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 3

Inorganic Chemicals II

TC Publication 188
Washington, D.C.
1966

UNITED STATES TARIFF COMMISSION

The basic staff work in the preparation of this volume was done by Thomas J. Scott, John G. Fletcher, Robert E. Ruhlman, and James J. Leonard of the Chemicals Division, Louise M. Rovner, Albert H. Small, George C. Reeves, and John F. Hennessey, Jr. of the Economics Division, and Leo Jablonski of the Office of the General Counsel.

The Summaries series will consist of 62 volumes, of which this volume is the second to be released; the first was volume 6 of schedule 1, Cereal Grains, Malts, Starches, and Animal Feeds.

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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

F O R E W O R D

In an address delivered before a Boston audience on May 18, 1917, Frank W. Taussig, the distinguished first chairman of the Tariff Commission, delineated the responsibility of the recently established Commission to operate as a source of objective factual information on all aspects of domestic production and trade. As an initial step in meeting this obligation, the chairman stated, the Commission was preparing--

> a handy source of reference . . . 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, and subsequent general issues of tariff summaries were published in 1921, 1929, and 1948-50.

In the 50 years since its establishment the Commission has been assigned many duties by the Congress, but the primary obligation for factfinding and production of information has remained a continuous major responsibility. Through its professional staff of commodity specialists, economists, lawyers, statisticians, and accountants, the Commission maintains constant surveillance of trade in the thousands of articles provided for in the Tariff Schedules of the United States. In its files and in the accumulated knowledge of its staff, the Commission has, therefore, built up a large reservoir of data and understanding not only with respect to imports but also with regard to significant developments affecting individual products and their uses and to processing and manufacturing techniques, business practices, and world trade. The publication of the present Summaries of Trade and Tariff Information will make available a current broad cross section of this information and understanding.

Every effort has been made to include all pertinent information in the summaries so that they will meet the needs of wide and varied interests that include the Congress, the courts, Government agencies, importers, business concerns, trade associations, research organizations, and many others. The structure of the individual summaries conforms generally with the earlier admonition of Chairman Taussig that the work "be exhaustive in inquiry, and at the same time brief and discriminating in statement." The scope of the entire project is encyclopedic, requiring concise and accurate descriptions of thousands of products, with indications of their uses, methods of production, number of producers, world supplies, and appraisals of their importance in trade and in our economy. In a society such as ours that has become progressively more dynamic, the task of sifting the essential from the nonessential has become both more difficult and more

important. Nevertheless, the summaries include substantive analytical material with regard to the basic factors affecting trends in consumption, production, and trade, and those bearing on the competitive position and economic health of domestic industries.

The publication of tariff summaries is particularly appropriate at this time. On August 31, 1963, the 16 schedules in titles I and II of the Tariff Act of 1930, certain import-excise provisions, other provisions of law, and some administrative practices were superseded by the Tariff Schedules of the United States (abbreviated to TSUS in these volumes). These changes resulted in an extensive regrouping of imports under 8 new tariff schedules and in modifications of the nomenclature and rates of duty for many articles. The summaries present for the first time full information on tariff items under the new structure, including import data derived through use of the Tariff Schedules of the United States Annotated (which comprises the legal tariff text plus statistical annotations).

Commodities are generally identified in the summaries in nontechnical language, which will meet most requirements. As an aid where more complete information is desired, the applicable legal language from the TSUS is reproduced in each volume as appendix A, which includes the article description, together with the general headnotes and rules of interpretation, and the directly applicable headnotes. Thus each volume will permit convenient reference to the statutory tariff language pertinent to the summaries it contains.

Publication of the 62 volumes projected for the series is scheduled under a 3-year program. Individual volumes, however, will be released as rapidly as they are prepared. For practical reasons the sequence of the summaries in the volumes do not necessarily follow the numerical sequence of the TSUS; however, all item numbers of the tariff schedules will be covered. The titles of the volumes to be issued for a particular TSUS schedule are set forth on the inside cover of the volumes for that schedule.

We believe that the current series of summaries, when completed, will represent the most comprehensive publication of its kind and that the benchmark information it presents will serve the needs of many interests.

Paul Kaplowitz

Paul Kaplowitz,
Chairman.

SUMMARIES OF TRADE AND TARIFF INFORMATION

SCHEDULE 4

Volume 3

C O N T E N T S

Numerical List of TSUS Items in This Volume

This volume (identified as volume 4:3) is the first in a series of 12 volumes on the chemicals and related products classified under schedule 4 of the Tariff Schedules of the United States (TSUS). Schedule 4 is divided into 13 parts, and this volume is one of three that deal with the inorganic chemicals provided for in part 2 of that schedule. 1/ U.S. Bureau of the Census data indicate that manufacturing activity in inorganic chemicals in 1963 accounted for roughly $2.6 billion in value added by manufacture, and $4.6 billion in value of shipments, or 15 percent of both value added and value of shipments for all chemicals and allied products (Major Group 28 of the Standard Industrial Classification). 2/ In 1963, U.S. exports of the inorganic chemicals included in Major Group 28 amounted to $294 million, which constituted 14 percent of the value of the exports of all chemicals and allied products and 6 percent of the value of producers' shipments of inorganic chemicals. U.S. imports of inorganic chemicals in 1963 amounted to $111 million, accounting for 24 percent of all imports of chemicals and allied products, and were equivalent to 2 percent of shipments of inorganic chemicals.

Volume 3 includes summaries on nearly all of the inorganic compounds 3/ in the TSUS list from "Calcium compounds" through "Silver compounds" in part 2C of schedule 4. The complete list of compounds in this interval of the TSUS is included in appendix A to this volume; those not discussed here, identified by bracketing [ ], are discussed in volume 4:2 or volume 4:4. Volume 4:3 includes several chemicals that are not within the interval mentioned above (viz, ammonium molybdate, sodium ferrocyanide, sodium molybdate, and mixtures 4/ of inorganic compounds in chief value of mercury, molybdenum, or nickel oxide).

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

2/ In terms of value added by manufacture in 1963, Major Group 28 ranks third among the 21 categories for which the Bureau of the Census reports domestic manufacturing activity, following Major Groups 37 and 20 (transportation equipment, and food and kindred products, respectively).

3/ Inorganic compounds as defined in headnote 2 to pt. 2 of schedule 4 of the TSUS are "compounds not containing carbon, except carbides and such carbon-containing compounds as inorganic cyanides and cyanates, metallic carbonates, and oxides of carbon which are inorganic in nature." These exceptions, although accounting for only a few of the hundreds of thousands of carbon-containing compounds, represent a significant portion of the trade in inorganic chemicals. The term "compounds" is defined in headnote 2 to schedule 4.

4/ The term "mixtures" is defined in headnote 3 to schedule 4.

The scope of part 2 is limited by its relation to the other 12 parts of schedule 4, as well as to the other schedules of the TSUS. The subordinate relationship of part 2 to the rest of the TSUS is stated in headnote 1 to that part, as follows:

> This part covers chemicals, except those provided for elsewhere in this schedule and those specially provided for in any of the other schedules.

Certain chemicals, for example, are not classifiable in part 2 if they are drugs, synthetic plastics materials, pigments, or fertilizers provided for in parts 3, 4, 9, and 11, respectively, of schedule 4. Litharge (item 473.52) is a notable example of an inorganic compound classifiable in part 9 rather than in part 2, whereas lime is an inorganic chemical compound which is specially provided for in schedule 5 (hydrated lime in item 512.11 and other lime in item 512.14).

Classification of inorganic compounds in schedule 4, part 2C, of the TSUS is governed by their cation (positive ion) constituents, as indicated in headnote 1 to that subpart, which states:

> For the purposes of this subpart, inorganic compounds containing only one kind of cation are classifiable according to the cation constituent as indicated in the alphabetical listing set forth in this subpart; and inorganic compounds containing two or more different kinds of cations are classifiable according to the cation constituent thereof first named in the alphabetical listing in this subpart. Inorganic compounds, having no cations or none of the cation constituents of which are named in this subpart, are covered by the provision for other inorganic compounds (item 423.00).

Many of the compounds provided for in part 2C are enumerated by their chemical names under the superior heading identifying their first (or only) named cation constituent in the alphabetical listing (e.g., cesium chloride, which is named in item 418.50 under the heading "Cesium compounds"). Other compounds classifiable under part 2C are provided for in so-called basket provisions for "Other" under the superior headings. Cesium sulfate, for example, which contains cations of cesium, is classifiable under "Other" cesium compounds in item 418.52 (included in this volume); cesium aluminum sulfate, however, which contains cations of both cesium and aluminum, is classifiable under "Other" aluminum compounds in item 417.18 (included in volume 4:2) inasmuch as aluminum is named first in the alphabetical listing of part 2C. The sulfate ion in both of these compounds is an anion

(negative ion) and hence does not determine the tariff classification of either compound. In the event that none of the cations of a compound are listed or the compound has no cations, the compound is classifiable in item 423.00, the residual provision for inorganic compounds, which is discussed in volume 4:4.

Certain terms, in addition to those used in the TSUS, occasionally appear in the summaries in this and other volumes of schedule 4 to describe types and qualities of chemicals moving in domestic and international trade. For example, the term "U.S.P." refers to a grade of a specified product that meets the standards described in the United States Pharmacopoeia for medicinal uses. 1/ U.S.P. grades, however, may not be of sufficient purity for a specific industrial use. The terms "Technical," "Commercial," and "Industrial" are used somewhat interchangeably to denote the grade most frequently used in volume by industry.

The chemicals in this volume that ranked highest in terms of dollar value of U.S. imports in 1965 were nickel oxide, cobalt oxide, calcium carbide, magnesium sulfate (kieserite), potassium ferrocyanide, and potassium ferricyanide. In terms of the percentage of domestic consumption obtained from imports, three of the above-mentioned chemicals--nickel oxide, potassium ferrocyanide, and cobalt oxide--ranked highest. Virtually all U.S. consumption of nickel oxide and potassium ferrocyanide and about two-thirds of the U.S. consumption of cobalt oxide were supplied by imports.

U.S. exports of inorganic chemicals are generally not separately reported in official statistics. Among the chemicals in this volume for which export statistics have been published in recent years, calcium hypochlorite, calcium chloride, potassium hydroxide (caustic potash), calcium carbide, lead arsenate, and copper sulfate rank highest in dollar value of exports. The United States is on an export basis with respect to five of these six chemicals. In terms of quantity, U.S. imports of calcium carbide (the exception) in 1964 were about twice as large as domestic exports, though they accounted for only 1 percent of domestic consumption.

1/ Many of the compounds discussed in this volume have medicinal or therapeutic properties. Few of these compounds, however, have special grades that are chiefly used in the United States as medicines or as ingredients in medicines. Such special grades are classifiable as drugs under items in pt. 3 of schedule 4, which will be discussed in volume 4:7.

Commodity	TSUS item
Calcium arsenate	418.10

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

U.S. trade position

Domestic consumption of calcium arsenate in recent years (valued at $600,000 in 1964) has been supplied almost entirely by domestic production. During 1961-64, exports ranged from 6 to 22 percent of annual production.

Comment

Calcium arsenate, a poisonous white powder, is produced from arsenic pentoxide and lime. It is used as an agricultural insecticide against plant insects and is particularly effective in combating the cotton boll weevil.

Imports of calcium arsenate are duty free. The duty-free treatment was provided for in the original Tariff Act of 1930 and has been bound since January 1, 1948, in a concession granted by the United States in the General Agreement on Tariffs and Trade.

The consumption of calcium arsenate fluctuates considerably from year to year, depending almost solely on the prevalence of the boll weevil. Domestic production of calcium arsenate declined from 7.9 million pounds in 1961 to 3.3 million pounds in 1963 and then rose to almost 7 million pounds in 1964 (see the accompanying table). There are 10 plants in the United States producing this insecticide--2 each in New Jersey and California and 1 each in Maryland, Pennsylvania, Tennessee, New York, Texas, and Georgia. Five of the companies producing calcium arsenate are large diversified chemical companies (one of which operates plants at two locations), and four are small concerns for which sales of calcium arsenate provide a substantial part of their revenue.

Annual exports of calcium arsenate have varied considerably from 1961 to 1964, ranging from 187,000 pounds in 1963 (6 percent of production) to 1.5 million pounds in 1964 (22 percent of production). Certain Latin American countries are the chief export markets for this insecticide.

There have been no imports of calcium arsenate since 1957 except for 4,000 pounds, valued at $465, from West Germany in 1960.

Calcium arsenate: U S. production, exports of domestic merchandise, and apparent consumption, 1961-65 1/

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

Year	Production 2/	Exports	Apparent consumption	Ratio (percent) of exports to production
	Quantity			
1961	7,944	670	7,274	8
1962	4,660	942	3,718	20
1963	3,310	187	3,123	6
1964	6,958	1,537	5,421	22
	Value			
1961	475	58	417	12
1962	288	104	184	36
1963	199	18	181	9
1964	695	96	599	14

1/ There were no imports in 1961-65; exports were not separately reported for 1965; and other data for 1965 are not available.

2/ Value of production estimated from unit value of shipments.

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

Commodity	TSUS item
Calcium carbide	418.14

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

U.S. trade position

Virtually all the U.S. consumption of calcium carbide has been supplied by domestic production in recent years, when exports and imports each have amounted to less than 1 percent of the value of annual consumption. U.S production in 1964 amounted to 2.3 billion pounds, valued at an estimated $103 million.

Description and uses

Commercial calcium carbide is a gray-black, rocklike material about 80 percent pure, produced by reacting coke (item 521.31) and lime (item 512.14) at white heat in an electric furnace. Pure calcium carbide, a transparent, colorless solid, is a rare laboratory product. The commercial product is a low-unit-cost, bulky material used in the United States principally for the production of acetylene (item 429.52). In small quantities, it is used as a reducing agent in metallurgy and as a drying agent. In other countries, substantial quantities are also used in the production of calcium cyanamide (item 480.15). Calcium carbide, CaC_2, is one of the carbon-containing compounds which are considered to be inorganic in nature and, therefore, classifiable in subpart C of part 2 of schedule 4 of the TSUS (see headnote 2 of that part).

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.14	Calcium carbide	0.425¢ per lb.

The current rate, in effect since June 1958, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. For the 1965 imports, this rate was equivalent to an ad valorem rate of 12 percent.

U.S. consumption and production

Virtually all U.S. consumption of calcium carbide is provided from domestic production, which averaged 2.2 billion pounds annually in the period 1961-64. The bulk of the output is consumed near the production site in the manufacture of acetylene; approximately 85 percent of the total acetylene generated is used in the production of various organic chemicals, principally elastomers and plastics, and the remainder is used in oxyacetylene cutting and welding and in the manufacture of acetylene black. In recent years, natural gas has been displacing calcium carbide as the raw material for the production of acetylene, and further expansion of consumption and production of carbide has become problematic.

U.S. producers

The bulk of the output of calcium carbide is produced by two large, diversified chemical firms at four establishments situated in Kentucky (two), New York (one), and Ohio (one). The remaining output is produced by these two firms and two additional small firms at seven establishments located in Alabama (one), Iowa (two), Oklahoma (one), Oregon (two), and Virginia (one). The establishments are concentrated near sources of low-cost power because of the large quantities of electricity used in manufacture. Several have become the focal points of large multicorporation chemical complexes based on acetylene as a raw material. This arrangement minimizes transportation costs of calcium carbide.

U.S. exports and imports

In terms of value, neither exports nor imports have exceeded 1 percent of annual U.S. production or consumption in recent years. Annual exports averaged 12 million pounds in the period 1961-64 and were sent chiefly to developing countries throughout the free world for use principally in generating acetylene for oxyacetylene cutting and welding. Annual imports averaged 15 million pounds a year in the period 1961-64. They originated almost solely in Canada at two establishments operated by two corporations, one of which is a subsidiary of a large, diversified U.S. corporation that does not produce calcium carbide in the United States.

Foreign production and trade

Capacity to produce calcium carbide is reported for some 40 countries throughout the free world, but official statistics on foreign production and trade are fragmentary. Free-world production

outside North America is centered principally in Japan, West Germany, France, Italy, and the United Kingdom. In 1963, Japanese production amounted to 3.4 billion pounds, the world's largest, and West German production, to 2.4 billion pounds. Production in France, Italy, and the United Kingdom in 1963 ranged between 0.6 and 1.1 billion pounds. In foreign countries, as in the United States, the substitution of natural gas and petroleum-based feed stocks for calcium carbide in the production of acetylene has limited expansion of carbide capacity.

To minimize transportation costs, the bulk of foreign output is consumed near production sites; it is estimated that less than 3 percent of world production enters international trade.

Calcium carbide: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

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

Year	Production 1/	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1961	2,084,176	10,542	11,495	2,083,223	0.5
1962	2,166,516	11,178	12,386	2,165,308	.5
1963	2,218,218	13,664	11,945	2,219,937	.6
1964	2,263,318	24,102	11,090	2,276,330	1.1
1965	2/	20,918	3/	2/	2/
	Value				
1961	103,544	351	638	103,257	0.3
1962	101,031	355	700	100,686	.4
1963	104,959	435	672	104,722	.4
1964	102,722	770	589	102,903	.7
1965	2/	728	3/	2/	2/

1/ Value of production estimated from the unit value of total shipments.

