Grade by processed	th	Free.	Free
0.05		and a second state and a second state of the s	\$0	59 dil Val. 17	158 ad wit. 1/
(A. 80		or taming, not specially provided for	18	Eree	line -
1 4.8 5	00	Other.	lb	4.55 az val.	155 ml vol
		Subpart B Pigments and Pigment-Like			
		Materials			
		Subsert B boadnote:			
		t. The term "nigments", as used in this submart.			
		means products consisting of fine solid particles or powder, in dry form, in pulp, or ground in or mixed			
		with oil, water, or other vehicle, commonly known as pigments and suitable for use in Imparting color			
		(including black and white) to paints, inks, rubber, a plastics, linoleum, and other products.			
		Parium combenato			
72 02	00	Natural (witherite):	1.5	Etee	Free
72.04	00	Ground Precipitated.	Lb	11% ad val, 1.08¢ per lb.	30% ad val.
		Barium sulfate:			
72.10	00	Natural (barytes): Crude	Ton	\$2.29 per ton	\$4 per ton
72.12 72.14	00 00	Ground Precipitated (blanc fixe)	Ton Lb	\$5.85 per ton 0.55¢ per 1b.	\$7.50 per ton 1.25¢ per 1b.
		Caltium cathonata:			
2.20 2.22	80 00	Chuta, crude. Chata abiling	Ton	Free 0-09c ner 1h	Pres 9 de nor Ib
2.24	-00	Pretipišstud	w	5.51 ad ve1.	758 an val.
2,30	00	Calcium selfate, pretigitated, and satin selfs	th	0.454 per 16.	Ø 5e per 15.
		Iron-oside and iron-hydroxide pignent esterials, astural, if trude or washed but not pround:			
4.49) 7.81	100	ocnett. Sitemas: Vanda	1.60	0.14 per 16.	0.375¢ per 15
2.44	að	Reshed.	(ib	0.24 per lb.	0.1139 per 10. 0.375c per 10.
2.46	60 56	Epude	1.5 1.6	0.05* per 15. 0.15* per 15.	0.125# per 15 0.375# per 15.
2.50	90	Other	ü	14:5% ad yet.	20% ad val.
		ly Duty importantly suppended by institution. See			
		Appendix to Tariff Schemiles.			
-900000					
			1	1	1

A-23

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 1 Schedule 4, Part 9

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3922 (Kennedy Round), Dec. (6, 1967, 32 F.R. (9002);