2/ Not available. 3/ Not separately reported for 1965.

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

Commodity	TSUS item
Calcium chloride:	
Crude	418.16
Other	418.18

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

U.S. trade position

Imports of calcium chloride in recent years have amounted to less than 1 percent of domestic consumption. Exports, which have accounted for less than 10 percent of U.S. production (valued at $24.9 million in 1964), have gone mainly to Canada.

Description and uses

Crude calcium chloride is a hygroscopic material obtained from natural deposits or as a byproduct in the manufacture of soda ash. It is used chiefly in conjunction with salt, for stabilizing road foundations and for melting ice and snow on city streets. It is also used in the setting and curing of concrete, as a refrigeration brine, and for dustproofing coal, iron ore, and other minerals. Crude calcium chloride is sold in flake, solid, and liquid forms, the flake being the most common. Refined grades of calcium chloride, which may be obtained by recrystallization of the crude material or by the action of hydrochloric acid on calcium carbonate, are used in small quantities in medicine (U.S.P. grade) and as chemical reagents and desiccants. The refined grades are of little commercial importance.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
	Calcium chloride:	
418.16	Crude	Free.
418.18	Other	10.5% ad val.

The duty-free treatment of crude calcium chloride was provided for in the original Tariff Act of 1930 and has not been bound in a trade agreement. The rate on other calcium chloride, which reflects a concession granted by the United States in the General Agreement on Tariffs and Trade, became effective June 30, 1958.

U.S. consumption, production, and exports

Production of calcium chloride, which is practically equivalent to consumption, rose from 1.38 billion pounds, valued at $18.0 million (1.3 cents a pound), in 1961 to 1.77 billion pounds, valued at $24.9 million (1.4 cents a pound), in 1964 (see the accompanying table). Its use in the highway building program, together with its more extensive use for melting ice and snow on city streets, accounts for most of the increase.

Calcium chloride is produced in 15 plants, 5 of which are in Michigan, 4 in California, 2 in West Virginia, and 1 each in New York, Missouri, Ohio, and Washington. In 10 of these plants it is produced from natural deposits; in 4, as a byproduct in the manufacture of soda ash; and in the remaining plant, both as a byproduct and from natural deposits. The chief producers are large, diversified chemical companies.

Annual U.S. exports of calcium chloride in 1961-64, principally to Canada, ranged in quantity from 44 million to 88 million pounds, and in value from $1.1 million to $1.7 million.

U.S. imports

Annual imports of calcium chloride in 1961-64, chiefly from Belgium and Canada, averaged 5 million pounds, valued at $80,000 (1.6 cents a pound). Almost all the imports in that period consisted of crude calcium chloride. Total imports of the refined grades in the period from September 1963 (when they were first reported separately) through December 1964 amounted to 46,000 pounds, valued at $13,000; this total included 30,000 pounds (at 38.8 cents a pound) from Japan and 16,000 pounds (at 7.5 cents a pound) from West Germany. In the official import statistics published for 1964, however, the entries reported under item 418.18 include also 903,000 pounds from Canada, valued at $13,000 (1.4 cents a pound); these low-valued imports are believed to have been crude calcium chloride provided for under item 418.16. In 1965 the reported imports of crude calcium chloride totaled 7 million pounds, valued at $97,000, and came chiefly from Canada (at 1.2 cents a pound) and Belgium (at 1.4 cents a pound). The reported imports of the refined grades in 1965 consisted of 48,000 pounds, valued at $3,000 (5.9 cents a pound), all from West Germany.

Calcium chloride, crude and refined: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

Year	Production 1/	Imports	Exports	Apparent consumption
	Quantity (1,000 pounds)			
1961	1,379,164	6,045	44,095	1,341,114
1962	1,620,642	3,793	87,661	1,536,774
1963	1,624,024	4,469	73,968	1,554,525
1964	1,774,576	5,436	79,785	1,700,227
1965	2/	7,317	3/	2/
	Value (1,000 dollars)			
1961	18,000	103	1,091	17,012
1962	21,774	60	1,687	20,147
1963	23,708	67	1,527	22,248
1964	24,917	92	1,513	23,496
1965	2/	100	3/	2/

1/ Includes the solid or flake equivalent of liquid calcium chloride (computed on the basis of 1 pound liquid=0.56 pound solid or flake) as follows: 1961--262,461 thousand pounds; 1962--277,370 thousand pounds; 1963--265,469 thousand pounds; and 1964--331,420 thousand pounds.

2/ Not available.

3/ Not separately reported for 1965.

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

Commodity	TSUS item
Calcium hypochlorite----------	418.22

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

U.S. trade position

The United States has been a net exporter of calcium hypochlorite in recent years, having exported from 10 to 15 percent of production. Domestic production--amounting to 55 million pounds, valued at $12 million, in 1964--has provided virtually all of the U.S. supply.

Description and uses

Calcium hypochlorite (calcium oxychloride), $Ca(OCl)_2$, is a white crystalline solid which usually contains about 70 percent available chlorine. It is used primarily in water treatment, in the manufacture of paper, and as a bleaching agent in laundries, as well as in other applications as an algecide, bactericide, deodorant, disinfectant, and fungicide. Owing largely to its higher chlorine availability and its greater stability under ordinary storage conditions, calcium hypochlorite has replaced other chlorine-containing compounds, such as chlorinated lime (item 418.24), in most bleaching operations.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.22	Calcium hypochlorite----------	12.5% ad val.

This rate, which has been in effect since June 1951, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade.

U.S. consumption and production

The domestic consumption of calcium hypochlorite, which totaled 33.8 million pounds in 1961, increased to 47.6 million pounds in 1962. Consumption declined to 43.4 million pounds in 1963, probably because of the cool summer in that year, which lessened its use in water treatment, particularly for swimming pools. In 1964, consumption reached 48.4 million pounds.

Calcium hypochlorite is produced by three large, diversified chemical firms at four plants, situated in Michigan, New York, Ohio, and Tennessee. Their total capacity is reported to be 76 million pounds per year. The sale of calcium hypochlorite is a substantial source of revenue for each of these firms but is not the principal source for any of them.

Domestic production of calcium hypochlorite, which amounted to 37.1 million pounds in 1961, increased to 51.9 million pounds in 1962, and declined to 47.4 million pounds in 1963. In 1964, production was reported at 55.3 million pounds (table 1).

U.S. exports

Annual exports of calcium hypochlorite have generally increased in recent years; they rose from 4.1 million pounds in 1961 to 7.9 million pounds in 1964 (table 2). Canada, Vietnam, Venezuela, Mexico, the Republic of South Africa, and Peru were the leading foreign outlets in 1964; in that year, New Zealand, Australia, Guatemala, and Jamaica also took more than 100,000 pounds each. Exports during the 1961-64 period ranged between 10 and 15 percent of annual U.S. production.

U.S. imports

Although annual U.S. imports of calcium hypochlorite (table 3) fluctuated during 1961-65, the trend was generally upward. In 1961, they amounted to 806,000 pounds, valued at $132,000; in 1965, they totaled 1.0 million pounds, valued at $147,000. During 1961-64, when Japan was virtually the only source, imports supplied 1 to 2 percent of consumption.

Foreign production and trade

Denmark, Japan, the Netherlands, and the United Kingdom all have capacity to produce and export calcium hypochlorite. Other countries with well-established chemical industries--such as Belgium, France,

Italy, and West Germany--probably produce enough to meet domestic requirements. No survey of foreign production statistics is available. Foreign trade in calcium hypochlorite is not attractive to some producers because of the special packaging necessary to prevent loss of available chlorine content during transportation and storage.

Table 1.--Calcium hypochlorite: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

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

Year	Production	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1961	37,070	806	4,067	33,809	2
1962	51,938	790	5,159	47,569	2
1963	47,432	570	4,648	43,354	1
1964	55,328	983	7,863	48,448	2
1965	1/	1,035	2/	1/	1/
	Value				
1961	8,940	132	1,107	7,965	2
1962	10,819	131	1,377	9,573	1
1963	10,463	90	1,214	9,339	1
1964	11,984	142	1,925	10,201	1
1965	1/	147	2/	1/	1/

1/ Not available. 2/ Not separately reported for 1965.

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

Table 2.--Calcium hypochlorite: U.S. exports of domestic merchandise, by principal markets, 1961-64

Country	1961	1962	1963	1964
	Quantity (1,000 pounds)			
Canada	764	1,144	1,513	2,230
Vietnam	76	41	71	1,104
Venezuela	874	620	154	857
Mexico	651	1,147	753	815
Republic of South Africa	211	530	322	430
Peru	106	270	307	421
New Zealand	149	299	269	341
Australia	38	57	39	191
Congo	50	81	57	64
Guatemala	147	79	157	160
Jamaica	99	121	120	136
All other	902	770	886	1,114
Total	4,067	5,159	4,648	7,863
	Value (1,000 dollars)			
Canada	207	316	401	544
Vietnam	20	10	17	253
Venezuela	244	166	41	200
Mexico	173	298	186	189
Republic of South Africa	53	133	77	108
Peru	28	69	79	101
New Zealand	37	75	64	78
Australia	10	16	10	50
Congo	13	23	16	39
Guatemala	40	22	40	38
Jamaica	26	33	31	33
All other	256	216	252	292
Total	1,107	1,377	1,214	1,925

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

Note.--Exports were not separately reported for 1965.

Table 3.--Calcium hypochlorite: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Japan	806	788	530	983	1,025
Republic of the Philippines	-	-	-	-	10
Netherlands	-	-	40	-	-
United Kingdom	-	2	-	-	-
Total	806	790	570	983	1,035
	Value (1,000 dollars)				
Japan	132	129	84	142	146
Republic of the Philippines	-	-	-	-	1
Netherlands	-	-	6	-	-
United Kingdom	-	2	-	-	-
Total	132	131	90	142	147

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

Commodity	TSUS item
Chlorinated lime	418.24

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

U.S. trade position

Chlorinated lime (bleaching powder) has been largely replaced by competing products. In 1965, imports valued at $83,000 supplied about one-third of the estimated 5 million to 7 million pounds consumed in the United States, and exports were negligible or nil.

Description and uses

Chlorinated lime (bleaching powder) sometimes improperly called chloride of lime, is produced by the action of chlorine gas (item 415.20) on hydrated lime (item 512.11). It is an unstable white powder, somewhat variable in composition, corresponding approximately to the double salt $CaCl_2 \cdot Ca(OCl)_2 \cdot xH_2O$ and is often represented as $CaCl(OCl)$. In water solution it furnishes both chloride and hypochlorite ions. The bleaching powder covered by this summary, which is limited to that containing not more than 40 percent of available chlorine, generally contains about 35 to 37 percent of available chlorine. Calcium hypochlorite, $Ca(OCl)_2$, a bleaching product containing about 70 percent of available chlorine, is provided for in item 418.22 (see separate summary). The separate provision in the TSUS for the high-test material follows the longtime customs administrative practice, confirmed by a 1959 Customs Court ruling (CAD 713). The merchandise in that case, which was invoiced as "High Test Bleaching Powder 70% granular," was held not to be "bleaching powder or chlorinated lime" as that term was used in the Tariff Act of 1930.

The term "available chlorine content" was established in the trade as the basis for comparing the potential bleaching or disinfecting power of a chlorine compound with that of liquid or gaseous chlorine. The term is used as a measure of the oxidizing power of a compound rather than as a direct measure of the chlorine content of the product. Generally, the "available chlorine content" of both chlorinated lime and calcium hypochlorite is approximately double the percentage, by weight, of the chlorine content of the hypochlorite ion (the active constituent of most chlorine bleaching solutions).

Chlorinated lime is used principally as a bleaching agent for woodpulp paper stock, textiles, and various other products, as a deodorizer and disinfectant, and for organic chemical synthesis. Calcium hypochlorite is also used in almost all of these applications. For uses where large quantities of bleach are required, liquid chlorine (item 415.20) is frequently preferred over either chlorinated lime or calcium hypochlorite.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.24	Chlorinated lime	0.25¢ per lb.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages. Previously, chlorinated lime had been dutiable at 0.3 cents per pound. For imports in 1965 the current rate was equivalent to an ad valorem rate of nearly 6 percent.

U.S. consumption, production, and exports

Annual U.S. production of chlorinated lime has been declining for several years. This product has been replaced, in part, by other bleaching agents that contain a higher available chlorine content and are more uniform and stable under various conditions of storage. Such domestic production as exists is that of large concerns which consume their own output in making other chemical products or in chemical operations requiring the use of bleaching powder. It is estimated that annual domestic production ranges between 3 million and 5 million pounds, and annual domestic consumption, between 5 million and 7 million pounds. Information from the trade indicates that the domestic market requirements of nonproducers are supplied by imports and that exports, which are not reported in official statistics, are negligible or nil.

U.S. imports

Imports of chlorinated lime (see accompanying table) fluctuated during 1961-65, the high for the period being 3.9 million pounds, valued at $177,000, in 1962. They declined to 2.1 million pounds,

valued at $93,000, in 1963 and to 1.4 million pounds, valued at $58,000, in 1964. In 1965, imports amounted to 1.9 million pounds, valued at $83,000. The United Kingdom has been the chief source of imports, with Denmark and West Germany as secondary sources. The Netherlands, Italy, and Japan have been occasional suppliers.

Chlorinated lime (bleaching powder): U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
United Kingdom	1,785	1,672	1,186	1,283	1,495
Denmark	-	78	73	110	270
West Germany	62	2,196	778	56	124
All other	1/	2	40	-	-
Total	1,847	3,948	2,077	1,449	1,889
	Value (1,000 dollars)				
United Kingdom	82	66	54	50	63
Denmark	-	2	2	5	13
West Germany	3	109	35	3	7
All other	2/	2/	2	-	-
Total	85	177	93	58	83

1/ Less than 500 pounds.
2/ Less than $500.

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

Commodity	TSUS item
Dicalcium phosphate	418.28

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

U.S. trade position

The U.S. market for dicalcium phosphate has been supplied almost entirely by domestic producers, whose output in 1964 amounted to 250,000 short tons. Exports are not separately reported but are believed to be smaller than imports, which totaled 3,000 tons, valued at $177,000, in 1965.

Description and uses

Dicalcium phosphate (calcium phosphate dibasic), a white to grayish powder, is produced in the United States mainly by reacting phosphoric acid with lime. A small quantity is obtained as a byproduct of the manufacture of gelatin or glue from bones.

Formerly, the chief use of dicalcium phosphate in the United States was as a fertilizer. At the present time, however, little, if any, is being used domestically for that purpose, although it is commonly so used in other countries. The major part of the dicalcium phosphate consumed in the United States is used as a mineral supplement for animal and poultry feeds. Smaller quantities are used by the food and drug industries as a polishing agent in toothpastes and powders, as an ingredient in baking powders, as a mineral supplement, as a carrier for antibiotic drugs, and for similar purposes. The fluorine content of dicalcium phosphate used in animal feeds, as well as that used for food and drug purposes, is strictly controlled. Frequently, the source material for the phosphoric acid used contains objectionable amounts of fluorine, which must be removed before the dicalcium phosphate is produced. Food and drug grades also require the control of other impurities.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.28	Dicalcium phosphate--------	9.5% ad val.

This rate, which reflects a concession granted by the United States in the General Agreement on Tariffs and Trade, became effective on July 1, 1962.

Although schedule 1 includes provisions (in items 184.60-.75) for various products chiefly used for animal feeds, and dicalcium phosphate is chiefly so used, it is not classified under schedule 1. Public Law 89-241, effective December 7, 1965, removed any doubt concerning this matter by amending headnote 1a of part 15C of schedule 1 as follows:

> The term "animal feeds, and ingredients therefor" embraces products chiefly used as food for animals, or chiefly used as ingredients in such food, respectively, but such term does not include any product provided for in schedule 4 (except part 2E thereof). . . .

A mixture of dicalcium phosphate with another inorganic chemical compound provided for in part 2C of schedule 4 (e.g., in item 423.96), even though chiefly used as an ingredient in animal feeds, is also excluded from classification in schedule 1, since the headnote quoted excepts only the mixtures provision in part 2E of schedule 4.

U.S. consumption and production

Since 1961, annual apparent consumption of dicalcium phosphate in the United States has approximated domestic production. In 1964, consumption amounted to 257,000 tons, and production, to 250,000 tons (see accompanying table). The market for phosphatic feed supplements is highly competitive, and the quantity of dicalcium phosphate used annually has been affected primarily by the varying relative prices of competitive materials, such as defluorinated phosphate rock, defluorinated superphosphates, low-fluorine phosphate rock, steamed bones, and colloidal phosphate rock. All of these, except the naturally occurring low-fluorine phosphate rock, are largely domestic materials. No low-fluorine phosphate rock is produced in the United States.