TSUS	Prior	Rate of duty	Rate of duty, effective with respect to articles entered on and after January 1								
item	rate	1968	1969	1970	1971	1972					
475.36.37 475.32 476.32 470.55 470.57 470.55 470.55	5,55 no yai 18 nd yel 5,55 nd yel 7,55 nd yel 7,55 nd yel 5,755 nd yel 5,57 ni yel	4.53 ad val. 33 ad vol. 4.53 ad vol. 53 ad vol. 55 ad vol. 55 ad vol.	45 ad ent. 25 ad ent. 46 ad val. 55 ad val. 28 ad val. 45 ad val.	2.55 at eat 2.35 at eat 3.35 at eat 3.55 at eat 3. at eat 3. at eat 3. at eat	Sh ad yat Shad yat Shad yat Ah yat Shad yat Shad yat	2 (54 ad. vel) Free 2 .55 at yel 3 .51 at yel 9 free 2 .55 at yel					
472.04 472.06 472.10 472.12	12.5% ad val. 1.2¢ per lb. \$2.55 per ton \$6.50 per ton	11% ad val. 1.08¢ per 1b. \$2.29 per ton \$5.85 per ton	10% ad val. 0.95\$ per 1b. \$2.04 per ton \$5.20 per ton	8.5% ad val. 0.84¢ per lb. \$1.78 per ton \$4.55 per ton	7% ad val. 0.72¢ per 1b. \$1.53 per ton \$3.90 per ton	6% ad val. 0.6¢ per 1b. \$1.27 per ton \$3.25 per ton					
472.14 472.22 472.24 3/ 472.30 2/ 472.40	0.625¢ per 1b. 0.17 per 1b. 5.53 ad val. 0.54 per 3b 0.125¢ per 3b	0.55¢ per 1b. 0.00% per 1b 5.5% ad wal. 0.45% per 1b. 0.1% per 1b	0.5¢ per 1b. 9.00% per 1b. 25 at val. 8.4¢ per 1b. 0.1¢ per 1b.	0.43¢ per 1b. 0.07; per 16. 4.33 ed vel. 0.35¢ per 15. 0.08¢ per 15.	0.35¢ per 1b. 0.06% per 1b 3.5% ad ver. 0.5¢ per 1b. 5.00% per 1b.	0.34 per 1b. 0.054 per 1b. 34 aC val. 0.254 per 1b. 0.054 per 1b.					
372,42 472,44 432,46 472,48 472,48 572,50	0.06354 per ib 0.259 per ib 0.06255 per ib 0.16354 per ib 10% md vel	9 05: per 15. G.24 per 15. C.05r per 15. G.15: per 15. 14.5% and val	0.030 per 35. 0.34 per 35. 0.034 cer 15. 0.034 cer 15. 0.154 per 15. 14.55 ad val.	0.034 per 15. 0.134 per 15. 0.024 per 15. 0.134 per 15. 123 nd val.	0.055 per 3b. 0.15; per 1b. 0.014 per 1b. 0.14 per 2b. 115 ad val.	0.03% pet 1 0 14 pet 10 Pres 0.09% per 16 10% mi val					
473.02 473.04 473.06 473.10 473.12	10% of val. 5% ad val. 10% ad val. 10% ad val. 10% ad val.	3% ad vel 4% ad vel 9% ad vel 9% ad vel 5% ad vel 5% ad vel	83 ad v 1. 34 ad vel 35 ad vel 83 ad vel 83 ad vel.	7% ad yal. 2% ad yal. 7% ad yal. 7% ad yal. 7% ad yal.	6% ad val 1% ad val 2% ad val 6% ad val 6% ad val	5% ad val. Free 5% ad val. 5% ad val. 5% ad val.					
472.14 473.16 473.18 473.19 473.20	10% ad val. 16% ad val. 10% ad val. 10% ad val. 10% ad val.	9% ad val. 9% ad val. 9% ad val. 9% ad val. 9% ad val.	87 ad val. 85 ad val. 88 ad val. 88 ad val. 88 ad val.	75 od val. 25 od val. 29 al val. 29 al val. 24 al val. 25 od val.	Cf. of val. Cf. ad val. Cf. ad val. Cf. ad val. Cf. at val.	5% al vel 5% al vel 5% al vel 5% ad vel 5% ad vel 5% ad vel					
473,24 473,28 <u>1</u> 7 473,30 475,32 475,32	1.275. per 15. • 15% ad vai 3.4: per 10. 10% ad val 0.125: per 15. 0.25: per 15.	14 per 16 + 13 55 ad val. 56 per 16, 55 ad val. 6 35 per 16, 6 35 per 16, 6 25 per 16,	14 per 15 12% ad val. 2.74 per 15. 2% ad val. 0.14 per 15. 0.24 per 15.	6.84 per 35 * 10.55 ad val. 2.3e per 35. 75 ad val 0.06 per 35. 0.45c per 35.	0.7; per 36, 35 ad val 25 ad val 65 ad val, 0.005 per 38, 0.15; per 38,	0.64 per 15 7.5% ad val 1.74 per 35 3% ad val 0.0% per 15 0.14 per 15					
473.38 473.40 473.44 473.46 473.68 473.68	0 18754 per lb 168 ad val. 205 ad val. 205 per lb 19 per lb	0.162 per 10 13.55 ad vel. 185 ad vel. 185 ad vel. 0.54 per 10. 0.54 per 10.	0.154 per 15. 13.55 nd val 163 nd val 0.454 per 16. 0.54 per 16.	9.13* per 16. 12% ad val. 14% ad val. 0.4* per 16. 0.7* per 16.	0.14 per 15 11% ed val 12% ed val 12% ed val 0.34 per 15 0.64 per 15	0.094 pr. 7h. 195 nd val 195 nd val 195 ad val 9.34 per 15. 9.54 per 15.					
473.50 421.54 473.60 <u>1</u> / 473.62 373.69 <u>1</u> /	205 ad val 24 per 15 1,055 per 15 205 ad val 308 per 15	185 ad vol 1 36 par 35. 6 34 par 15. 185 ad val 276 par 15.	168 ad wol. 1.94 per 15 0.84 per 18 168 af 081. 214 per 15	141. ad wal. 1.34 per B 0.71 per B 143 ad wal 214 per B	121 ad yal. 1.24 per 35. 9.64 per 35. 121 ad yal 136 per 35.	105 ad suit 10 per 15 0 50 per 36, 108 ad suit, 158 per 15					
473,78 675,72 473,74 473,74	155 ad val 0.575; per 15. 0.575; per 16. = 7.55 ad val 5; per 16.	15% at val. 5.784 set 15 6.785 set 35 6.5% at val. 2.35 set 35 2.35 set 35	175 3.1 594 6 24 597 10, 0.71 597 10, * 53 51 541 24 57 10;	10% at yet 0.00 per 10. 0.03 per 10. 55 ad yet 1 75 per 10.	9% all val 0.524 per 15, 0.54 per 15, * 4.55 ad val 1.54 per 16	7.5% ud bal 0.43r per 1b 0.43r per 1b 4.5% m Val 1.2c per 1b					
473,62 1/ 804 feat	93 ad yp1. note 1 at the cost of	So al wat. this list of Stappe	""Lad val. Editor	05 ad val.	55 al 1921.	4.53 ad val.					

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 2 Schedule 4, Part 9

TANG	Brian	Bate of daty, effective with respect to articles entered on and after January 1									
iten	ree Sector	1968	1959	1978	1971	1972					
472,84 473,84 473,84 473,00 474,04 474,04 474,04 474,05 474,05 474,05 474,05 474,05 474,05 474,05 474,05 474,05		 Se par 10. Se par 10. Se ad val. Se ad val. Se par start Se par start Se ad val. 	1.74 per 15. 1.55 of eq. 5.55 of eq. 5.55 of eq. 1.14 per pices 5.14 per pices 5.14 per pices 5.14 per pices 5.14 per pices 5.10 ad est. 10 ad vel 10 ad vel 4 of est. 10 ad vel 5 of est. 12 ad vel 5.5 ad est. 12 ad vel 5.5 ad vel	Life pay 15 11.23 and val. 3.34 and val. 14.24 and val. 15.25 pay pictor 6.54 pay pictor 4.5.34 and val. 0.554 and val. 15.54 and val.	1.24 per 15 105 mi val. 53 ad val. 53 ad val. 9 die per place 0.64 per place 2 di ad val. 9.752 per place 2 di ad val. 9.752 per place 2 di ad val. 165 mi val. 28 ad val. 28 ad val. 28 ad val. 28 ad val. 28 ad val. 29 ad val. 29 ad val.	24 per B. 1.45 ed val. M at val. 100 ed val.					
474,44 474,46 474,50 478,60 U 674,92	21e per di 101 ad van 9 Je of val 0 35e per 10. 105 per 11.	10.54 per 15 Pl.54 per 15 Pl.54 per 15 0.24 per 15 94 st wei	s.5t per ib. St ad vot. s.5t mi vet 0.4t per ib. St ad vot.	fer per 10 75 at set. 1.55 at val. 0.154 per 76. 75 at set.	7e par 10, 65 of wal, 33 of wal, 53 of wal, 54 par 36, 55 of sel.	Se per 3h Sh ad vei 44 ad vei 54 ad vei 54 ad vei 55 ad vei					

Other Amendments and Modifications

#10915108

PROVISION

Subpt B--Language "chiefly used to impart color" deleted and heate 1 language "commonly known as pigments and suitable for use in imparting color" inserted in lieu thereof. Pub. L. 89-241, Secs. 2(a), 26, 0ct. 7, 1965, 79 Stat. 933, 939, effective date Dec. 7, 1965.