U.S. producers

At the end of 1963, dicalcium phosphate was produced by six medium-to-large chemical corporations, in seven plants situated in Florida, Illinois, Michigan, Missouri, New Jersey, Tennessee, and Texas. In addition, a small quantity of dicalcium phosphate was produced as a byproduct of glue and gelatin manufacture at plants in Massachusetts, New Jersey, and Pennsylvania.

Exports and imports

Exports are not separately reported but are believed to be very much smaller than imports. Annual imports in 1961 and 1962 amounted to more than 10,000 tons, valued at more than $430,000. Since then imports of dicalcium phosphate have declined, largely as a result of increasing preference, based on price, for other phosphatic mineral supplements. The imports totaled 3,000 short tons, valued at $177,000, in 1965. Belgium has been the predominant source in recent years.

Foreign production and trade

Capacity to produce dicalcium phosphate is reported for about 15 countries, but data on their output are not available. It is believed, however, that the United States is the largest producer. Other free-world producers include Canada, Belgium, Denmark, France, West Germany, the Netherlands, Switzerland, the United Kingdom, Israel, Japan, Brazil, and Peru. East Germany and the U.S.S.R. are the only Communist areas for which production data are reported.

Dicalcium phosphate: U.S. production, imports for consumption, and apparent consumption, 1961-65

Year	Production	Imports	Apparent consumption	Ratio of imports to consumption
	Short tons	Short tons	Short tons	Percent
1961	249,608	11,367	260,975	4
1962	250,653	10,296	260,949	4
1963	239,891	9,690	249,581	4
1964	249,883	7,046	256,929	3
1965	1/	3,005	1/	-

1/ Not available.

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

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

Commodity	TSUS item
Calcium compounds not elsewhere enumerated--------	418.32

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

U.S. trade position

Annual U.S. production of the calcium compounds included here is estimated at $10 million to $15 million. Annual exports are believed to be negligible or nil, and annual imports supply about 2 to 3 percent of domestic consumption.

Description and uses

This summary deals with some 50 to 60 inorganic calcium compounds of minor industrial importance that are not provided for by name in the TSUS. Such compounds include the following: Calcium bromide, used in sizing compounds; calcium dichromate, a corrosion inhibitor; calcium ferrocyanide, used in the manufacture of citric acid; calcium hydride, a reducing agent; calcium hypophosphite, used in medicines; calcium iodate, used in mouth washes; calcium iodide, employed in photography; calcium perborate, used in tooth powders; calcium peroxide, used in dentifrices; calcium plumbate, an oxidizing agent; and tricalcium phosphate, used in ceramics.

The inorganic calcium compounds provided for by name in schedule 4, part 2C, are discussed in separate summaries either in this volume or in volume 4:4. This volume (4:3) includes, in addition to the calcium compounds covered in the first six summaries, calcium molybdate (item 418.26), which is discussed with other molybdates. In volume 4:4, crude calcium borate (item 418.12) is discussed with sodium borate; calcium cyanide (item 418.20), with other cyanide compounds; and calcium tungstate (item 418.30), with other tungstate compounds. Certain inorganic calcium compounds which are major industrial products are provided for by name in schedule 4, part 11, e.g., calcium cyanamide (item 480.15) and calcium nitrate (item 480.20), or in schedule 5, e.g., calcium hydroxide (hydrated lime, item 512.11) and calcium oxide (unslaked lime, item 512.14).

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.32	Calcium compounds not elsewhere enumerated.	10.5% ad val.

This rate, effective since June 1958, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade.

U.S. consumption, production, and exports

Official statistics on consumption, production, and exports of the compounds under consideration are not separately reported. The value of annual domestic production, which is estimated at $10 million to $15 million, approximates that of consumption. Exports, if any, are small and are probably equivalent to less than 2 percent of the value of domestic production.

The compounds under consideration here are produced by about 50 chemical companies of various sizes, 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, which constitute only a small part of their total output of chemical products. The medium-size and small companies generally produce a single calcium compound or, at most, two or three of the compounds, which usually represent a substantial part of their total output. The majority of the producing plants are located east of the Mississippi River, with New York, New Jersey, Illinois, and Pennsylvania accounting for 70 percent of the total.

U.S. imports

Imports of the compounds under consideration were first officially reported as a separate group in September 1963. In 1964, 5.0 million pounds, valued at $239,000, was imported, chiefly from Japan, the United Kingdom, and West Germany; in 1965, 8.9 million pounds, valued at $316,000, was imported, chiefly from Japan (see accompanying table).

Tricalcium phosphate from Japan led all other calcium compounds in quantity and value of imports in both 1964 and 1965. Other calcium compounds imported in those years included calcium ferrocyanide from West Germany and calcium perborate from Sweden. The imports from the United Kingdom consisted largely of calcium plumbate in 1964 and of calcium hypophosphite in 1965. Although imports of the group of compounds considered here were not separately reported before August 31, 1963, it is known that the imports then included calcium ferrocyanide, calcium hypophosphite, calcium perborate, calcium plumbate, and tricalcium phosphate and that Sweden, the United Kingdom, West Germany, and Japan were among the suppliers.

Calcium compounds not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1964 and 1965

Country	1964		1965	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
Japan	3,649	120	8,557	294
West Germany	581	26	254	9
United Kingdom	554	75	5	7
Canada	139	5	40	1
Netherlands	11	3	-	-
Norway	61	1	-	-
All other	7	9	64	5
Total	5,002	239	8,920	316

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

Commodity	TSUS item
Cerium compounds:	
Chloride	418.40
Oxide	418.42
Other	418.44

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

U.S. trade position

Annual U.S. consumption in recent years, estimated at 700,000 pounds, has been obtained almost entirely from domestic production. U.S. exports and imports have been small.

Comment

Cerium forms a cerous series of compounds, in which the element is trivalent, and a ceric series, in which the element is tetravalent. Commercial compounds of both series are included in this summary. Cerous carbonate, chloride, fluoride, and nitrate are representative of the one series, and ceric oxide and sulfate, of the other. Cerium compounds are obtained from the rare-earth minerals bastnasite (item 601.12) and monazite (item 601.45) and are used chiefly in the manufacture of glass, ceramics, incandescent gas mantles, catalysts, and paint and varnish driers.

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Cerium compounds:	
418.40	Chloride	30% ad val.
418.42	Oxide	30% ad val.
418.44	Other	30% ad val.

These rates, in effect since March 1953, reflect concessions granted by the United States in the General Agreement on Tariffs and Trade.

U.S. production (presumed to approximate domestic consumption) is estimated at 700,000 pounds, valued at $1.5 million, a year. The bulk of the output is produced by two diversified corporations at establishments in Illinois and Tennessee. About 10 additional companies produce smaller quantities at widely scattered locations. Exports are not separately reported in official statistics, but are believed to be small.

Reported imports of cerium chloride (item 418.40) for 1965 show substantial quantities from Brazil and India. A study of these entries, however, established that the imports were rare-earth chlorides which were classified for duty purposes under item 423.96. From September 1, 1963, through December 31, 1965, imports under the other TSUS items considered here were valued at $14,000 and consisted principally of cerium chloride, sulfate, and oxide from France and other countries of Western Europe.

August 1966
4:3

Commodity	TSUS item
Cesium compounds:	
Chloride	418.50
Other	418.52

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

U.S. trade position

Cesium compounds are of minor commercial importance. Annual U.S. production is estimated at 10,000 pounds. Exports and imports have been small and sporadic.

Comment

This summary covers the principal cesium compounds of commerce, including cesium bromide, carbonate, chloride, fluoride, iodide, nitrate, sulfate, and oxide. Certain inorganic compounds of cesium are included in other summaries. For example, cesium aluminum sulfate, $CsAl(SO_4)_2 \cdot 12H_2O$, is classifiable as an aluminum compound under item 417.18 rather than as a cesium compound under item 418.52 because aluminum is the first named cation in the alphabetical listing of inorganic compounds in part 2C of schedule 4 of the TSUS (see headnote 1 of that subpart).

Cesium compounds are produced principally from the mineral pollucite (item 523.81) and are used somewhat interchangeably in the manufacture of elemental cesium, optical crystals, scintillation counters, specialty glass, and catalysts.

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Cesium compounds:	
418.50	Chloride	12.5% ad val.
418.52	Other	10.5% ad val.

These rates reflect concessions granted by the United States in the General Agreement on Tariffs and Trade, effective in April 1950 for cesium chloride and in June 1958 for other cesium compounds.

CESIUM COMPOUNDS

Annual production, which approximates consumption, is estimated at 10,000 pounds, valued at $250,000. It is expected to increase significantly in future years owing to a projected increase in demand for elemental cesium (item 415.10). The bulk of the output is provided by three diversified firms at plants in California, Michigan, and Pennsylvania. Smaller quantities are produced by 10 other companies at plants in California, New Jersey, New York, Pennsylvania, and Ohio. Cesium compounds are not the principal source of revenue for any of the producers.

Exports, as indicated by trade sources, are small. Imports from West Germany and the United Kingdom have been small and sporadic. Those of cesium chloride amounted in 1964 to 106 pounds, valued at $5,802 ($55 a pound), and in 1965 to 411 pounds, valued at $14,663 ($36 a pound). Those of the other cesium compounds amounted in 1964 to 1,815 pounds, valued at $58,415 ($32 a pound), and in 1965 to 453 pounds, valued at $14,198 ($31 a pound).

Commodity	TSUS item
Cobalt oxide	418.60

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

U.S. trade position

Approximately two-thirds of U.S. consumption of cobalt oxide in recent years has been obtained from imports. Exports have been negligible. In 1965, imports were valued at $1 million.

Comment

Commercial cobalt oxide is a gray-to-black powder consisting of cobalt monoxide and tricobalt tetraoxide in various proportions and containing from 70 to 78 percent cobalt. Cobalt oxide is produced from cobalt ore and concentrates (item 601.18) and from cobalt metal, waste, and scrap (item 632.20). It is used as a coloring or decolorizing agent in the manufacture of ceramics and glass, as a bonding agent in the enameling of sheet steel, as a source of cobalt in animal feed supplements, and for the production of cobalt metal, driers for paints and varnishes, and catalysts.

The current column 1 rate of duty applicable to imports (see general headnote 3, in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.60	Cobalt oxide	1.5¢ per lb.

The current rate, in effect since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages. For the 1965 imports, the current rate was equivalent to 1.4 percent ad valorem.

U.S. consumption of cobalt oxide has manifested no consistent pattern of growth in recent years. During 1961-65, reported annual consumption ranged (in terms of cobalt content) between 846,000 pounds in 1965 and 998,000 pounds in 1962, and averaged 927,000 pounds (table 1). U.S. production of cobalt oxide was more stable than reported domestic consumption in the period 1961-65, ranging (in terms

of cobalt content) from 297,000 pounds in 1963 to 320,000 pounds in 1962 and 1965, and averaging 309,000 pounds. Cobalt oxide is produced domestically by five firms with plants in Delaware, New Jersey, Ohio, Pennsylvania, and Virginia. For some of these firms, revenue from the sale of cobalt oxide is a substantial source of income.

Exports of cobalt oxide are not separately reported in official statistics, but trade information indicates that they have been small.

Imports, which supplied approximately two-thirds of U.S. consumption in the period 1961-65, fluctuated during that period between 337,000 pounds (estimated cobalt content) in 1963 and 1,090,000 pounds in 1964, and averaged 661,000 pounds. The wide fluctuation in annual imports is attributable primarily to political instability in the Congo, which is the source of cobalt materials processed in Belgium, the principal supplying country for U.S. imports.

Foreign free-world production of cobalt oxide is concentrated in Belgium, Canada, France, Japan, Western Germany, and the United Kingdom. Statistics on foreign production and trade are fragmentary.

Table 1.--Cobalt oxide: U.S. production, imports for consumption, and reported consumption, 1961-65

(In thousands of pounds, cobalt content)

Year	Production	Imports	Reported consumption
1961	306	490	900
1962	320	704	998
1963	297	337	935
1964	302	1,090	958
1965	320	682	846

Source: Consumption and production compiled from official statistics of the U.S. Bureau of Mines; the cobalt content of the imports, estimated from the figures reported in the official statistics of the U.S. Department of Commerce as shown in table 2.

Table 2.--Cobalt oxide: U.S. imports for consumption, by principal sources, 1961-65

Year	Total	Belgium and Luxembourg	Canada	All other
	Quantity (1,000 pounds)			
1961	681	681	-	1/
1962	978	958	20	1/
1963	468	460	8	-
1964	1,514	1,449	53	12
1965	947	897	50	-
	Value (1,000 dollars)			
1961	663	663	-	2/
1962	943	921	22	2/
1963	451	441	9	1
1964	1,422	1,355	55	12
1965	1,011	954	56	1

1/ Less than 500 pounds.
2/ Less than $500.

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

Commodity	TSUS item
Cobalt sulfate	418.62

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

U.S. trade position

In 1964, U.S. imports, valued at $27,000, provided 12 percent of the apparent domestic consumption of cobalt sulfate. Exports have been negligible.

Comment

Cobalt sulfate is a brownish-red crystalline compound that enters commerce as the heptahydrate or hexahydrate. It is obtained from cobalt metal and scrap (item 632.20), cobalt ore (item 601.18), and other cobalt compounds. This compound is used in electroplating, in the manufacture of ceramics, catalysts, and driers for paint, ink, and varnish, as a decolorizing or coloring agent, and in animal feeds as a mineral supplement.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.62	Cobalt sulfate	1.5¢ per lb.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages. For the 1965 imports, the 1.5-cent rate was equivalent to an ad valorem rate of about 4 percent.

Annual U.S. production increased from 383,000 pounds in 1961 to 548,000 pounds in 1964 (table 1), reflecting in part the increasing recovery of cobalt sulfate from scrap. Cobalt sulfate is produced by 10 firms operating 13 plants situated in California (1), Illinois (2), Missouri (1), New Jersey (3), Ohio (4), Pennsylvania (1), and Virginia (1). Exports are not separately reported in official statistics; trade information indicates that they have been small.

Annual U.S. imports for consumption declined in the period 1961-65 from 157,000 pounds in 1961 to 78,000 pounds in 1965, and were equivalent to 12 percent of apparent U.S. consumption in 1964 (table 1). Imports originated in the United Kingdom and West Germany (table 2). Cobalt sulfate is produced in several industrialized countries, but statistics on foreign production and trade are fragmentary.

Table 1.--Cobalt sulfate: U.S. production, imports for consumption, and apparent consumption, 1961-65 1/

Year	Production	Imports	Apparent consumption	Ratio of imports to consumption
	1,000 pounds	1,000 pounds	1,000 pounds	Percent
1961	383	157	540	29
1962	502	115	617	19
1963	589	78	667	12
1964	548	74	622	12
1965	2/	78	2/	2/

1/ Exports, for which data are not separately reported, are believed to be small relative to production. Apparent consumption is assumed to be the sum of production and imports. 2/ Not available.

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

Table 2.--Cobalt sulfate: U.S. imports for consumption, by sources, 1961-65

Year	Total		United Kingdom		West Germany	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
1961	157	56	142	51	15	5
1962	115	42	99	36	16	6
1963	78	29	44	16	34	13
1964	74	27	52	19	22	8
1965	78	30	70	27	8	3

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

August 1966
4:3

Commodity	TSUS item
Cobalt compounds not elsewhere enumerated----------	418.68

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

U.S. trade position

In recent years domestic production has provided practically all of the U.S. supply of the inorganic cobalt compounds not elsewhere provided for in the TSUS, and exports have been negligible. Imports in 1965, valued at $133,000, are estimated to have aggregated less than 5 percent of domestic consumption.

Comment

This summary covers the miscellaneous inorganic cobalt compounds not provided for elsewhere in the TSUS, principally cobalt carbonate and hydrate. The compounds considered here include some 20 commercial inorganic cobalt compounds that are obtained primarily from cobalt metal, waste, and scrap (item 632.20). They are used in the manufacture of driers for paint, varnish, and ink; in animal feeds as a mineral supplement; in the production of ceramics and glass as coloring or decolorizing agents; in electroplating; and in the preparation of catalysts and other cobalt chemicals. Cobalt oxide (item 418.60) and cobalt sulfate (item 418.62) are covered in separate summaries.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.68	Cobalt compounds not elsewhere enumerated.	12% ad val.

This rate, in effect since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

U.S. production statistics are available for cobalt carbonate and cobalt hydrate, the principal compounds in the category covered here. Domestic output of cobalt carbonate increased from 282,000 pounds in 1961 to 523,000 pounds in 1964, and that of cobalt hydrate increased from 225,000 pounds to 705,000 pounds between those years. Exports are not separately reported in official statistics, but trade sources indicate that they have been small.

Total U.S. imports for consumption of the inorganic cobalt compounds increased from approximately 3,000 pounds, valued at $3,000, in 1961 to 67,000 pounds, valued at $133,000, in 1965, but represent only a small part of domestic supply. Canada, the United Kingdom, and West Germany were the principal sources. Several industrialized countries produce miscellaneous inorganic cobalt compounds. Statistics on foreign production and trade are fragmentary.