477.50-Lolumn) rate of fury of 10% ad val. setuced to 16% ad val. on Jun. 1, 2064. General headmins S(g)

873.40.-Golumn 1 sats of data of 125 ad val. reduced to 15% ad val. on Jan. 1, 1964. Contral beamate S(g).

	Statistical Notes
PROVISION	Lifective Fffthtise Jacob Jaco
\$70.23-See Anoxanents and Modifications (Sear 207.30)	170,57-See Anonyburg and Modifications (jon 377-19
473.22-See Anoningtio and Sectifications.	ED-Dias (prenagherned to: 670,5700)
470.60	170. Si-See Anarchenia and Mediflantian
SU-Durchternisternet is 210.0070. SU-Disc. do 72Seta: (Insusferred from 270.622	**************************************
177 ESSea Avendratite and Rodé-filostians	hints In-See while Amendments and Modifications for sixed francings constants its is at a sixed as
	177.10-sec-Other Averghants and West Playrove
	\$22.40-bee Oblight Anatometric and Multiplasteene

A-25

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS Part II. - Fertilizers and Fertilizer Materials

Page 269

4 - 11 - -

<u> </u>				r	480.00 - 400.80
Item	Stat. Suf-	Articles	Units of	Rates o	f Duty
	fix	****	Quantity	1	2
		PART II FERTILIZERS AND FERTILIZER MATERIALS			
		Part headnote: i. The articles described in this part are classifiable hereunder whether or not obtained, derived, or manufactured in whole or in part from any product described in part of this schedule.			
480.03 430.10	00	Limestone, erude, brakes, er crushed, when imported to be used in the manufacture of fertilizer	5. Len., 5. ton	Free Free	Free Free
450,15 480,20	00 50	Calcium symmetrie of first stronger	S. ton S. ton	Free Free	Pree Froe
480.25	00 00	Sodłum mitzara	S. ton S. ton	Free	Free
480.35	00	Basic slag	S. ton	Free states and states	Free
480,45	60	Phosphates, crude, and apatite	S. ton	Free	Free
480,50	00 00	Potassium chloride or muriate of potash	S. ton S. ton	Froe	Ртее Гтее
480.60	00	Potassium hitrate or saltpeter, crude	S. tou,.	Free	Free
480.65	10	Those grades of all substances (other than are de- scribed in the foregoing items of this part) used chiefly for fertilizers, or chiefly as an ingredi- ent in the manufacture of fertilizers: Nitrogenous fertilizers and fertilizer materials	s	Free	Free
	20 30 40	Anmonium nitrite limetelone mituwe Anmonium sulfate Anhydrous anmonia.	5. tan 5. ton 5. ton		
480.70	60 20	Other. Phosphatic fertilizers and fertilizer materials Liquid	S. ton S. ton S. ton	Free	Free
480.75	40 00	Cther Potassic fertilizers and fertilizer materials Other Chemically compounded or mixed, containing	3. ton S. ton 	Pree Free	Frce Free
	10 20 30 00 90	two or more major plant focds (nitrogen, phosphorous, and potassium): Ammonium phosphates Potawsion nitrate-sodium ritrate matures Other Ped mose Other	S. ton S. ton S. ton S. ton S. ton		ана 1997 —

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 1 Schedule 4, Part 11

Statistical Notes



PROVISION

480.70--00--Diec.(transferred to 460.7020 & 40)..Jan. 1, 1966 20--Estab.(transferred from 480.7000pt).. do 40--Estab. do do

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

APPENDIX TO THE TARIFF SCHEDULES Part l. - Temporary Legislation

Page 527

9 - 1 - A 901.00

~.	Stat.	A	Units	Rates	Effective Period	
Item	Sur- fix	Articles	Quantity	1	2	Lifective reliou
		PART 1 TEMPORARY LEGISLATION		a an		
		Subpart A Temporary Provisions for				
		Additional Duties				
		Subpart A beadquites:				
		 inclustics provided for in this subpart are cumulative duties which apply in sadition to the duties it any otherwise property of the articles. 				
		involved. The dufles provided for in this subpart apply only with respect to articles entered during				
		the period specified in the last column.				
		called flexible tariff and trade-agreements provisions, respectively) shall not apply with respect to the				
		duty provided for in item 901.00.				
		 With respect to any articles upon which the duty imposed under (tem 901.00 has been paid and which are the adds of termination of the tax nerveland. 				
		for in section 4501, 1.R.C., are held by the important and intended for sale or other disposition, there				
		shall be rejunded (without interest) to such importer an amount equal to the duty paid on such articles				
		when the source of the delegate within 90 days after the date of termination of the factors of the source of the source of the tax.				
		Subpart & esatistical headmate:				
		1. For statistical reporting purposes in this subjust (item 901-00)				
		ial the 7-digit number found herein should follow the 7-digit reporting number found in schedules				
		1-7 for the imported article (see subpart A headness 1). (L) The quartity required in this subpart is the				
		 (a) The value for the imported article should be reported only in connection with the 7-digit reporting. 				
		number found in cohedulas 1-7.				
901.00	11	Sugars, Strups, and molasses provided for in items				
	-	155.20 to 155.31, inclusivo, of part 10A of sched- ule 1, if hot to be further refined or otherwise				
		and molasses of the kinds described in such items, and molasses of the kinds described in such items, all the forceolog (Sycept Sucers, sirgus, molasses.				
		or articles to be used as livestock feed, or in the production of livestock feed, or for the distillation			,	
		of alcohol)		tax imposed	tax imposed	for such time as the tax imposed under
				4501, 1.R.C.2/	4501, 1.R.C.2/	soc. 4501, 1.R.C., is in
		Success single and metanom and that the to				effect 3/
	40	tom 155.30. Sugars, strupt, and molaissa provided for in	Lb, 1/			
	60	* 6 tam 166.80	$\overset{ib.}{\underbrace{1}}$			
		1/ See Submont & algorithmeth lighting 1				
		2/ The tax rate is 0.5% cent per pound of total sugars.				
		3/ The tax terminates June 30, 1972.				
					1	1

Page 528

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

APPENDIX TO THE TARIFF SCHEDULES Part I. - Temporary Legislation

9 - 1 - B 903.20 - 903.21

	Stnt.		Units	Rates	of Duty			
ltem	3uf- fix	Artioleg	of Quantity	1	2	Effective Period		
					· .			
		Subpart B Temporary Provisions Amending the Tariff Schedules	I					
		Subpart B headnotes:			i.			
		I. Any article described in the provisions of this subpart, if entered during the period specified in the last column, is subject to duly at the rate set forth herein in lieu of the rate provided therefor in schedules I to 8, inclusive.	·					
		2. Articles exempted under item 915.25 from the payment of duty shall be exempt also from the payment of any Internal revenue tax imposed upon or by reason of importation.						
		<u>Subpart B etatistical headnotes:</u>						
		1. For the purposes of statistical reporting of any item for which a unit of quantity (including X)						
		appears in this subpart no additional reporting number (from schedules 1-7) is to be furnished.						
		3. No statistical reporting information for item B15.35 is required.						
903.20 903.21		Chicory roots (provided for in part 11A, schedule 1): Crude (item 160.30) Ground or otherwise presared (item 160.351	1/ 1/	Free 24 per 1b.	Free 7¢ per 15.	On'or before 6/30/69		
and the second	4	and the second			Section and a section of			
			1. A.					
		from the second s						
	I			1	1	8		

A-29

A-30

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

APPENDIX TO THE TARIFF SCHEDULES Part 1. - Temporary Legislation

Page 529

İ

9 - 1 - B 903.90 - 911.07

Ttem	Stat. Suf-	Articles	Units of	Rates	Effective Period	
	fix		Quantity	1	2	
903.90	1/	Table, processed (pracided for in item 192.70, part 156, schedule 1)	<u>1</u> 7	Free	Free	On os before 9/5/09
905.30 905.31	17 17	For an part 1D, scholute 3): Singles, not bleached and not colored, measuring ever 55,800 wards per sound (item 303.40) Plice, but bleached and set colored, measuring ever 22.400 study per sound (item 305.50 and item 305.51 million).	1 <u>/</u>	Free	Free	On or before 11/7/08
907.15	00	Aluminum oxide (alumina) (provided for in item 417.12, part 2C, schedule 4) when imported for use in producing aluminum		Free	Free	On or before
907-30 907-80	00 1/	Reptanoic acld (provided for in item 425.98, part 20, schedule 4). Canalgre, chestnet, curupay, divi-divi, eucalyptus,	t.b	Free	Free	Qn or before 8/8/69
		neblock, Lirch, 1274, Hadrone, myrdoalaw, Ozk, neblozene, sumaka, usunday, wattle, and vatonin, All the foregoing provided for in items 470.25, 470.25, 470.55, 470.57, and 470.65, part 9A, schedule 4	1/	Prec	Free	On or before 9/30/69
909.25	00	Electrodes (provided for in item 317.61, part 18, schodule 5) when imported for use in producing pluminum	S. ton	Pree	Free	Gn or before 7/15/68
909.30 911.05	1/ 1/	Bauxite, calcined (provided for in item 521.17, part LJ, schedule 57 Ruuxite are (provided for in item 601.06, part 1,	<u>1</u> /	Free	Free	On or before 7/15/68
911.07		Schedule 6)	1/	1 .166	Free	01 07 06 07 06 07 06 07 06 07 06 07 07 07 07 07 07 07 07 07 07 07 07 07
	20	Speed de for in from 601.27, part 1, schedule 6) Contations under 530 by weight of manganese		Free	14 per 15. on manganese content	On or before 6/50/70
	40 60	Containing 35% on own, but is as then d'A by weight of maganess	12, v 12, 12, 12, 12, 12, 12, 12, 12, 12, 12,			
		<u>1</u> / See Appendix Statistical headnote 1.				

3.7

APPENDIX B

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966.