U.S. production of cobalt carbonate and hydrate, and total imports for consumption of inorganic cobalt compounds not elsewhere enumerated, 1961-65

Year	Production		Total imports of inorganic cobalt compounds not elsewhere enumerated	
	Cobalt carbonate	Cobalt hydrate	Quantity	Value
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1961	282	225	1/ 3	3
1962	381	277	1/ 5	5
1963	472	445	1/ 16	16
1964	523	705	20	16
1965	2/	2/	67	133

1/ Probably includes small quantities of organic cobalt salts that are provided for in items 426.24 and 426.26.
2/ Not available.

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

Commodity	TSUS item
Copper iodide:	
Crude	418.70
Other	418.72

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

U.S. trade position

Annual U.S. production of copper iodide in recent years is estimated to have been about 10,000 pounds; exports and imports, if any, have been negligible.

Comment

The copper iodide of commerce is cuprous iodide, a white to brownish-yellow crystalline compound formed by reacting potassium iodide (item 420.20) with copper and iron sulfates (items 418.76 and 418.92). It is used as an animal feed and as a catalyst. At one time, when copper iodide was used as an intermediate in the production of iodine, it was of greater commercial importance than at present. Iodine is now produced almost entirely by other methods. Cupric iodide, which is also provided for in items 418.70 and 418.72, is unstable and not an article of commerce.

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Copper iodide:	
418.70	Crude	Free.
418.72	Other	1.275¢ per lb. + 10.5% ad val.

The duty-free treatment of crude copper iodide was provided for in the original Tariff Act of 1930 under paragraph 1698 and has not been bound in a trade agreement. The compound rate for "other" copper iodide was established by the TSUS on August 31, 1963; it reflects concessions in effect since June 1958 that were granted by the United States in the General Agreement on Tariffs and Trade. The specific component of the current rate of duty--1.275 cents per pound--was derived from the import tax previously imposed under the

Internal Revenue Code on articles in chief value of copper, whereas the ad valorem component--10.5 percent--carried forward the regular import duty imposed under the tariff act.

Annual U.S. production of copper iodide, which is believed to approximate consumption, has amounted to about 10,000 pounds in recent years. There are five producers--two in New Jersey, one each in California, Illinois, and Ohio. Exports, if any, have been negligible.

Subsequent to the publication of the official import statistics for 1964 and 1965, the imports reported therein as crude copper iodide under item 418.70 were determined to have been crude iodine, classifiable under item 415.25. U.S. imports in 1964 of copper iodide other than crude (item 418.72) are believed to have consisted of 210 pounds from the United Kingdom, valued at $356 (or about $1.70 a pound). The imports from Belgium and Luxembourg included under item 418.72 in the official statistics for 1964--22,046 pounds, valued at $5,612 (or about 25 cents a pound)--were determined to have been copper oxychloride, classifiable under item 418.78. No imports were reported under item 418.72 for 1965.

Commodity	TSUS item
Copper sulfate	418.76

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

U.S. trade position

Although annual U.S. consumption of copper sulfate, almost entirely from domestic production, was generally stable in the period 1961-64, domestic production declined by 14 percent as exports dropped by 86 percent. In 1964, exports of nearly 1,100 short tons, valued at $275,000, were equivalent to only about 3 percent of the quantity produced, and imports were even smaller.

Description and uses

Copper sulfate is produced chiefly by the action of sulfuric acid on copper (mostly scrap), with purification by recrystallization. It is usually sold in the hydrated form (blue vitriol, containing about 25 percent copper) as crystals, granules, or powder. The anhydrous form is a white to grayish-white powder containing about 40 percent copper. Hydrated copper sulfate is used principally in agriculture--as a fungicide, insecticide, and trace-element fertilizer. It is also used in industry as a flotation reagent, catalyst, and textile mordant. The anhydrous form is used as a dehydrating agent.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.76	Copper sulfate	1.7¢ per lb. on copper content.

This rate of duty was established by the TSUS on August 31, 1963. Before that date imports of copper sulfate had been duty free under the provisions of paragraph 1659 of the Tariff Act of 1930, but had been subject to an import tax under the Internal Revenue Code. Since June 1932 the current rate of 1.7 cents on the copper content is

equivalent to the reduced import tax that became effective in June 1958 pursuant to a concession granted by the United States in the General Agreement on Tariffs and Trade. The duty-free provision of the original Tariff Act of 1930 was not bound in a trade agreement. The current rate is equivalent to an ad valorem rate of 3.5 percent, based on imports in 1965.

U.S. consumption, production, exports, and imports

Annual consumption of copper sulfate has remained fairly stable in recent years, averaging about 41,000 short tons (see accompanying table). In 1964 slightly less than one-half of U.S. consumption was used for agricultural purposes, and the remainder was used in various industrial applications. Production in 1964 was reported by 8 concerns, operating 10 plants situated in Arizona, California, Idaho, Ohio, Montana, New Jersey, Tennessee, Utah, and Washington.

Annual U.S. production rose by 5 percent from 1962 to 1964, but output in 1964 was 13 percent smaller than that in 1961. Exports declined from about 7,600 tons in 1961 to less than 900 tons in 1963, and totaled about 1,100 tons in 1964. Latin American and African countries were the markets for the major share of U.S. exports. The downward trend of exports resulted largely from the substitution of less costly fungicides for copper sulfate, especially in banana-producing countries.

From 1961 through 1964, annual imports ranged from 290 to 560 tons, with Canada and Mexico providing the major part and various European countries supplying smaller quantities. In 1965, imports totaled 540 tons, nearly all from Mexico.

World production

Production capacity exists in many countries, but statistical data concerning output are fragmentary. The major producers besides the United States are Italy, the United Kingdom, Belgium, and Yugoslavia. Smaller producers include Canada, Argentina, Brazil, Chile, Uruguay, Venezuela, Portugal, Spain, and the Republic of South Africa. It is believed that there is a decreasing trend in world production similar to that in U.S. production. World output is estimated to have been between 300,000 and 325,000 short tons in 1964.

Copper sulfate: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

Year	Production	Imports	Exports	Apparent consumption
	Quantity (short tons)			
1961	48,584	320	7,575	41,329
1962	39,984	297	1,916	38,365
1963	41,636	288	851	41,073
1964	41,908	564	1,087	41,385
1965	1/	543	2/	1/
	Value (1,000 dollars)			
1961	1/	67	1,542	1/
1962	1/	60	456	1/
1963	1/	66	227	1/
1964	1/	127	275	1/
1965	1/	131	2/	1/

1/ Not available.
2/ Exports were not separately reported for 1965.

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

COPPER (CUPRIC) OXIDE AND COPPER COMPOUNDS NOT ELSEWHERE ENUMERATED

Commodity	TSUS item
Copper (cupric) oxide	418.74
Copper compounds not elsewhere enumerated	418.78

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

U.S. trade position

The inorganic copper compounds discussed here are not important items of trade. Total U.S. production in 1964 is estimated at slightly more than $5 million. Imports are believed to have amounted to about one-half of 1 percent of estimated U.S. production in recent years; exports also are believed to have been small.

Description and uses

Copper (cupric) oxide, a black to brownish-black powder, is used as a chemical reagent, as a polishing agent, in antifouling paint, and as a fungicide. Cuprous oxide is provided for as a pigment in TSUS item 473.24.

In addition to cupric oxide, this summary covers some 15 inorganic copper compounds that are not provided for by name in the TSUS, such as the chloride, hydroxide, nitrate, and oxychloride. These compounds are usually crystalline, and most vary from white to blue green in color. Copper chloride is used for such purposes as the following: As an intermediate in producing other copper salts, as a textile mordant, in the preparation of metallurgical reagents, and in deodorizing and desulfurizing petroleum distillates. Copper hydroxide is used in the cuprammonium process for making rayon, as an intermediate for various copper salts, as a mordant, and as a feed additive. Copper nitrate is used in medicine, photography, and electroplating. Copper oxychloride is used as a fungicide.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

COPPER (CUPRIC) OXIDE AND COPPER COMPOUNDS NOT ELSEWHERE ENUMERATED

TSUS item	Commodity	Rate of duty
418.74	Copper (cupric) oxide----------	1.275¢ per lb. + 10.5% ad val.
418.78	Copper compounds not elsewhere enumerated.	1.275¢ per lb. + 10.5% ad val.

These compound rates of duty were established by the TSUS on August 31, 1963; they reflect concessions in effect since June 1958 that were granted by the United States in the General Agreement on Tariffs and Trade. The specific component of the current rates of duty--1.275 cents per pound--was derived from the import tax previously imposed under the Internal Revenue Code on articles in chief value of copper, whereas the ad valorem component--10.5 percent--carried forward the regular import duty imposed under the tariff act.

For the 1965 imports under item 418.78, the compound rate was equivalent to an ad valorem rate of 14.5 percent. There were no imports reported under item 418.74 in either 1965 or 1964.

U.S. consumption, production, imports, and exports

It is believed that annual U.S. consumption and production have not varied appreciably in recent years. In 1964, U.S. production amounted to about $5 million. Inasmuch as U.S. imports of the products considered herein are minor and exports are believed to be small, U.S. consumption approximates U.S. production.

Imports of the copper compounds covered here were not separately classified before August 31, 1963; since then imports have been reported only under item 418.78. In 1964 they totaled 115,000 pounds, valued at $35,000 (including the imports erroneously reported under item 418.72; see p. 46 of this volume), and in 1965 they amounted to 230,000 pounds, valued at $73,000. Imports came mainly from the United Kingdom and West Germany, and are believed to have been predominantly cupric chloride.

Production facilities for these copper compounds are known to exist in countries with extensive chemical industries, such as Belgium, France, West Germany, Italy, the United Kingdom, and Japan, but data on production and trade are fragmentary.

Commodity	TSUS item
Gold compounds	418.80

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

U.S. trade position

Annual U.S. production of inorganic gold compounds in recent years has approximated domestic consumption and currently has an estimated value of $20 million. Foreign trade is negligible or nil.

Description and uses

This summary covers approximately 30 inorganic gold compounds, such as the bromide, chloride, hydroxide, and oxide. Gold forms two series of compounds, a univalent series and a trivalent series. Since the compounds comprising the univalent series are unstable, the commercially important gold compounds are mainly of the trivalent series: Gold tribromide, trichloride, trihydroxide, and trioxide. The bromide is used in medicine, whereas the other listed compounds are used in making special inks and gilding liquids, in decorating ceramic and glass, in toning photographic prints, and in coloring rubber.

Gold also forms very stable complex compounds, such as gold potassium bromide, chloride, cyanide, and iodide, as well as a corresponding series of gold sodium compounds. Most such compounds are classifiable under provisions other than item 418.80 because the gold is present in the anion rather than in the cation (see headnote 1 to pt. 2C of schedule 4). Thus, gold potassium cyanide, $KAu(CN)_2$, formed when gold metal dissolves in potassium cyanide solution in the recovery of gold from ores, is, for tariff purposes, a potassium compound (item 420.36). These complex compounds are used in decorating porcelain, electrogilding, goldplating, and staining fine glass, and in medicine and photography.

Gold compounds covered by item 418.80 and having 90 percent or less gold value are classified under U.S. Treasury regulations as "fabricated gold," and those having more than 90 percent gold value, as "semi-processed gold." In general, the importation and exportation of gold in these forms is permissible to the extent that it is

required for legitimate industrial, professional, or artistic uses, but is prohibited if the purpose is evasion of U.S. monetary regulations.

None of the inorganic gold compounds covered here are important in international trade, and only a few are produced on a commercial scale in the United States. Organic gold salts are covered under TSUS item 427.28, "All other salts of organic acids."

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.80	Gold compounds	10% ad val.

This rate, which reflects a concession granted by the United States in the General Agreement on Tariffs and Trade, was derived from the rate, effective July 1, 1963, for chemical compounds of which gold constituted the element of chief value. The concession became operative in two annual stages.

U.S. consumption, production, and trade

Data on domestic consumption and production are not published in official statistics, but it is estimated that annual U.S. production, which approximates consumption, has been increasing in recent years and is currently valued at about $20 million.

Inorganic gold compounds are produced in the United States by five companies with plants in Illinois (two), Missouri (one), and New Jersey (two). The products of at least two of these companies are laboratory reagents for use in chemical analysis and research activities. For each company the output of inorganic gold compounds represents a small part of its total annual production.

Domestic exports of inorganic gold compounds are not separately reported but are estimated to be negligible or nil. A separate provision for imports of inorganic gold compounds has been in effect only since August 31, 1963. No imports were reported for September-December 1963 or for the whole of 1964. Examination of the entry documents for the imports reported for 1965 (23,000 pounds, valued at $29,000, chiefly from Belgium and Luxembourg) indicate that most, if not all, of these imports were erroneously reported as gold compounds.

Commodity	TSUS item
Iron sulfide (pyrites)	418.90

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

U.S. trade position

Annual consumption of iron sulfide in recent years has averaged about 1.2 million long tons. Imports, all from Canada, are estimated at about 300,000 long tons, valued at $1.4 million, a year. Exports, if any, are small.

Comment

Iron sulfide is used in the United States mainly as a minor source of sulfur (item 415.45) for manufacturing sulfuric acid (item 416.35). Iron sulfide is traded in the form of certain minerals collectively known as pyrites. Of these, the only commercially important mineral is pyrite itself, a brassy, pale yellow, metallic mineral which is generally obtained in the United States as a byproduct in the mining of copper, lead, or zinc sulfide ores.

Imports of iron sulfide are duty free. The duty-free treatment was provided for in the original Tariff Act of 1930 and has been bound since January 1948 in a concession granted by the United States in the General Agreement on Tariffs and Trade.

Annual domestic consumption and production of iron sulfide (pyrites) generally declined during the period 1961-64 (see accompanying table), whereas consumption of sulfur in all forms increased substantially. The increased demand for sulfur was largely supplied from the output of elemental sulfur rather than from secondary sources such as iron sulfide.

In 1965, iron sulfide was produced as a byproduct by seven mining companies at seven plants--two in Arizona and one each in California, Colorado, Pennsylvania, South Carolina, and Tennessee. Three of the producers are medium-size mining companies and four are large diversified corporations. The production of iron sulfide accounts for only a small part of the firms' operations.

Exports are not separately reported but are believed to be nil. Annual imports of iron sulfide, all from Canada, have ranged from 240,000 to more than 340,000 long tons in recent years. They have consisted largely of informal entries (valued at not more than $250 each) that are not separately reported in the official statistics. In 1965 the estimated unit value of imports was $4 a long ton.

Iron sulfide minerals, mainly pyrite, are produced in more than 30 countries, but only small quantities enter international trade. The major foreign producing countries include the U.S.S.R., Japan, and Spain; in 1964 the United States ranked sixth. The bulk of the world output is consumed near the production sites in the manufacture of sulfuric acid. Annual world production of iron sulfide has remained fairly constant in recent years, averaging about 19 million long tons.

Iron sulfide (pyrites): U.S. production, imports for consumption, and apparent consumption, 1961-65

Year	Production 1/	Imports 2/	Apparent consumption	Ratio of imports to consumption
	1,000 long tons	1,000 long tons	1,000 long tons	Percent
1961	987	282	1,269	22.2
1962	916	302	1,218	24.8
1963	825	3/ 250	1,075	23.3
1964	847	3/ 325	1,172	27.7
1965	4/	3/ 340	4/	4/

1/ Gross weight of ores and concentrates, containing an average of 41.2 percent sulfur.
2/ Gross weight of pyrites containing more than 25 percent sulfur.
3/ Estimated; includes informal entries (valued at not more than $250 each) from Canada.
4/ Not available.

Source: Production compiled from official statistics of the U.S. Bureau of Mines; imports compiled from official statistics of the U.S. Department of Commerce, except as noted.

Note.--Data on exports are not separately reported, but exports are believed to be nil.

August 1966
4:3

Commodity	TSUS item
Ferrous sulfate	418.92

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

U.S. trade position

Ferrous sulfate is one of the most important iron salts of commerce. U.S. production totaled 173,000 short tons in 1964. Imports, which have declined in recent years, have been equivalent to about 1 percent of production since 1962. Imports in 1965 were valued at $22,000. Exports are believed to have been smaller than imports.

Comment

Ferrous sulfate, $Fe(SO_4)\cdot 7H_2O$, sometimes known as copperas or green vitriol, is usually marketed as greenish crystals or granules, which often have a yellowish-brown coating of ferric sulfate caused by oxidation. Ferrous sulfate marketed in the anhydrous form is also included in this summary. Ferrous sulfate is produced chiefly as a byproduct of the pickling of iron and steel. It is used principally as an intermediate in the production of such other iron compounds as ferrous sulfide (item 418.94) and ferrous gluconate (a medicinal and an ingredient in animal feeds). It is also used in water treatment, medicinals, printing and engraving, wood preservation, and various metallurgical processes.

Imports of ferrous sulfate are duty free. The duty-free treatment was provided for in the original Tariff Act of 1930 and has been bound since January 1948 in a concession granted by the United States in the General Agreement on Tariffs and Trade.

In 1964, ferrous sulfate was produced for sale by six plants, all of which are east of the Mississippi River. Since much of the sulfate producible from the pickling process is customarily used for regeneration of sulfuric acid, commercial production of ferrous sulfate could be increased substantially if the need arose. The U.S. output of ferrous sulfate increased from 144,000 tons in 1961 to 173,000 tons in 1964 (see accompanying table). Exports are not separately reported, but are believed to have been smaller than imports. Imports, predominantly from Japan, amounted to 915 tons, valued at $22,000, in 1965.

Ferrous sulfate is produced in several foreign countries, but statistical data on their output are not available. The principal producing countries other than the United States are Japan, the United Kingdom, West Germany, France, and the U.S.S.R. The current worldwide expansion of the iron and steel industry will probably increase the available supply of ferrous sulfate.

Ferrous sulfate: U.S. production and imports for consumption, 1961-65

(In short tons)

Year	Production	Imports
1961	144,103	2,075
1962	154,989	1,984
1963	159,845	1,172
1964	172,657	952
1965	1/	915

1/ Not available.

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

Commodity	TSUS item
Iron compounds not elsewhere enumerated----------	418.94

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

U.S. trade position

It is estimated that the value of U.S. production of the inorganic iron compounds included in this summary amounted to slightly more than $7 million in 1964. Imports in recent years have been equivalent to less than 5 percent of the estimated U.S. production, and exports have been even smaller.

Description and uses

The inorganic iron compounds not provided for by name in the TSUS include such compounds as ferric and ferrous chlorides, ferric and ferrous fluorides, ferric hydroxide, and ferric phosphate. The chlorides are used in sewage treatment, textile dyeing, metallurgical processing, and medicinal preparations, and the fluorides, chiefly in ceramics. Ferric hydroxide has a limited use in the manufacture of medicinals. Ferric phosphate is used in the manufacture of medicinals, feed additives, and fertilizers. Iron sulfide (pyrites), item 418.90, and ferrous sulfate, item 418.92, are discussed in other summaries.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
418.94	Iron compounds not elsewhere enumerated--	9% ad val.

This rate, which has been in effect since January 1, 1966, reflects the first stage of a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT). The concession is to become fully effective in five annual stages, the last (5 percent ad valorem) on January 1, 1970 (see Presidential Proclamation No. 3694,

dated Dec. 27, 1965). The previous rate (10.5 percent), also a result of a U.S. concession in the GATT, had been in effect since June 1958.

U.S. consumption, production, imports, and exports

It is believed that the value of the annual U.S. consumption of the iron compounds included here amounted to about $7 million in 1964 and has been increasing. From 5 to 10 chemical companies, most of them situated east of the Mississippi River, manufacture the iron compounds covered by this summary; for none of the producers are these compounds their principal products.

U.S. imports in 1965 were valued at $221,000. Most of the imports, believed to be largely ferric chloride, came from Sweden, West Germany, Canada, and France. U.S. exports are not separately reported, but they have probably been smaller than imports. The iron compounds discussed herein are produced in Italy, the United Kingdom, Japan, and Australia, as well as in the countries supplying U.S. imports; data on the output of these countries are not available.

Commodity	TSUS item
Lead arsenate----------	419.00

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

U.S. trade position

The declining U.S. consumption of lead arsenate in recent years (amounting to about 7.4 million pounds, valued at $1.5 million, in 1964) has been supplied almost entirely by domestic production. During 1960-64, exports fluctuated, ranging from 9 to 20 percent of annual production.

Comment

Lead arsenate, which is a poisonous white powder produced from lead oxide (litharge, item 473.52) and arsenic pentoxide (item 417.64), is used principally as an insecticide, especially for spraying apple and other fruit trees.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.00	Lead arsenate----------	1.5¢ per lb.

This rate, which reflects a concession granted by the United States in the General Agreement on Tariffs and Trade, has been in effect since June 1951. On lead arsenate imported in 1964 (there were no imports in 1965), the 1.5-cent rate was equivalent to 2.2 percent ad valorem.

As a result of the competition from DDT (item 405.15) and other insecticides, annual U.S. consumption of lead arsenate has been declining since the late 1940's. Apparent annual consumption of this insecticide declined from 9.5 million pounds in 1961 to slightly more then 7 million pounds in both 1963 and 1964 (see accompanying table).

Lead arsenate is produced by 9 companies at 10 locations in the United States; the producing plants are situated as follows: 4 in New Jersey, 2 each in California and Georgia, and 1 each in Pennsylvania and New York. Three of the producing companies are large, integrated chemical concerns, and the others are small companies for which sales of lead arsenate provide a substantial part of total revenue. U.S. production of lead arsenate fell from 10.4 million pounds in 1961 to 7.8 million pounds in 1963, but then rose to 9.3 million pounds in 1964.

Exports of lead arsenate in 1961-64 demonstrated considerable variation, ranging between 800,000 pounds and 1.9 million pounds. Exports have gone principally to Latin American countries in recent years.

From 1952 to 1965 there were no imports of lead arsenate except in 1964, when 4,000 pounds was imported, primarily from West Germany, with the remainder from Canada.

Lead arsenate: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

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

Year	Production 1/	Imports	Exports	Apparent consumption	Ratio (percent) of exports to production
	Quantity				
1961	10,446	-	929	9,517	9
1962	9,930	-	1,423	8,507	14
1963	7,842	-	803	7,039	10
1964	9,258	4	1,872	7,390	20
1965	2/	-	3/	2/	2/
	Value				
1961	2,261	-	183	2,078	8
1962	2,000	-	249	1,751	12
1963	1,516	-	135	1,381	9
1964	1,800	3	278	1,525	15
1965	2/	-	3/	2/	2/

1/ Value of production estimated from unit value of shipments.
2/ Not available. 3/ Not separately reported.

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

August 1966
4:3

Commodity	TSUS item
Lead nitrate	419.02

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

U.S. trade position

Annual U.S. production of lead nitrate in recent years is estimated not to have exceeded $250,000 in value. Annual imports have amounted to less than $50,000, and exports have been negligible or nil.

Comment

Lead nitrate, which is produced by treating lead oxide or lead carbonate with nitric acid, is available commercially as a white powder or as colorless crystals. It is used in the manufacture of lead colors and pigments, as a mordant for the dyeing and printing of textiles, and in the production of matches and certain types of explosives.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.02	Lead nitrate	1.5¢ per lb.

This rate reflects a concession granted by the United States in the General Agreement on Tariffs and Trade and has been in effect since October 1951. The ad valorem equivalent of the rate, based on 1965 imports, is 11.4 percent.

In the United States three large chemical companies produce lead nitrate in three plants--in New York, New Jersey, and Missouri. Annual production is estimated to range between 500,000 and 1 million pounds, valued at $125,000 to $250,000. Exports, if any, are small.

During the last 4 months of 1963, when imports of lead nitrate were first separately reported in official U.S. statistics, they amounted to 152,894 pounds, valued at $16,421. Imports, almost all from the United Kingdom, the Republic of South Africa, and Belgium and Luxembourg, amounted in 1964 to 329,969 pounds, valued at $41,385, and in 1965 to 342,074 pounds, valued at $45,072.

Lead nitrate is a relatively unimportant item in international trade. The process of manufacture and the equipment required to produce it are comparatively simple, and production is possible in almost any industrialized country.

August 1966
4:3

Commodity	TSUS item
Lead compounds not elsewhere enumerated----------	419.04

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

U.S. trade position

Annual production of the lead compounds included in this summary is estimated to have ranged between 3 million and 5 million pounds during the period 1961-65. Annual imports during that period declined from nearly 600,000 pounds, valued at $50,000, which was equivalent to about a sixth of domestic consumption, to a few thousand pounds.

Comment

This summary includes lead chloride, lead phosphate, lead borate, lead fluoride, and nearly 40 other inorganic lead compounds, all of minor commercial significance, which are not provided for by name in the TSUS. Lead arsenate (item 419.00) and lead nitrate (item 419.02) are discussed in separate summaries of this volume, and lead pigments (items 473.44-473.62) are discussed in volume 4:10. The compounds considered here are used for analytical reagents and in the manufacture of coating materials, glass, and certain plastics.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.04	Lead compounds not elsewhere enumerated------	15% ad val.

This rate, which reflects a concession granted by the United States in the General Agreement on Tariffs and Trade, has been in effect since January 1948.

The bulk of the production of lead compounds not elsewhere enumerated is the output of three manufacturers, for which chemicals of this kind are minor products. Production, which is presumed to be roughly equal to consumption, is estimated at 3 million to 5 million pounds a year, and exports, if any, are small.

Imports of the compounds considered here declined from 585,000 pounds in 1961 to a few thousand pounds in the years 1963-65. The bulk of the imports in 1961 and 1962 consisted of lead chloride from Mexico, whereas those in 1963-65 comprised various other compounds entirely from the United Kingdom and West Germany (see accompanying table). The 1965 imports totaled 7,000 pounds, valued at $11,000.

Lead compounds not elsewhere enumerated: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
United Kingdom	3	60	1/	8	2
West Germany	4	6	4	7	5
Mexico	578	300	-	-	-
Total	585	366	4	15	7
	Value (1,000 dollars)				
United Kingdom	2	16	2/	5	7
West Germany	1	2	2	5	4
Mexico	47	20	-	-	-
Total	50	38	2	10	11

1/ Less than 500 pounds.
2/ Less than $500.

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

August 1966
4:3

Commodity	TSUS item
Magnesium carbonate:	
Not precipitated	419.20
Precipitated	419.22

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

U.S. trade position

From 1958 to 1964, U.S. production of magnesium carbonate declined from 51 million pounds to 23 million pounds, and U.S. imports increased from 652,000 pounds, valued at $66,000, to 2.5 million pounds, valued at $225,000. Exports are believed to be negligible.

Description and uses

Magnesium carbonate is a white, bulky powder derived from dolomite, magnesite, sea water, and salt bitterns. The most important use of magnesium carbonate is in the manufacture of insulating materials, in competition with such commodities as fiber glass, glass wool, and asbestos products. It is used to a lesser extent in the manufacture of paints, plastics, printing ink, and varnishes, and as a filler in the production of rubber goods.

Because of the depletion of natural deposits of magnesite of sufficiently high purity for most commercial uses, practically all magnesium carbonate presently being marketed is "precipitated." The method most commonly used in producing this type involves aeration or gradual heating of solutions of magnesium bicarbonate. Precipitation makes possible a purity of more than 99 percent $MgCO_3$ and the optimum control of particle size. The term "precipitated" first appeared in connection with the duty on magnesium carbonate in the Tariff Act of 1913 to distinguish the precipitated product from the carbonate obtained directly from natural deposits of magnesite.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Magnesium carbonate:	
419.20	Not precipitated	8.5% ad val.
419.22	Precipitated	0.35¢ per lb.

These rates, effective since July 1, 1963, reflect concessions granted by the United States in the General Agreement on Tariffs and Trade. The concessions became operative in two annual stages.

The rate of 0.35 cent per pound on item 419.22 was equivalent to 3.9 percent ad valorem, based on the total imports in 1965. On imports of this item from individual countries during that year, the 0.35-cent rate, however, was equivalent to ad valorem rates ranging from 1.0 (on those from France) to 4.5 percent (on those from the United Kingdom, the predominant supplier).

U.S. consumption

U.S. consumption of precipitated magnesium carbonate has been declining in recent years because other products, such as fiber glass, glass wool, and asbestos products, have been replacing it in the manufacture of insulating materials. Domestic consumption of precipitated magnesium carbonate (reported by the U.S. Bureau of Mines as the amount "used") decreased from 37.4 million pounds in 1958 to 16.1 million pounds in 1964.

U.S. production, exports, and imports

Precipitated magnesium carbonate is produced by four large integrated chemical manufacturing companies operating plants in California, Illinois, and Michigan. Inasmuch as each company manufactures numerous chemical products, its income from the sale of precipitated magnesium carbonate has represented only a small part of its total sales. Total output of magnesium carbonate declined from 51.4 million pounds in 1958 to 23.2 million pounds in 1964 (table 1). In terms of quantity, imports of magnesium carbonate were equivalent to 9.6 percent of domestic production in 1964, compared with 1.3 percent in 1958.

U.S. exports of magnesium carbonate are estimated to be negligible, whereas U.S. imports increased from 652,000 pounds, valued at $66,000, in 1958 to 2.5 million pounds, valued at $225,000, in 1965 (table 2). The United Kingdom, for many years the predominant source of U.S. imports, supplied 92 percent of the total in 1965. Although

magnesium carbonate not precipitated has been separately provided for in the official import statistics since August 31, 1963, no imports were reported until 1965, when 22,628 pounds, valued at $1,642, was entered, all from Japan.

Table 1.--Magnesium carbonate, precipitated: U.S. production, 1958-64

Year	Quantity	Value	Unit value
	1,000 pounds	1,000 dollars	Cents per pound
1958	51,392	4,774	9.3
1959	44,556	4,712	10.6
1960	35,048	3,689	10.5
1961	26,464	2,925	11.0
1962	27,618	3,072	11.1
1963	23,882	2,578	10.8
1964	23,166	2,519	10.9

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

Table 2.--Magnesium carbonate, precipitated: U.S. imports for consumption, by principal sources, 1958-65

Year	United Kingdom		Italy		France	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
1958	560	39	66	18	22	7
1959	481	32	109	36	73	25
1960	527	36	114	31	49	16
1961	566	38	69	20	48	16
1962	605	46	131	30	53	17
1963	985	72	188	26	61	20
1964	1,922	145	222	38	80	27
1965	2,307	180	60	20	54	18

Year	All other		Total		
	Quantity	Value	Quantity	Value	Unit value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars	Cents per pound
1958	4	2	652	66	10.1
1959	40	1	703	94	13.4
1960	2	1	692	84	12.1
1961	-	-	683	74	10.8
1962	6	1	795	94	11.8
1963	12	1	1,246	119	9.6
1964	-	-	2,224	210	9.4
1965	79	7	2,500	225	9.0

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

Commodity	TSUS item
Magnesium chloride:	
Anhydrous	419.24
Other	419.28

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

U.S. trade position

U.S. production of magnesium chloride, primarily a captive intermediate product in the manufacture of magnesium metal, increased from 329 million pounds in 1961 to 612 million pounds in 1965. In the period 1961-65, exports accounted for less than 2 percent of the annual production, and imports were insignificant.

Description and uses

Commercial grades of magnesium chloride, a white crystalline compound, are usually made by treating magnesium oxide (item 419.32) or hydroxide (in item 419.38) with hydrochloric acid. In this process, the material is fed onto a heated drum which forms fused lumps or flakes containing varying amounts of water, depending upon the temperature of the heated drum. Magnesium chloride is also recovered directly from sea water and natural brines. The hydrated form (provided for in item 419.28) ranges in moisture content from about 27 to 53 percent (i.e., 2 to 6 molecules of water of hydration). Commercial grades of hydrated magnesium chloride, however, rarely contain as much as 53 percent of water, the theoretical water hydration of the hexahydrate form, $MgCl_2 \cdot 6H_2O$.

The dehydration of magnesium chloride to make the anhydrous form (item 419.24) is more expensive than the dehydration of many other chemicals because hydrochloric acid gas must be used in the drying process. This factor explains in part the wide spread between the prices of the hydrated form and those of the anhydrous form; in 1965 the unit price of one of the common grades of the anhydrous form in the U.S. market (92 percent flake or pebble) was nearly four times the unit price of the hydrated form. Most of the anhydrous form, however, is an intermediate product in the manufacture of magnesium metal (see summary on item 628.55 et al.) and is a captive product.

Magnesium chloride sold in the hydrated form is used principally in the preparation of magnesium oxychloride cements, as a fire-extinguishing agent, as a fire-proofing agent for wood, and in the production of refrigerating brines, paper, and other magnesium compounds. Small amounts of chemical grade magnesium chloride are marketed for special chemical applications, e.g., as analytical reagents. This grade, sometimes designated chemically pure, is usually in the form of crystals.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Magnesium chloride:	
419.24	Anhydrous	1¢ per lb.
419.28	Other	0.42¢ per lb.

The rate for anhydrous magnesium chloride was provided for in the original Tariff Act of 1930 and has not been subject to a trade-agreement concession. The rate for other magnesium chloride, in effect since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. That concession became operative in two annual stages. For products of East Germany (consisting of the Soviet zone and the Soviet sector of Berlin), which accounted for a small portion of the imports entered under item 419.28 in 1965, the current rate of duty is (as indicated in pt. e of general headnote 3 mentioned above) the column 2 rate, i.e., 0.625 cent per pound.

The 1-cent rate for anhydrous magnesium chloride was equivalent to approximately 18 percent ad valorem, based on the imports of 2 million pounds, valued at $113,000, in 1962, the latest year in which anhydrous magnesium chloride is believed to have been imported (see discussion on U.S. imports). The rate of 0.42 cent per pound was equivalent to 27 percent ad valorem, based on the total imports under item 419.28 that were dutiable at the column 1 rate in 1965. For the 15,000 pounds, valued at $223, imported from East Germany in 1965, the ad valorem equivalent of the 0.625-cent rate was 42 percent.