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966

	All co	untries	: First	sup	plier	:	Second	51	upplier	: Third	euŗ	plier
Summary title: and page; : TSUS(A) item : ;	Amount in 1966	: Per- : cent :change : from	: : : Countr	: ; у:	Value		Country	::	Value	: : : Country :	:	Value
i			<u>.</u>	:	·····	:				:		
Bromine, potass 415.05 : 420.02 :	ium brom 2 6	ide, and : 1/ : +421	sodium bro : Canada : Israel : W Corma	mide : :	(p. 3) 2 4	:	- France	::	1	: - : W. Germany	:	<u>2/</u>
420.02		01	(1	•		•		•	•	
415.10 : 415.40 :	um, sodi <u>3</u> /47 <u>2</u> /	um, and r : +204 : <u>1</u> /	ubidium (p : Argentin : U.K.	. () a. : :	25 <u>2</u> /	::	U.K. -	:	22 -	: -	::	· -
Acetylene black 415.15 :	and oth 1,185	erelemen : +8	tal carbon : Canada	(p.1	.1) . 1,081	:	E. Germany	:	55	: W. Germany	:	49
Chlorine (p. 15 415.20 :) 4,167	: +74	: Canada	:	4,011	:	Venezuela	:	95	: Mexico	:	61
Iodine (p. 21)		;			·							
415.25 : 415.27 :	5,934 3	: +140 : +1	: Chile : Japan	:	3,676 3	::	Japan -	:	2,245 -	: Hong Kong : -	:	13
Lithium and lit	hium comj	pounds (p	• 27)									
415.30 : 419.10 :	9	: <u>1</u> / : -98	: – : U.K.	:	- 4	:	- Switzerlan	: d:	<u>1</u>	: Ireland	:	<u></u> 2/ -
Phosphorus (p. 1415.35 :	29) 249	: -15	: Japan	:	197	:	Canada	:	26	: Hong Kong	:	14
Sulfur (p. 33) 415.45 :	33,525	: +23	: Mexico	:	21,117	:	Canada	:	12,084	: Bahamas	:	293
Chemical elemen 415.50 :	ts not e 706	lsewhere : -45	enumerated : Canada	(p. :	39) 307	:	W. Germany	:	231	: India	:	86.
Boric acid (p. 416.10 :	45) 15	: +844	: France	:	15	:	W. Germany	:	<u>2</u> /	· -	:	-
Hydrochloric ac 416.15 :	id (p. 49 952) : +16	: Canada	:	947	:	W. Germany	:	5	: Mexico	:	<u>2</u> /
Hydrofluoric ac 416.20 :	id (p. 55 31	5) : +121	: Canada	:	31	:	~	:	· _	: -	:	. -
Nitric acid (p. 416.25 :	59) <u>2</u> /	: +29	: Canada	:	<u>2</u> /	:	-	:	. [.] –	: -	:	-
Phosphoric acid 416.30 : 480.7020 :	(p. 63) <u>3</u> / 934	: -100 : <u>4</u> /	:	:	- 934	::	-	::	-	: -	::	-
Sulfuric acid 416.35 :	(p. 69) 766	: +15	: Canada	:	765	:	W. Germany	:	<u>2</u> /	: -	:	-

See footnotes at end of table.

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966--Continued

(In thousands of dollars. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

	All countries		First supplier				Second supplier				: Third supplier			
Summary title: and page; : TSUS(A) item :	Amount	: Per- : cent :change	: : : Country	::	Value	:	Country	::	Value	: : :	Country	::	Value	
:	1966	: from : 1965	:	:		:		:		:		:		
			, <u>, , , , , , , , , , , , , , , , , , </u>		······		<u> </u>							
Inorganic acid 416.45 :	s not els 1,083	ewhere en : +1	umerated (p. : Japan	:	638	:	W. Germany	:	132	:	υ.κ.	:	129	
Aluminum oxide	and hydro	oxide (p.	(77)		031		Suninam		01/0		Tompian		1.80	
907.15 :	5727,383	• <u>5</u> 7 ₊₁₀₂	: Surinam	:	10,177	:	Jamaica	:	5,029	:	Japan	:	3,594	
Aluminum sulfa	te (p.81)													
417.16 :	425	: +27	: Canada	:	373	:	W. Germany	:	46	:	U.K.	:	3	
Aluminum ammon not elsewher	ium sulfat e enumerat	te, alumi ted (p. 8	num potassium	a su	lfate, s	30	dium alumina	ate	e, and alu	1711	inum compou	nds		
417.10 :	4	: -61	; U.K.	:	3	:	W. Germany	:	1	:	_	:	-	
417.14 :	7	: -3	: W. Germany	:	3	:	U.K.	:	2	:	Japan	:	1	
420.68 :	79	: -10	: W. Germany	:	43	:	U.K.	:	35	:	Netherland	s :	1	
417.18 :	879	: +15	: Canada	:	604	:	W. Germany	:	122	:	Italy	:	90	
Ammonia, aqua	and liquid	l anhydro	us (p. 89)											
417.20 :	-	: -100	: -	:	-	:	-	:	-	:	-	:	-	
417.22 :	-	: -100	: -	:	-	:	-	:	-	:	-	:	-	
480.6540 :	15,271	: +61	: Trinidad	:	9,212	:	Colombia	:	2,417	:	Canada	:	2,199	
Ammonium carbo 417.24 :	nate and 1 269	bicarbona : +40	te (p. 97) W. Germany	:	179	:	Norway	:	42	:	Netherland	s:	37	
Ammonium chlor 417.26 :	ide (p. 10 331	01) : +42	: U.K.	:	177	:	Japan	:	81	1.	Canada	;	45	
Ámmonium nitra	te (p. 109	5)												
417.30 :	29	+110	: Canada	•	20	•	-	•	-		_	•	-	
480.6510 :	8,123	: -14	: Canada	:	8,046	:	Norway	:	46	:	Neth. Anti	1:	30	
Ammonium perch 417.32 :	lorate (p. -	. 113) : 1/	: -	:	_	:	-	:	-	:	-	:	-	
	hata (m. 1	-												
hiz 2h	nate (p. j		. Nothenland		11		0d-		21					
480.8010 :	13,756	: +10)	: Canada	:	13,634	:	Japan	:	<u>-</u> / 122	:	-	:	-	
Ammonium silic 417.36 :	ofluoride 23	(p. 121) : +403	: W. Germany	:	23	:	_	:	-					
Ammondo										•		•		
417.38 ···	te (p. 125 55) • +558	• Janan		Տև		Netherlands		1		11 12		2/	
480.6530 :	5,247	: -10	: Canada	:	5,128	:	W. Germany	:	61	:	Trinidad	:	<i>2/</i> 57	
Ammonium compo	ounds not	elsewhere	e enumerated	(p	.133)						' 4			
417.44 :	562	: +70	: Netherland:	3:	193	:	Belgium	:	157	:	W. Germany	:	83	
Antimony compo-	unds (p. 1	.37)												
417.50 :	3,998	: +122	: U.K.	:	1,946	:	Belgium	:	1,322	:	France	:	496	
417.52 :	· 1	: <u>1</u> /	: Sweden	:	1	:	-	:	-	t	-	:	-	
417.54 ;	134	: -38	: U.K.	:	131	:	W. Germany	:	3	:	-	:		

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See footnotes at end of table.