U.S. consumption, production, and exports

U.S. consumption of magnesium chloride is believed to have approximated domestic production in recent years. Five U.S.

chemical companies, four of them large, produce magnesium chloride in plants situated in California, Delaware, Michigan, New Jersey, New York, Texas, and West Virginia. Magnesium chloride is an important product for most of these companies, but the producers consume about 95 percent of their own production in the manufacture of magnesium metal and other products. Total output as reported in the official statistics of the U.S. Bureau of Mines increased from 329 million pounds in 1961 to 612 million pounds in 1965, as shown in the following tabulation:

Year	Quantity (1,000 pounds)
1961	328,954
1962	522,890
1963	581,518
1964	611,204
1965	611,980

Annual U.S. exports of magnesium chloride, which are not separately reported in the official statistics, are estimated to have ranged from 5 million to 10 million pounds in recent years.

U.S. imports

Annual U.S. imports of magnesium chloride in recent years have been very small compared with domestic production. They averaged 1.7 million pounds in the period 1961-65. The imports in that period consisted entirely of hydrated magnesium chloride (mostly in the hexahydrate form), except in 1962, when 2 million pounds of the anhydrous form, valued at $113,000, was imported from France. West Germany was by far the dominant supplier of the hydrated form (see accompanying table).

Magnesium chloride: U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
West Germany	1,974	773	921	1,321	581
Netherlands	50	131	386	183	137
France	-	2,000	-	-	-
All other	-	44	30	-	1/ 15
Total	2,024	2,948	1,337	1,504	733
	Value (1,000 dollars)				
West Germany	30	12	15	21	9
Netherlands	1	1	6	3	2
France	-	113	-	-	-
All other	-	1	2	-	2/
Total	31	127	23	24	11

1/ All from East Germany.
2/ Less than $500.

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

Note.--Except for the 2,000 thousand pounds of anhydrous magnesium chloride imported from France in 1962, the imports shown above, including the small amounts reported as anhydrous in the published official statistics for 1963 and 1964, are believed to have been other than anhydrous.

Commodity	TSUS item
Magnesium oxide (calcined magnesia)-------	419.32

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

U.S. trade position

U.S. production of magnesium oxide declined from 51 million pounds in 1961 to 15 million pounds in 1964. Imports, with an average annual value of about $50,000, have been equivalent to less than 2 percent of the total quantity of domestic output in recent years. U.S. exports have been smaller than imports.

Description and uses

Magnesium oxide, also known as calcined magnesia, is a white powder, either "light" or "heavy," depending on whether it is prepared by heating magnesium carbonate ($MgCO_3$) or basic magnesium carbonate ($3MgCO_3 \cdot Mg(OH)_2 \cdot 3H_2O$), respectively. Magnesium oxide is used principally in technical grades as a neutralizing agent and vulcanization accelerator in the manufacture of neoprene (a synthetic rubber) and rubber products, as a catalyst in the preparation of organic compounds, and as a decolorizer of drycleaning solvents. Technical grades of magnesium oxide are also used in the preparation of magnesium compounds, animal feeds, fertilizers, fuel additives, and oxychloride cements. Magnesium oxide, in a grade that meets the standards of the United States Pharmacopoeia, is used for the production of medicinal preparations (such as milk of magnesia) and cosmetics.

Caustic calcined magnesite (item 522.64), which is obtained by calcining magnesite or other magnesium-bearing substances and which is used in some of the same applications as magnesium oxide, is discussed in a separate summary.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.32	Magnesium oxide (calcined magnesium)--	2¢ per lb.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

The rate of 2 cents per pound was equivalent to 12.6 percent ad valorem, based on total imports in 1965. On imports from individual countries the corresponding percentage ranged from 7.0 percent for Canada to 35.9 percent for Australia.

U.S. consumption, production, and exports

Domestic production of magnesium oxide, which has been nearly equivalent to domestic consumption in recent years, declined markedly from 1961 to 1964, as shown in the following tabulation compiled from official statistics of the U.S. Bureau of Mines:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)	Unit value (cents per pound)
1961	50,628	4,267	8.4
1962	39,698	4,161	10.5
1963	14,144	3,535	25.0
1964	15,474	3,704	23.9

Magnesium oxide is produced by five large integrated chemical manufacturing companies operating plants in California and Michigan. During 1961-64, production of other magnesium products increased significantly, in particular that of caustic calcined magnesite (item 522.64). It is probable that the decline in the production of magnesium oxide was offset by an increase in the production of caustic calcined magnesite and other magnesium products.

The increase in the average price per pound for U.S. production after 1962 reflects both a sharp increase in the average unit value of heavy magnesium oxide, and proportionately greater sales of the lighter (more expensive) grades. A similar increase in the average unit value of imports occurred at the same time (see section on imports).

U.S. exports of magnesium oxide are not separately reported in official statistics, but it is estimated that in recent years the annual total has ranged between 50,000 and 100,000 pounds.

U.S. imports

U.S. imports declined from 495,000 pounds, valued at $61,000, in 1961, to 253,000 pounds, valued at $50,000, in 1964 and then increased to 296,000 pounds, valued at $47,000, in 1965. The United Kingdom was virtually the only supplier until 1965. In that year Australia supplied about a third of the total quantity of imports but only a tenth of the total value. Imports during 1961-65 are shown below:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)	Unit value (cents per pound)
1961	495	61	12.3
1962	364	48	13.2
1963	186	39	21.0
1964	253	50	19.8
1965	296	47	15.9

Commodity	TSUS item
Magnesium sulfate (epsom salts)-------	419.34

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

U.S. trade position

U.S. consumption and production of magnesium sulfate have increased in recent years. Annual imports have amounted to 5 to 10 percent of consumption; in 1965 they were valued at $126,000. Exports have been much smaller than imports.

Comment

Magnesium sulfate ($MgSO_4 \cdot 7H_2O$), also known as epsom salts, is a colorless crystalline compound made from either (1) magnesium oxide, hydroxide, or carbonate treated with sulfuric acid or (2) natural brines. In the United States the bulk of the product is consumed in industrial applications, such as in fireproofing textiles, tanning leather, and sizing paper. Some is used in fertilizers. The magnesium sulfate for industrial purposes is generally marketed as technical grade; that which meets the standards of quality in the United States Pharmacopoeia, however, is usually designated as U.S.P. grade. Some of the magnesium sulfate of U.S.P. grade is used as an ingredient in laxative preparations, cosmetic lotions, and dietary supplements.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.34	Magnesium sulfate (epsom salts)---	0.375¢ per lb.

This rate, which has been in effect since October 1951, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The rate is equivalent to 39 percent ad valorem, based on imports in 1965.

Kieserite, a natural form of magnesium sulfate, is covered by a separate summary (item 419.36) and is free of duty.

The U.S. producers are chiefly large, integrated chemical companies producing magnesium sulfate at plants in half a dozen States. Annual production is estimated at 200 million to 250 million pounds, valued at $4 million to $6 million. The bulk of the output is of the technical grade. Production and consumption have increased in recent years, with the increase in industrial activity. Exports are estimated at 1 million to 2 million pounds annually.

In the years 1961-64, annual imports, nearly all from West Germany, ranged from 17 million to 20 million pounds and had an average value of about $200,000. In 1965, imports declined to 13 million pounds, valued at $126,000. The imports in 1961-65 were as follows:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)
1961	20,062	231
1962	18,594	210
1963	17,087	187
1964	19,229	213
1965	13,281	126

Commodity	TSUS item
Kieserite (except calcined)----------	419.36

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

U.S. trade position

Inasmuch as kieserite is not produced in the United States, imports supply domestic requirements. Imports in 1965, valued at $471,000, came chiefly from West Germany.

Comment

Kieserite is monohydrous magnesium sulfate ($MgSO_4 \cdot H_2O$). It occurs naturally in large quantities in the Stassfurt salt beds in West Germany. Important deposits are also found in Austria and India. Kieserite is converted principally to epsom salts ($MgSO_4 \cdot 7H_2O$), item 419.34, and calcined kieserite ($MgSO_4$), part of item 419.38. Calcined kieserite is an ingredient in prepared fertilizers.

Imports of kieserite are free of duty. The duty-free treatment was provided for in the original Tariff Act of 1930 and has never been subject to a trade-agreement concession.

U.S. demand for kieserite is wholly supplied by imports. During 1961-65, the quantity of imports fluctuated widely from year to year, although the general trend was upward, as indicated in the following tabulation:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)
1961----------	15,433	94
1962----------	101,619	491
1963----------	75,480	370
1964----------	83,951	430
1965----------	100,723	471

All these imports came from West Germany, except 4 million pounds, valued at $23,000, from the Netherlands in 1964.

Commodity	TSUS item
Magnesium compounds not elsewhere enumerated----------	419.38

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

U.S. trade position

The estimated value of U.S. production of inorganic magnesium compounds not elsewhere enumerated (principally magnesium hydroxide) rose from about $20 million in 1961 to about $26 million in 1964. In recent years annual production has been virtually equivalent to consumption, inasmuch as annual imports (principally calcined kieserite) have amounted to less than $135,000.

Description and uses

This summary deals with about 50 miscellaneous inorganic magnesium compounds, such as magnesium bromide, fluoride, hydroxide, nitrate, sulfite, trisilicate, and calcined kieserite. The bromide is used in organic syntheses; the fluoride, in ceramics and glass; the hydroxide, in sugar refining and dentifrices; the nitrate, in pyrotechnics; the sulfite, in the production of paper pulp; the trisilicate, in medicine and as an antioxidant; and calcined kieserite (magnesium sulfate, $MgSO_4$), as a secondary plant food. Except for the hydroxide, the magnesium compounds considered here are of minor industrial importance. The inorganic magnesium compounds provided for by name under items 419.20-419.36 are discussed in separate summaries in this volume.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.38	Magnesium compounds not elsewhere enumerated.	8.5% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

U.S. consumption, production, and exports

Data on aggregate production of the magnesium compounds are not available in official statistics; however, the value of U.S. production is believed to have increased from $20 million in 1961 to $26 million in 1964. The major share of the estimated growth is attributable to the increase in the reported production of magnesium hydroxide from 764 million pounds in 1961 to 1 billion pounds in 1964. Because exports and imports have been minor, domestic consumption approximates production.

The magnesium compounds included here are produced by about 30 chemical companies, most of which are large and diversified. Their plants are situated in California, Connecticut, Illinois, Indiana, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, Ohio, and Pennsylvania.

U.S. exports of the magnesium compounds covered in this summary are not separately reported in official statistics, but the value of recent annual exports, consisting chiefly of magnesium hydroxide, has been estimated at about $13,000.

U.S. imports

Annual U.S. imports of inorganic magnesium compounds not elsewhere enumerated ranged between $58,000 and $134,000 in the years 1961-65 (see accompanying table). West Germany was the chief supplier, with the United Kingdom, Japan, Switzerland, Belgium, and Canada supplying small amounts. The fluctuations in the value of annual imports are believed to have resulted principally from fluctuations in the imports of calcined kieserite. Kieserite is not produced in the United States (see summary on item 419.36). In addition to calcined kieserite, small quantities of the bromide, the fluoride, the hydroxide, and the trisilicate compounds were imported.

Foreign production and trade

Magnesium compounds are produced in many countries. International trade in the miscellaneous inorganic magnesium compounds considered here is believed to be small because most of the countries which require them have chemical industries capable of satisfying domestic needs. Such trade is probably limited to high-purity grades of individual chemicals designed for special uses.

August 1966
4:3

Magnesium compounds not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
West Germany	7,585	7,011	7,215	2,096	7,194
United Kingdom	7	1/	3	5	4
All other	-	-	31	2	1/
Total	7,592	7,011	7,249	2,103	7,198
	Value (1,000 dollars)				
West Germany	111	105	122	55	130
United Kingdom	6	2	3	2	4
All other	-	-	3	1	2/
Total	117	107	128	58	134

1/ Less than 500 pounds.
2/ Less than $500.

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

Commodity	TSUS item
Manganese sulfate----------	419.42

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

U.S. trade position

U.S. production has supplied virtually all of the manganese sulfate consumed domestically; domestic production in 1964 amounted to 68 million pounds (with an estimated value of $3.5 million), compared with 55 million pounds in 1961. Exports are estimated to have been small compared with production; imports have been negligible.

Comment

Manganese sulfate is a transparent, pale rose-red, crystalline compound obtained directly from manganese ore (item 601.27) or as a coproduct in the manufacture of hydroquinone, a benzenoid photographic chemical (in item 405.20). Manganese sulfate is used as a soil and feed additive to correct manganese deficiencies, as an electrolyte in the production of electrolytic manganese (item 632.32), as an intermediate in the production of other manganese compounds, and as a catalyst.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.42	Manganese sulfate----------	10% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

U.S. production of manganese sulfate increased from 55 million pounds in 1961 to 68 million pounds in 1964; production in 1964 had an estimated value of $3.5 million. Seven firms produce manganese sulfate at plants in Georgia (one), Illinois (one), New Jersey (three), and Tennessee (two). For some of these firms the sale of manganese sulfate is a substantial source of revenue.

U.S. exports of manganese sulfate are not separately reported in official statistics, but they are believed to be small in relation to domestic production. U.S. imports for consumption, which were not separately reported in official statistics until September 1963, have been negligible in recent years. In 1964, aggregate imports of manganese sulfate from West Germany and Denmark amounted to 40,000 pounds, valued at $4,000. In 1965, imports, all from West Germany, totaled 68,000 pounds, valued at $7,000. Before September 1963, imports of manganese sulfate were reported with those of manganese borate and manganese resinate. Such combined imports were also negligible for a number of years, compared with domestic production of manganese sulfate.

Capacity to produce manganese sulfate exists in several industrialized countries, but statistics on foreign production of and trade in this commodity are fragmentary.

August 1966
4:3

Commodity	TSUS item
Manganese borate	419.40
Potassium permanganate	420.28
Manganese compounds not elsewhere enumerated	419.44

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

U.S. trade position

In 1964, U.S. shipments of the inorganic compounds considered here had a value of $7 million. U.S. imports in 1964 were valued at about 2 percent of that amount. Exports are believed to have been smaller than imports.

Description and uses

This summary includes, in addition to manganese borate and potassium permanganate, some 30 other inorganic manganese compounds not elsewhere enumerated in the TSUS, principally manganese monoxide, dioxide, carbonate, and chloride. Manganese sulfate (item 419.42), however, is in a separate summary. Potassium permanganate, $KMnO_4$ or $\overset{+}{K}(\overset{-}{MnO_4})$, listed under the "potassium compounds" in the TSUS because potassium is the only cation present (manganese occurs in the anion), is discussed here since it is included with other compounds containing manganese in the official statistics on domestic shipments.

The compounds included here are obtained from manganese ore (item 601.27) or, in purer form, from electrolytic manganese (item 632.32), and are used extensively in such applications as paint and varnish driers (borate), oxidizing agents (permanganate and dioxide), catalysts (chloride and monoxide), feed additives and fertilizer supplements (dioxide, carbonate, and chloride), depolarizers for dry cells (dioxide), and bleaching agents and disinfectants (permanganate).

Currently three types of manganese dioxide are of commercial importance in the United States:

(1) Manganese dioxide which occurs in ores as the mineral pyrolusite and is often used in its natural form as a depolarizer in the manufacture of dry-cell batteries (see summary on item 601.27);

(2) "Activated" manganese dioxide, a pyrolusite which has been heated to change the manganese dioxide, MnO_2, into manganese sesquioxide, Mn_2O_3, subsequently treated with sulfuric acid to reconvert part of the sesquioxide back into manganese dioxide, and then, along with most of the gangue materials present prior to activation, partially dried for direct use in the manufacture of dry-cell batteries; and

(3) Manganese dioxide obtained synthetically by the electrolysis of manganese compounds, by heating the monoxide with oxygen, or by the decomposition of manganous nitrate.

The U.S. Customs Court in a decision (C.D. 1861) of March 21, 1957, ruled that certain "activated" manganese ore, as described in (2) above, was dutiable as a manganese compound under paragraph 50 of the original Tariff Act of 1930. That product, along with the synthetic manganese dioxide described in (3) above, is provided for in item 419.44 and is included in this summary.

The "activating" process improves the depolarizing properties of the ore without removal of substantial amounts of impurities. In fact, the reason for the increased depolarizing ability of the "activated" material, which contains less manganese than was present in the original ore, is unknown. Some manganese is recovered from the process as a byproduct in the form of manganese sulfate. Chemical analysis is not adequate to evaluate the usefulness of a particular shipment of manganese dioxide as a depolarizer in dry-cell batteries. Before deciding whether to use manganese dioxide in the manufacture of batteries or to ship it to a smelter for the recovery of manganese metal, importers will often store the material (including pyrolusite ore) in a warehouse until sample batteries made from it are tested for depolarizing efficiency. Battery-grade material is usually higher in price than other grades having the same or even higher manganese content.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
419.40	Manganese borate	10% ad val.
420.28	Potassium permanganate	6¢ per lb.
419.44	Manganese compounds not elsewhere enumerated.	14% ad val.

The rates for items 419.40 and 419.44, effective since July 1, 1963, reflect concessions granted by the United States in the General Agreement on Tariffs and Trade (GATT). The concessions became operative in two annual stages. The 6-cent rate for potassium permanganate was provided for in the original Tariff Act of 1930 and has been bound in a GATT concession since January 1, 1948. The 6-cent rate was equivalent to about 28 percent ad valorem, based on the total imports of potassium permanganate in 1965, which were all from the United Kingdom.

U.S. consumption, production, and exports

Information on U.S. production and consumption of these inorganic manganese compounds is fragmentary. The value of U.S shipments (including interplant transfers) in 1963 and 1964 as reported by the U.S. Department of Commerce totaled $6.7 million and $7.1 million, respectively. Potassium permanganate is produced domestically by a single specialized firm; some 20 other domestic firms produce one or more of the other compounds dealt with here. Most of these firms are diversified chemical concerns, but some specialize in the manufacture of manganese chemicals.

U.S. exports of these inorganic manganese compounds are not separately reported but are believed to be smaller than imports in the aggregate.

U.S. imports

Based on value, aggregate imports in 1964 of the manganese compounds considered here were equivalent to approximately 2 percent of U.S. shipments in that year. In recent years manganese dioxide and potassium permanganate have been the principal compounds imported; they have come mainly from the United Kingdom, Japan, and the Republic of South Africa. U.S. imports of potassium permanganate increased from 40,000 pounds, valued at $10,000, in 1961 to 165,000 pounds, valued at $36,000, in 1965. The average unit prices for the reported imports of potassium permangate--25.6 and 21.7 cents per pound in 1964 and 1965, respectively--plus the 6-cent duty were greater than the corresponding domestic price quotations for the technical grade--26.0 and 24.5 cents

per pound. Domestic potassium permanganate of U.S.P. grade, however, was about 10 cents per pound higher than that of technical grade in both 1964 and 1965. Accordingly, it may be assumed that at least part of the imports reported under item 420.28 for those years were of the U.S.P. grade.

Imports of the other inorganic manganese compounds included here totaled 1.3 million pounds, valued at $128,000, in 1964 and 2.1 million pounds, valued at $242,000, in 1965, as indicated in the accompanying table. Before September 1963, imports of manganese borate and manganese compounds not elsewhere enumerated were included in the official statistics with imports of certain organic manganese compounds.

U.S. imports for consumption of specified manganese compounds, by sources, 1964 and 1965

Item	1964		1965	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
Manganese borate, total (all from India)	44	1	-	-
Potassium permanganate, total (all from United Kingdom)	93	24	165	36
Manganese compounds not elsewhere enumerated, total	1,291	128	2,051	242
Japan	392	68	1,066	172
United Kingdom	796	54	910	58
Belgium and Luxembourg	-	-	35	6
Netherlands	2	2	4	4
India	-	-	36	2
Republic of South Africa	101	4	-	-

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

Commodity	TSUS item
Mercury compounds:	
Chloride:	
Mercuric (corrosive sublimate)	419.50
Mercurous (calomel)	419.52
Cyanide	419.53
Other	419.54
Mixtures of inorganic compounds, in chief value of mercury	423.86

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

U.S. trade position

The value of U.S. consumption of the inorganic mercury chemicals discussed here is estimated at $4 million. U.S. exports have been small or nil in recent years; annual imports, with a maximum value of $228,000 since 1960, have been irregular, ranging from 1 percent to 6 percent of domestic consumption.

Description and uses

Mercury forms a mercurous series of compounds in which mercury is univalent and a mercuric series in which mercury is divalent. Both series are represented by articles of commerce included in this summary. In addition to the compounds provided for by name in items 419.50, 419.52, and 419.53, this summary covers mercuric oxide, mercuric nitrate, and some 20 other inorganic mercury chemicals of both series that are of less commercial importance than those named. Certain inorganic mercury chemicals, however, are not covered here; for example, mercuric sulfide (vermilion red) is provided for as a pigment in item 473.66, and mercuric cyanate (mercury fulminate) is provided for as an explosive in item 485.20.

By far the principal chemical covered is mercuric oxide (in item 419.54) used in the manufacture of dry-cell batteries and pesticides. Mercuric chloride is used principally as an intermediate in the manufacture of mercuric oxide and other mercury compounds. The other compounds and the mixtures in chief value of mercury are of limited commercial importance.

The chemicals considered here are produced from mercury metal obtained from both imports and domestic sources (see summary on item 632.34). They contain various amounts of mercury. The mercury content of the compounds ranges from 60 to 95 percent of the weight, whereas that of the mixtures in chief value of mercury may be much less than 50 percent. Compounds with a high content of mercury (such as mercuric oxide, with about 92 percent, and mercuric nitrate, with about 59 percent) sell in the United States at $1.25 to $2.50 a pound above the price of the metal. In December 1965, for example, when the metal was selling at about $7.00 a pound, chemicals with a high mercury content were quoted at $8.50 to $9.50 a pound.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Mercury compounds:	
	Chloride:	
419.50	Mercuric (corrosive sublimate)--	18.5¢ per lb. + 12.5% ad val.
419.52	Mercurous (calomel)----------	18.5¢ per lb. + 12.5% ad val.
419.53	Cyanide----------	Free.
419.54	Other----------	18.5¢ per lb. + 12.5% ad val.
423.86	Mixtures of inorganic compounds, in chief value of mercury.	18.5¢ per lb. + 12.5% ad val.

The duty-free treatment of mercury cyanide was provided for in the original Tariff Act of 1930 and has been bound since October 1951 in a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT). The compound rates on the remaining mercury compounds and mixtures listed above reflect a U.S. concession granted in the GATT, effective June 30, 1958.

Inasmuch as the mercury chemicals considered here vary widely in composition, and information is not readily available on the exact types included in the sporadic imports reported in recent years, the ad valorem equivalent of the duty based on the imports in any one year may not be a representative measure of the current rate. Before September 1963 the imports of the mercury chemicals included in this summary (except mercury cyanide) were all reported under one class in the official statistics. In 1964 there were small imports of mercuric chloride (item 419.50) and of mercuric oxide (in item

419.54). An increased volume of imports was reported for 1965 under items 419.54 and 423.86. The bulk of the 1965 imports, however, consisted of shipments admitted duty free under bond for processing in the United States and exportation. Such duty-free importations are provided for in schedule 8 of the TSUS (see item 864.05). For the dutiable imports entered in 1965 under item 419.54, which were valued at $7.11 a pound, the ad valorem equivalent of the duty was 15 percent; and for those entered under item 423.86, with an average value of $2.61 a pound, the corresponding figure was 22 percent. The protection afforded U.S. processors by the compound rate of duty generally increases in absolute amount as the price of the raw material rises abroad. At the prices quoted in the United States in December 1965 for mercury and mercury oxide--$7 and $9 a pound, respectively--the duty on the mercury oxide imported in 1965 was equivalent to about 50 percent of the difference between the domestic cost of the raw material and the selling price of the compound.

U.S. consumption, production, and exports

As reported by the U.S. Bureau of the Census, producers' shipments (including interplant transfers) of mercuric chloride and other inorganic compounds of mercury were valued at $4.1 million in 1961 and $3.9 million in 1964. Such shipments, which do not include mercury fulminate and medicinal grades of mercury compounds, are presumed to have approximated domestic consumption. The U.S. producers include several large chemical and pharmaceutical companies, but most of the production is accounted for by two firms with plants situated in New Jersey; one of these firms is small and specializes in mercury chemicals. U.S. exports, if any, are small.

U.S. imports

Imports of inorganic mercury compounds during the years 1961-65 were as follows:

Year	Quantity	Value	Unit value
	Pounds		Per pound
1961	90,700	$227,821	$2.51
1962	46,368	104,540	2.25
1963	14,899	36,805	2.47
1964	8,625	29,643	3.44
1965	47,648	184,177	3.87

Imports in most of the recent years are believed to have consisted predominantly of mercury oxide (in item 419.54). There have been no recent imports of mercurous chloride and mercury cyanide, and imports of the other compounds and mixtures have been sporadic. The imports for 1965 included duty-free entries under bond for processing and exportation as follows: 11,023 pounds of mercury oxide, valued at $74,956, from Japan and 19,096 pounds of mixtures of inorganic compounds in chief value of mercury, valued at $57,461, from Canada. The dutiable imports in that year consisted of 1,411 pounds of mercury oxide, valued at $9,415; 16,000 pounds of mixtures, valued at $57,461; and 18 pounds of "other" compounds (in 419.54), valued at $747.

Commodity	TSUS item
Ammonium molybdate	417.28
Calcium molybdate	418.26
Potassium molybdate	420.22
Sodium molybdate	421.10
Molybdenum compounds not elsewhere enumerated	419.60
Mixtures of inorganic compounds, in chief value of molybdenum	423.88

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

U.S. trade position

Annual domestic production of the compounds and mixtures considered here probably amounts to about 1.5 million pounds. Imports are small relative to domestic production. Exports are not separately reported, but were probably larger than imports in most recent years.

Description and uses

In addition to the four salts of molybdic acid (ammonium, calcium, potassium, and sodium molybdates), this summary covers the inorganic molybdenum compounds (principally molybdenum disulfide and trioxide) not provided for elsewhere in part 2C of schedule 4, as well as mixtures of two or more inorganic compounds, in chief value of molybdenum. In the above-listed molybdates (e.g., calcium molybdate, $Ca^{++}(MoO_4^{--})$), the molybdenum is present in the anion rather than as the cation (see headnote 1 to pt. 2C of schedule 4). Thus, these, the more important molybdates, were provided for by name in the TSUS under their appropriate cation listing (e.g., ammonium and calcium).

Molybdenum-bearing material which is obtained by roasting molybdenum sulfide ore is provided for under item 603.40 of schedule 6. Such material, which is often referred to as technical molybdenum oxide or roasted molybdenite, is discussed in another summary.

Ammonium molybdate (417.28), currently the principal compound included here, is used as an analytical reagent, as a catalyst for dehydrogenation and desulfurization in the petroleum and other industries, and in the manufacture of pigments and of pure molybdenum metal. Calcium molybdate (418.26) is used as an alloying agent to add molybdenum to special steels; potassium molybdate (420.22) is used as a

reagent in analytical chemistry; and sodium molybdate (421.10) is employed in the manufacture of special fertilizers to introduce molybdenum into soils deficient in this trace element, in the production of molybdenum orange and other pigments, in metal finishing, and as a corrosion inhibitor.

Refined molybdenum trioxide (in 419.60), derived from the roasted molybdenite (in 603.40) by sublimation, is used in the manufacture of metallic molybdenum, as a catalyst in petroleum refining, for the introduction of molybdenum into alloys, in the manufacture of ceramic glazes, enamels, and pigments, and as a source material for the preparation of other molybdenum compounds. Molybdenum disulfide (also in 419.60) is used both as a dry lubricant and a lubricant additive, and also as a catalyst in hydrogenation reactions.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
417.28	Ammonium molybdate	20¢ per lb. on molybdenum content + 6% ad val.
418.26	Calcium molybdate	
419.60	Molybdenum compounds not elsewhere enumerated.	
420.22	Potassium molybdate	
421.10	Sodium molybdate	
423.88	Mixtures of inorganic compounds, in chief value of molybdenum.	

The rate above, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages. The ad valorem equivalent of this rate for imports during 1965 of molybdenum compounds not elsewhere enumerated (item 419.60) was nearly 16 percent. For imports of ammonium molybdate (item 417.28) during 1964, the most recent year in which such imports were entered, the rate was equivalent to 13 percent ad valorem. In 1964 and 1965 there were no imports reported under the other items included in this summary.

U.S. consumption, production, and exports

Official statistics on U.S. production of the compounds and mixtures considered here are not available. It is estimated that the annual domestic output of these chemicals amounts to about 1.5 million

pounds, which is presumably the approximate level of annual domestic consumption. There are eight plants in the United States producing these refined molybdenum chemicals; three are in Pennsylvania, two in Ohio, and one each in New Jersey, Colorado, and California. For none of the plants are the chemicals discussed herein believed to be the major source of income. The raw material needed for the manufacture of these chemicals is available from domestic sources; the United States produces more than two-thirds of the world production of molybdenum ores.

Exports of these chemicals are not separately reported in official statistics; however, it is believed that they were slightly larger than imports in most years prior to 1965.

U.S. imports

During 1964, imports were entered under only two of the TSUS items covered by this summary--items 417.28 and 419.60. In that year imports under item 417.28 (ammonium molybdate) amounted to 20,062 pounds, 1/ valued at $34,490 (all from France), and imports under item 419.60, which were chiefly molybdenum disulfide, amounted to 9,757 pounds, valued at $11,816 (all from the United Kingdom except for 500 pounds from West Germany). In the published official statistics for 1965, imports were reported under only one of these items--419.60--and amounted to 457,305 pounds, valued at $553,259. Information obtained subsequent to publication of the 1965 statistics indicates that the reported imports from Chile and Canada--279,984 pounds and 148,765 pounds, respectively--consisted of the product obtained by roasting molybdenite ores. The imports from the United Kingdom--6,696 pounds--were primarily molybdenum disulfide lubricant additives, and those from West Germany--21,860 pounds--consisted principally of high-grade molybdenum oxide.

1/ Quantities shown in this summary for imports, as well as those shown for production, are in gross weight.

Commodity	TSUS item
Nickel compounds:	
Chloride	419.70
Oxide	419.72
Sulfate	419.74
Other	419.76
Mixtures of inorganic compounds, in chief value of nickel oxide	423.90

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

U.S. trade position

Nearly all U.S. requirements of nickel oxide in recent years have been supplied by imports, whereas those of the other inorganic nickel chemicals included here have been met by domestic production, largely from imported materials. In 1964, total imports of these chemicals (virtually all nickel oxide from Canada) amounted to about 7 million pounds, whereas total production (principally nickel sulfate) was approximately 35 million pounds. Exports, if any, were negligible.

Description and uses

In addition to nickel chloride, oxide, and sulfate, this summary deals with 60 to 70 inorganic nickel compounds that are not provided for by name in the TSUS, and also with mixtures of two or more inorganic compounds in chief value of nickel oxide. The material commonly referred to as nickel oxide sinter (item 603.60), produced by the heat treatment of nickel sulfide ore, is not included in this summary. It is for tariff purposes "Other metal-bearing material of a type commonly used for the extraction of metal or as a basis for the manufacture of chemical compounds" (see T.D. 56410(31)).

The two principal chemicals of this summary are nickel sulfate and nickel oxide. Nickel sulfate, a compound of blue or green crystals, is produced by the action of sulfuric acid on nickel-bearing materials. The nickel oxide considered here is a gray-black powder, which can be produced by heating nickel hydroxide or nitrate; the bulk of the output, however, is produced from sulfide ore.

The principal use for nickel sulfate is in plating solutions; it is also used as a mordant in dyeing and printing textiles and in

the preparation of nickel catalysts. Nickel oxide is used in Edison-type alkaline storage batteries and in the production of other nickel chemicals and of enamels and glazes. Nickel chloride is used as an absorbent for gas masks, and nickel nitrate (in item 419.76) is used in the preparation of nickel catalysts. Mixtures of inorganic compounds in chief value of nickel oxide are believed to be commercially insignificant at present.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Nickel compounds:	
419.70	Chloride	10.5% ad val.
419.72	Oxide	Free.
419.74	Sulfate	10.5% ad val.
419.76	Other	9% ad val.
423.90	Mixtures of inorganic compounds, in chief value of nickel oxide.	Free.

The duty-free treatment of nickel oxide, which was provided for in the original Tariff Act of 1930, was bound in a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT), effective January 1, 1948. The duty-free provision in the TSUS for inorganic mixtures in chief value of nickel oxide was derived from paragraph 1734 of the Tariff Act of 1930, as amended in 1956, and was also bound in the GATT. The current rates for nickel chloride and nickel sulfate, in effect since June 30, 1958, reflect U.S. concessions in the GATT. The current rate for "other" nickel compounds, which has been in effect since January 1, 1966, reflects the first stage of a U.S. concession in the GATT. This concession is to become fully effective in five annual stages, the last (5 percent ad valorem) on January 1, 1970 (see Presidential Proclamation No. 3694, dated Dec. 27, 1965). The previous rate (10.5 percent ad valorem), also a result of a U.S. concession in the GATT, had been in effect since June 30, 1958.

U.S. production, consumption, and exports

In recent years, annual U.S. consumption of nickel oxide has probably approximated imports, inasmuch as domestic production, if any, is believed to have been negligible. The annual consumption of

the other nickel chemicals considered here has approximated the rising annual domestic production.

U.S. production of nickel sulfate is estimated to represent about two-thirds of the total domestic output of the nickel chemicals included here. Annual output of nickel sulfate in the years 1961-64, as reported by the U.S. Department of Commerce, was as follows:

Year	Quantity (1,000 pounds) 1/	Value (1,000 dollars)
1961	21,156	5,154
1962	21,370	5,197
1963	20,488	5,090
1964	23,852	5,725

1/ Based on weight of the hydrated form, $NiSO_4 \cdot 6H_2O$.