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Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966--Continued

(<u>In thousands of dollars</u>. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

	All countries			:	First supplier				Second supplier				Third supplier			
Summary title:		<u>;</u>	Per-	~:-		:		-:-			· ·	÷		:	·······.	
and page:	Amour	nt :	cent			:		÷				:				
TSUS(A) item	in in	:0	hange	:	Country	:	Value	:	Country	:	Value	:	Country	:	Value	
	1966	5	from	•		:		•		•		•				
:	;	:	1965	:		:		:		:		÷		:		
Arsenic compo	unds (p.	. 143))													
416.05	<u>. 1</u>	1 :	1/	:	U.K.	:	1	:	-	:	-	:	-	:	-	
417.60	:	5:	-40	:	Belgium	:	5	:	-	:	-	:	-	:	· 🕳	
417.62	. 1,1	+77 :	+16	:	Mexico	:	945	:	France	:	331	:	Sweden	:	201	
417.64	:	7 :	+294	:	U.K.	:	7	:	-	:	-	:	-	:	-	
Barium chlorid	ie (p. 1	149)														
417.70	: 1	128 :	+60	:	France		94	:	Italy	:	13	:	Belgium	:	11	
			•			:										
Barium dioxid	e (p. 19	53)	1/													
41(.(2		- :	<u>1</u> /	:	-	:	-	:	-	:	-	:	-	:	-	
Barium hydrox	ide (p.	155)														
417.74	:	2 :	+111	:	W. Germany	:	2	:	-	:	-	:	-	:	-	
Barium nitrat	e (p. 19	59)														
417.76		170 :	+103	:	W. Germany	:	116	:	U.S.S.R.	:	36	:	Italy	:	. 8	
Barium oxide	(p. 163))														
417.78	:	3 :	<u>1</u> /	:	Japan	:	3	:	-	:		:	-	:	-	
Barium carbon	ate (p.	165)														
472.02		100 :	-11	:	U.K.	:	100	:	-	:			-	:	-	
472.04	:	8 :	+345	:	U.K.	:	8	:	-	:	-	:	-	:	-	
472.06	:	74 :	+39	:	W. Germany	:	64	:	Belgium	:	9	:	U.K.	:	1	
Barium sulfat	e (n. 17	1)														
472.10	; 5,	764 :	+4	:	Canada	:	1,541	:	Mexico	:	1,501	:	Peru	:	969	
472.12	:	2:	-77	:	W. Germany	:	1	:	Canada	:	1	:	-	:	_	
472.14	: :	304 :	+68	:	W. Germany	:	162	:	France	:	108	:	Netherland	ds:	17	
Inorganic bar	ium com	oounda	. not	el	.sewhere en	ume	rated (p		179)							
417.80	: 3	249 :	+51	:	Japan	:	226	:	Canada	:	16	:	Switzerla	nd:	5	
Bervllium com	pounds	(p. 1	83)													
417.90	: 2/		-24	:	Japan	:	2/	:	-	:	-	:	-	:	-	
417.92	·	17 :	+68	:	France	:	- 17	:	-	:	-	:	• -	:		
Bismuth compo	unds an	d mixi	tures	(n.	185)											
418.00	:	21 :	-16		W. Germanv	:	15	:	Italy	:	4	:	France	:	2	
423.80	:	- :	1/	:	-	:	-	:	-	:	-	:	_	:	-	
· • ·	:	:		:		:		:		:		:		:		
TI / No. doman	to in 10	265			······································											

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 $\frac{1}{2}$ No imports in 1965. $\frac{2}{2}$ Less than \$500. $\frac{3}{4}$ A study of reported imports established that the published data are incorrect; see text. $\frac{1}{4}$ Not separately classified in 1965. $\frac{5}{2}$ Published data have been adjusted by staff of Tariff Commission; see text.

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Source: Compiled from official statistics of the U.S. Department of Commerce.

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APPENDIX C

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1967. , • •

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Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1967

(<u>In thousands of dollars</u>. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

:	All coun	tries	First supplier				Second a	plier	:	Third supplier				
Summary title:	:	Per-	:	:		:		:		:		:		
and page; :	Amount :	cent	:	:		:		:		:	<i></i>	:		
TSUS(A) item :	in :	change	: Country	:	Value	:	Country	:	Value	:	Country	:	value	
:	1967 :	from	:	:		:		:		:		:		
		1900	·	·	· · ·	<u>.</u>						. <u>.</u>		
Bromine, potas:	sium bromid	e, and	sodium brom	nide	(p. 3)									
415.05 :	- :	-100	: -	:	-	:	-	:	-	:	+	:		-
420.02 :	9 :	+35	: France	:	7	:	Belgium	:	1	:	Israel	:	<u>1</u> /	
420.82 :	1 :	-53	:Israel	:	1.	:	~	:	-	:	-	:		-
Costum astaux				7)										
his in	1um, soarum 28 -	5/_10	NOIGIUM VE	• • •	21		Conede		1.1.		d Commony		1/	
415 h0	50. h.	+1384	· Canada	:	24),	:	Ganaua -	:	14	:	w. dermeny	:	<u>±/</u>	-
41).40 .	-,	.1204	. canada	•		•	-	•	-	•	-	•		
Acetylene blac	k and other	elemen	tal carbon	(p.	11)		E. Cummun		110			a .		5
41).1)	907 :	-11	: Canada	•	009	·	s. Germany	•	L.I. <i>C</i> .	•	DWI CZGI LEHR	4.1		4
Chlorine (p)	5)													
415.20 :	3,594 :	-14	: Canada	:	3,413	:	Mexico	:	82	:	Venezuela	:		75
Iodine (p. 21)														
415.25 :	3,177 :	-46	: Chile	:	1,834	:	Japan	:	1,313	: 1	Canada	:		29
415.27 :	12 :	+333	: Japan	:	12	:	-	:	-	:	-	:		-
T / + 1 / · · · · · · · · · · · · · · · · · ·					,									
bis 20	organic lit	nium co	mpounds (p	. 27), ,									
419.30	L : 6 ·	<i>≤1</i> - 30	: U.K. Suiteonle	i mdi			ц <i>к</i> –	•	-	•	Cenade			1
419.10 .	υ.	-30	. Switzerie		` ~ ~	•	U .R.	•	1	•	Canada	·		*
Phosphorus (p.	29)													
415.35	304 :	+22	: Japan	:	261	:	Canada	:	33	: 1	W. Germany	:		8
Sulfur (p. 33)														
415.45 :	47,612 :	+42	: Mexico	:	29,221	:	Canada	:	18,371	: '	W. Germany	:		12
Chemical element	nte not ole	ouhere	onumorated	1-	20)									
LIS. SO	100 100 ers	ewnere _31	· Israel	(p.	397		W. Germany	•	125	•	Canada			76
	400 .			•	-//	•	or ocrating	•	200	•	Janua -	•		
Boric acid (p.	45)													
416.10 :	5 :	-67	: France	:	5	:	-	:	-	:	-	:		-
Hydrochloric a	cid (p. 49))												
416.15 :	810 :	-15	: Canada	:	789	:	W. Germany	:	15	: 1	Mexico	:		6
Undwoflyowie o	-14 (n 55	۱												
hit 20	101 •	/ +22h	· Canada		101		_		_	•	_	•		-
410.20	101 .	1224	. canada	•	101	•	_	•		•		•		
Nitric acid (p	. 59)													
416.25 :	1:	+175	: W. German	ıy:	1	:	-	:	-	:	-	:		-
Phosphoric acid	d (p. 63)													
416.30 :	- :	<u>3/</u>	: -	:	-	:	-	:	-	:	-	:		-
480.7020 :	2,177 :	+133	: Canada	:	2,177	:	-	:	-	:	-	:		-
Culfumia and 3	(5 60)													
hif 25	1 25/ -	+6)	· Canada		1 251		Sveden		1/		_	•		-
· ((•)+·		.04	· Janaua	•	- - - J -	•	Sacucii	•	<i>±</i> ′	•		•		-

See footnotes at end of table.

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Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1967--Continued

(<u>In thousands of dollars</u>. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

	All co	untries	First supplier				Second supplier				Third supplier			
Summary title:		: Per-	:	:		:		:		:		:	······································	
and page;	: Amount	: cent	:	:		:		:		:		:		
TSUS(A) item :	: in	:change	: Country	:	Value	:	Country	:	Value	:	Country	:	Value	
:	: 1967	: from	:	:		:		:		:		:		
		: 1966	:	:		:		:		:		:		
Inorganic acid	ls not els	ewhere en	umerated (p.	73)									
416.4520	573	: 4/	: Japan	:	554	:	W. Germany	:	16	:	France	:	3	
416.4540	1,130	: <u>\</u>	: Canada	:	897	:	W. Germany	:	135	:	France	:	73	
Aluminum and de		and da la	77 \											
			(() . Franco		806		Conada		680		U Comons		121	
907.15	50,173	:5/ +83	: Surinam	-	20.378	•	Australia	•	15.479	÷	Jamaica	•	7.278	
		2 103		•	,_,_	·		•		•	0.1112.00	•	1,110	
່ Aluminum sulfe	te (n. 81	١											•	
417.16	128	· +1	Canada		370		W Commons		b 1		11 K		2	
	420		· vanada	•	519	•	". Germany	•	41	•	0.R.	•	2	
Aluminum ammor	ium sulfa	te, alumin	num potassiu	n su	lfate. so	oċ	lium alumin	ate	, and alu	um:	inum			
compounds no	t elsewhe	re enumera	ated (p. 85)						-					
417.10 :	11	: +167	U.K.	:	11 :	:	-	:	-	:	· -	:	-	
417.14 :	3	: -54	W. Germany	:	2 :	:	Japan	:	1.	:		:	-	
420.68 :	104	: +31 :	: W. Germany	:	82 :	:	U.S.S.R.	:	18	:	Netherlands	:	3	
417.18 :	613	: -30	: Canada	:	427	:	Italy	:	146,	:	W. Germany	:	35	
Ammanda and		a	(00)											
Ammonia, aqua	and liqui	a annyaro	18 (p. 89)		-									
417.20	($\frac{2}{2}$	France	•	Ϋ́	•	W. Germany	:	1/	:	-	:	-	
411.22 :	10 106	: <u>2</u> /	; - Montofaca	•	12.056	:	-	:	-	:		:	- 01-	
400.0940	19,120	: +2)	Trinidad	:	13,270	:	Canada	:	3,903	:	N. Antilles:	:	1,842	
Ammonium carbo	mate and 1	bicarbonat	ce (n. 97)											
417.24 :	201	: -25	W. Germany	:	140 :	:	Norway	:	38	:	Netherlands		10	
			-				•					-		
Ammonium chlor	ide (p. 10	01)										•		
417.26 :	307	: ~7 :	U.K.	:	160 :	:	Japan	:	-69	:	Canada	:	46	
Ammonium nitra	te (p. 10	5)												
417.30 :	4	: -86 :	Canada	:	3 :	:	Japan	:	1	:	- :	:	-	
480.6510 :	9,121	: +12 :	Canada	:	8,647 :	:	N. Antilles	3:	474	:	- :	:	-	
Ammonium memoh	lomato (-		•											
himonium perch	lorate (p.	. 113)												
411.32 :	-	<u> </u>	-	:	- :	:	-	:	-	:	- :		-	
Ammonium phosp	hate (n 1	115)												
417.34	7	-41	Netherlands		7 -		_		_					
480.8010	17.720	+20	Canada		17 505	:	N Antilles	•	125		-		-	
			04.444	•	-1,,///	•	MI MIDILLC.		12)	•		•	-	
Ammonium silic	ofluoride	(p. 121)												
417.36 :	3	-88	W. Germany	:	3 :	:	-	:	-	:	- :		-	
			•											
Ammonium sulfa	te (p. 125	5)												
417.38 :	12	: -78 :	U.K.	:	9 :	:	Netherlands	s:	3	:	- :	:	-	
480.6530 :	5,908	: +13 :	Canada	:	5,676 :	:	Netherlands	3:	149	:	W. Germany	:	60	
			-								-			
Ammonium compo	unds not e	lsewhere	enumerated (p.]	133)									
417.44 :	. 478	: -15 :	Belgium	:	113 :	:	W. Germany	:	107	:	Netherlands:	1	88	

See footnotes at end of table.

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APPENDIX, C

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1967--Continued

The dollar value of imports shown is defined generally as the market value in (In thousands of dollars. the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

:	ntries	Fire	st suppli	er	Second	supplier	Third supplier				
Summary title:		: Per-	:	-1			:				
and page; :	Amount	: cent	•	:							
TSUS(A) item :	in	:change	: Country	/ 🗄 Va	lue :	Country.	: Value	: Country	Value		
:	1967.	: from	:	:	:		:	:			
:		: 1966		<u>:</u>			:	<u> </u>	1		
Antimony compo	unds (p. J	137)			· · · .		• • • •	. :			
417.50 :	3.762	: -6	. U.K.	•	1.633 :	Belgium	1 461	Franca			
417.52 :	3	: +316	: France		2	Japan	: 1	. rrance			
417.54	35	: -74	: U.K.	: .	28	V. Germany			• •		
							• • • •	•	•. •		
			• •	· .	•			· · ·	·		
Arsenic compou	unds (p. 1 ¹	43)							•.		
416.05 :	1	: 3/	: Belgium	:	п:	Canada	: 1/	r	· -		
417.60 :	35	: +647	: Belgium	:	35 :	a 🚅 👘	: -		1 -		
417.62 :	2,503	: +69	: Mexico	:	1.017 :	Sweden	: 616	France	166		
417.64 :	23	: +226	: U.K.	•	18 :	W. Germany	. 5	·			
								• • • • • •	. –		
Barium chlorid	e (p. 149))									
417.70 :	120	-6	: France	· :	107 :	Belgium	: 7	Ttalv			
									• •		
Barium dioxide	(p. 153))									
417.72 :	-	: 2/	: :-	:	- :						
					• •	•			• –		
Barium hydroxi	de (p. 155	5)	• •								
417.74 :	-	: -100	: -	:	- :	<u>.</u>					
					• •	• • .	л ·,		·•, –		
Barium nitrate	(p. 159)	•						•			
417.76 :	153	: -10	: W. Germa	iny :	91 :	U.S.S.R.	: 40	E. Germany	: 15		
						: '	,				
Barium oxide	(p. 163)						•		· · ·		
417.78 :		: -100	1	:	- :		; -	: · · · · · · · · · · ·	· -		
			:	• •							
Barium carbons	te (p. 165	5)			• •	·			•		
472.02 :	53	: -47	: U.K.	:	53 :	— . ·		.	•		
472.04 :	3	: -62	: U.K.	:	. 3 :	· •		:	1		
472.06 :	54	: -27	: W. Germa	uny :	44 :	Belgium	: 8	. U.K.	: 2		
				-		• • •	•				
Barium sulfate	(p. 171)										
472.10 :	4,655	: -19	: Canada	:	1,141 :	Mexico	1,055	Peru	: 729		
472.12 :	4	: +103	: France	:	2 :	Canada	: 2	-	1 · · ·		
472.14 :	282	: -7	: W. Germa	uny:	138 :	France	: 117	Netherlands	: 12		
				•							
Inorganic bari	un compou	nds, not	elsewhere	enumerat	ed (p.	179)	• .		. i		
417.80 :	73	: -70	: Japan	:	53 :	Canada	: 15	U.K	ʻt (5		
						•			4 ¹		
Beryllium comp	ounds (p.	183)									
417.90 :	2	: +412	: Japan	: .	2:	-	: -	: -	: -		
417.92 :	1/	: -98	: France	:	<u>1</u> / :	· -	• . .		: -:		
	—			1	_						
Bismuth compou	nds and m	ixtures ((p. 185)		•						
418.00 :	25	: +16	: W. Germa	ny :	9 :	France	: 6	U.K.	: 6		
423.80 :	1	: <u>2</u> /	: Japan	1.	1.:	-	1	: -	: -		
:		:			:		:				
1/ Less than	\$500.			,							

2/ No imports in 1966.
 3/ A study of reported imports established that the published data are incorrect; see text.
 4/ Not separately classified prior to 1967.
 5/ Published data for 1966 adjusted by staff of Tariff Commission; see text.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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