Twelve large diversified chemical companies and about the same number of small-to-medium-size firms produce the chemicals covered by this summary. More than half of the producing plants are in New York and New Jersey; the others are in California, Illinois, Indiana, Kansas, Missouri, Ohio, and Pennsylvania. These chemicals account for only a small portion of the sales of the large companies but for a major portion of the sales of some of the other producing firms.

U.S. imports

Imports of the nickel compounds and mixtures considered here were first separately reported in official statistics in September 1963. Since then, nearly all of the reported imports have consisted of nickel oxide from Canada. Information available to the Tariff Commission indicates, however, that a large part of the imports reported under item 419.72 in the published statistics for 1964 and 1965 1/ consisted of nickel oxide sinter classifiable under item 603.60 (see section on description and uses). The imports of nickel oxide properly classifiable under item 419.72 actually amounted to a much smaller quantity than that reported in the official statistics, that is, to about 7.2 million pounds in 1964 and 14.3 million pounds in 1965, all from Canada.

1/ The published data show imports of nickel oxide in the amount of 33.7 million pounds, valued at $17.5 million, for 1964 and 27.2 million pounds, valued at $15.0 million, for 1965.

Imports of the other nickel chemicals considered here consisted almost entirely of nickel sulfate (item 419.74), as shown in the following tabulation:

Commodity (TSUS item)	1964		1965	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
Nickel compounds:				
Chloride (419.70)	2	2	4	2
Sulfate (419.74)	122	25	316	66
Other (419.76)	3	5	7	9
Mixtures of inorganic compounds in chief value of nickel oxide (423.90)	-	-	16	11

Finland and West Germany were the principal suppliers of the imports of nickel sulfate.

Foreign production and trade

Except for nickel oxide, which is usually produced in conjunction with nickel-smelting operations, there is believed to be relatively little international trade in inorganic nickel compounds. Production facilities for most of these compounds are presumed to exist in the major industrialized nations.

Commodity	TSUS item
Phosphorus compounds:	
Oxychloride	419.80
Trichloride	419.82
Other	419.84

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

U.S. trade position

U.S. production of the phosphorus compounds included here, largely for captive consumption, aggregated at least 106,000 short tons in 1964. Because these compounds, which are important chemicals in many countries, require special handling, they are seldom shipped over long distances. In recent years U.S. imports have been negligible, and exports are believed to have been nil.

Description and uses

In addition to phosphorus oxychloride and phosphorus trichloride, this summary deals with such inorganic phosphorus compounds as phosphorus pentachloride, phosphorus trisulfide, phosphorus pentasulfide, and phosphorus pentoxide (all in item 419.84). Phosphorus oxychloride and phosphorus trichloride are colorless, fuming liquids; the pentachloride is a crystalline solid; the trisulfide and the pentasulfide are flammable, hygroscopic, light-yellow crystalline materials; and the pentoxide is a flammable, fine white powder. The phosphorus chlorides and sulfides are produced by the direct union of elemental phosphorus and chlorine or sulfur. Phosphorus pentoxide is made by burning elemental phosphorus in an excess of dry air. The chlorides are used primarily as intermediates in the manufacture of other phosphorus compounds. The pentasulfide is used as an additive to lubricating oil and rubber, as a flotation reagent, and in insecticides. Phosphorus pentoxide is used principally as an intermediate in the manufacture of phosphoric acid. It is used also as a dehydrating agent, in organic synthesis, and in sugar refining.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Phosphorus compounds:	
419.80	Oxychloride	3¢ per lb.
419.82	Trichloride	6¢ per lb.
419.84	Other	10.5% ad val.

The rates for items 419.80 and 419.84, which reflect concessions granted by the United States in the General Agreement on Tariffs and Trade, have been in effect since June 1951 and June 1958, respectively. The 6-cent rate for phosphorus trichloride was provided for in the original Tariff Act of 1930; it is not a trade-agreement rate.

There have been no recent imports of phosphorus oxychloride. Had there been imports with an average foreign value equivalent to the average price quoted for the domestic product in the United States in 1964, the ad valorem equivalent of the 3-cent rate would have been 24 percent. On the imports of 1.6 tons of phosphorus trichloride, valued at $628, in 1961 (in more recent years imports, if any, have been smaller), the 6-cent rate for that compound was equivalent to 32 percent ad valorem.

U.S. consumption, production, and exports

Practically all U.S. consumption of the chemicals included in this summary has been supplied by U.S. production in recent years. A large part of the production has been for captive consumption. Domestic exports, which are not separately reported in official statistics, are believed to have been nil. Production data, which are available only for phosphorus oxychloride, trichloride, pentasulfide, and pentoxide (see accompanying table), indicate that the aggregate domestic output of these four compounds increased from 91,000 short tons (24,000 short tons phosphorus content) in 1961 to 106,000 short tons (27,000 short tons phosphorus content) in 1964. Because the trichloride and pentasulfide are sometimes used in the production of phosphorus oxychloride, there is some duplication in those totals. Most of the firms that produce these compounds also produce elemental phosphorus (item 415.35). The following tabulation shows the number of establishments producing each of the four phosphorus compounds, and the States in which the establishments are situated:

Phosphorus compound	Producing establishments	
	Number	State
Oxychloride----------	5	Ill., Mich., N.Y., Pa., W. Va.
Trichloride----------	4	Ill., N.Y., Pa., W. Va.
Pentasulfide----------	6	Ill., Miss., N.J., N.Y., Pa., Tenn.
Pentoxide----------	5	N.J., N.Y., Pa., S.C., Tenn.

U.S. imports

Imports were negligible during the years 1961-65. No phosphorus oxychloride was imported during this period; imports of phosphorus trichloride consisted of 1.6 tons from West Germany in 1961, and a very small shipment from the United Kingdom in 1962. Annual statistics on "other" phosphorus compounds have been available only since 1963; imports totaled 1.6 tons in 1964 and 79 tons in 1965, mainly from Canada. The aggregate value of 1965 imports of the products included in this summary was $74,000.

Production facilities for these phosphorus compounds are known to exist in France, Italy, the Netherlands, the U.S.S.R., and Japan, as well as in the above-named countries that have supplied U.S. imports in recent years. In foreign countries, as in the United States, little of the output of these phosphorus compounds is shipped abroad.

U.S. production of specified phosphorus compounds, 1961-64

(In short tons)

Year	Phosphorus oxychloride		Phosphorus trichloride	
	Quantity (gross weight)	Phosphorus content	Quantity (gross weight)	Phosphorus content
1961	23,204	4,687	23,737	5,353
1962	24,212	4,891	25,292	5,703
1963	23,948	4,837	26,764	6,035
1964	26,947	5,443	29,963	6,757

Year	Phosphorus pentasulfide		Phosphorus pentoxide	
	Quantity (gross weight)	Phosphorus content	Quantity (gross weight)	Phosphorus content
1961	34,168	9,523	10,198	4,457
1962	35,339	9,849	9,931	4,340
1963	33,992	9,474	9,828	4,295
1964	41,595	11,593	7,693	3,362

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

August 1966
4:3

Commodity	TSUS item
Platinum compounds	419.90

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

U.S. trade position

The value of annual U.S. production of platinum compounds is estimated at $1 million to $5 million. Imports are small and sporadic and exports, if any, are negligible.

Comment

This summary deals with approximately 25 inorganic platinum compounds, principally bromides ($PtBr_2$, $PtBr_3$, $PtBr_4$), chlorides ($PtCl_2$, $PtCl_3$, $PtCl_4$), 1/ fluorides (PtF_2, PtF_4), hydroxides ($Pt(OH)_2$, $Pt(OH)_4$), iodides (PtI_2, PtI_3, PtI_4), oxides (PtO, PtO_2), and sulfides (PtS, PtS_2). Various of these compounds, which are produced from platinum metal, are used as a chemical reagent; as a catalyst in hydrogenation; and in medicine, photography, platinum plating, and the manufacture of indelible ink.

Platinum also forms complex compounds, such as platinum potassium bromide, chloride, cyanide, iodide, and thiocyanate, as well as a corresponding series of platinum sodium compounds. Most such compounds are classifiable, however, under provisions other than item 419.90 because the platinum is present in the anion rather than in the cation (see headnote 1 to pt. 2C of schedule 4). Thus, platinum potassium cyanide ($K_2Pt(CN)_4 \cdot 3H_2O$), formed when platinum cyanide ($Pt(CN)_2$) reacts with potassium, is for tariff purposes a potassium compound (item 420.36). The complex compounds are used in medicine, microscopy, mirrors, photography, and plating; as catalysts; and to etch zinc.

1/ The platinum chloride of commerce is usually chloroplatinic acid ($H_2PtCl_6 \cdot 6H_2O$). In August 1966 the Bureau of Customs ruled that this compound is classifiable under TSUS item 416.45, "Other" inorganic acids.

None of the inorganic platinum compounds covered under item 419.90 are important in international trade, and only a few are produced on a commercial scale in the United States.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
419.90	Platinum compounds----------	10% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

Inorganic platinum compounds are produced in the United States by at least five large, diversified chemical companies. Annual production, approximately equal to consumption, is estimated at $1 million to $5 million and is believed to be increasing.

Exports of the platinum compounds considered in this summary are small or nil. Imports have been separately reported only since August 31, 1963. In 1964 and 1965, reported annual imports amounted to a few hundred pounds, valued at less than $10,000. A review of the entry documents, however, has revealed that the reported imports for 1964 and all those for 1965 except 1 pound, valued at $1,500, from the United Kingdom, were merchandise other than that provided for under item 419.90.

Commodity	TSUS item
Potassium bicarbonate----------	420.00

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

U.S. trade position

Annual U.S. production of potassium bicarbonate is believed to have ranged from 5 million to 10 million pounds in recent years. Annual imports have ranged from 226,000 to almost 1.4 million pounds, and exports, if any, have been small.

Comment

Potassium bicarbonate, also known as potassium acid carbonate, is made by treating a solution of either potassium carbonate or potassium hydroxide with carbon dioxide, which results in crystallization. Potassium bicarbonate is marketed as colorless transparent crystals, as white granules, or as a white powder. It is used primarily in baking powders and in medicine, but the unusually high imports in 1962 and 1963 were reportedly used in dry fire extinguishers.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.00	Potassium bicarbonate---------	1¢ per lb.

This rate, in effect since June 1951, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The ad valorem equivalent of the 1-cent rate, based on the value of total imports in 1965, was 22 percent. For imports from France, the principal supplier in that year, the ad valorem equivalent of the duty was 23 percent, and for imports from Canada it was 14 percent.

Potassium bicarbonate accounts for a relatively small part of the total output of three large, diversified chemical companies. The producing plants are situated in Missouri, New Jersey, and New York. Data on domestic production and exports are not separately reported in official statistics, but the domestic output (which is presumed to be roughly equivalent to domestic consumption) is estimated to range

between 5 million and 10 million pounds a year. Output is believed to be increasing. Exports, if any, are probably small.

Imports have varied widely in recent years. They increased from 466,000 pounds in 1961 to 1,362,000 pounds in 1962, then decreased to 226,000 pounds in 1964 (see accompanying table). Imports in 1965, nearly all from France, totaled 710,000 pounds, valued at $32,000.

Potassium bicarbonate: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
France	430	1,252	747	220	670
Canada	-	-	-	-	40
West Germany	36	34	104	6	-
Netherlands	-	32	243	-	-
Switzerland	-	-	22	-	-
United Kingdom	-	44	-	-	-
Total	466	1,362	1,116	226	710
	Value (1,000 dollars)				
France	25	71	40	11	29
Canada	-	-	-	-	3
West Germany	4	4	6	1	-
Netherlands	-	2	14	-	-
Switzerland	-	-	1	-	-
United Kingdom	-	3	-	-	-
Total	29	80	61	12	32

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

August 1966
4:3

Commodity	TSUS item
Potassium carbonate	420.04

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

U.S. trade position

Annual domestic production of potassium carbonate in recent years is estimated at about 60 million pounds, of which probably less than 500,000 pounds has been exported. Imports in 1965 aggregated 124,000 pounds, valued at $9,000.

Comment

Potassium carbonate is a white, granular, translucent powder obtained either by treating a solution of potassium hydroxide with carbon dioxide or by direct recovery from natural brines. The principal use of potassium carbonate is in the manufacture of high-quality glass for prisms, gunsights, and television tubes. It is also used in the manufacture of other potassium compounds, soft soaps, shampoo preparations, finishing oils and sizes, dyes, inks, and ceramics.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.04	Potassium carbonate	0.625¢ per lb.

This rate, in effect since June 1958, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The ad valorem equivalent of the 0.625-cent rate, based on total 1965 imports of potassium carbonate, was 8.7 percent. For the shipments from West Germany, which accounted for the bulk of the imports in that year, the ad valorem equivalent of the duty was 10.6 percent, and for the small quantity of higher priced imports from Hong Kong, it was 2.5 percent.

Potassium carbonate is produced in the United States by four large chemical companies, which manufacture a diversified line of products; for none does it constitute a major source of income. Three of the producing plants are in New York State, and the fourth is in Alabama.

The production capacity of the industry is reported to be 102 million pounds per year. Domestic output is not separately reported in official statistics, but the annual rate of production and sales is estimated at 60 million pounds, which is presumably equal to annual consumption.

Exports are not separately reported in official statistics, but they are estimated to be less than 500,000 pounds annually.

Imports of potassium carbonate fluctuated in 1961-65, as shown in the following tabulation:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)
1961	356	24
1962	232	15
1963	646	41
1964	544	35
1965	124	9

The unit values of imports (computed on the values reported in the official import statistics) remained in the range of 6 to 7 cents per pound throughout the period 1961-65. West Germany was the principal supplier; the United Kingdom, the Netherlands, Israel, and Hong Kong made occasional small shipments.

Foreign production of potassium carbonate is generally in areas where potassium-containing raw materials are available. In addition to the countries supplying U.S. imports, East Germany is a substantial producer, with reported output of 37.0 million pounds in 1962 and 38.1 million pounds in 1963.

Commodity	TSUS item
Potassium chlorate	420.06

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

U.S. trade position

The annual output of potassium chlorate is believed to have ranged between 12 million and 16 million pounds in recent years. Imports in 1965 totaled 1.1 million pounds, with an aggregate value of $105,000, and exports were estimated at less than 200,000 pounds.

Comment

Potassium chlorate, $KClO_3$, is a colorless crystalline compound or white powder which is made by the interaction of potassium chloride and sodium chlorate or calcium chlorate. Potassium chlorate is used principally as an oxidizing agent in the manufacture of matches, fireworks, signal flares, and munitions.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.06	Potassium chlorate	1.5¢ per lb.

This rate was provided for in the original Tariff Act of 1930; it is not a trade-agreement rate. Based on imports in 1965, the ad valorem equivalent of the rate was 16.3 percent.

Potassium chlorate is produced in the United States by three large, diversified chemical companies with plants in New York, Nevada, and Oregon. Data on domestic production are not reported in official statistics, but the annual output, estimated to range between 12 million and 16 million pounds, is believed to be increasing. Exports are estimated to be less than 200,000 pounds annually.

Annual imports of potassium chlorate increased from 366,000 pounds in 1959 (463,000 pounds in 1958) to 758,000 pounds in 1964, and to 1,145,000 pounds in 1965 (see accompanying table). Although official statistics are not available for the years 1960-63, imports

are estimated to have reached a low of 265,000 pounds in 1961. Throughout the period 1958-65, import values (estimated from a sample of official import entry papers) ranged between 8 and 9 cents per pound. In 1965 the aggregate value of imports was $105,000, and Sweden was the principal source.

Potassium chlorate is produced in Sweden by Alby Nya Kloratfabeiks at Mansbo, and most of the exports from Sweden go to foreign subsidiaries of that company. India reported production of 8.2 million pounds in 1962 and 9 million pounds in 1963. Capacity to produce potassium chlorate is known to exist in Finland, as well as in the countries supplying U.S. imports.

Potassium chlorate: U.S. imports for consumption, by principal sources, specified years 1958 to 1965 1/

Country	1958	1959	1964	1965
	Quantity (1,000 pounds)			
Sweden	353	287	483	804
Czechoslovakia	-	4	166	341
Spain	-	-	55	-
East Germany	-	-	30	-
West Germany	11	71	22	-
Switzerland	99	4	2	-
Total	463	366	758	1,145
	Value (1,000 dollars)			
Sweden	37	28	48	80
Czechoslovakia	-	2/	11	25
Spain	-	-	5	-
East Germany	-	-	3	-
West Germany	1	7	2	-
Switzerland	9	1	2/	-
Total	47	36	69	105

1/ Imports of potassium chlorate were not separately reported during the years 1960-63.
2/ Less than $500.

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

August 1966
4:3

Commodity	TSUS item
Potassium chromate and dichromate----------	420.08

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

U.S. trade position

Imports of potassium chromate and dichromate are insignificant compared with annual domestic production, which is estimated at 6 million to 8 million pounds. Exports have increased moderately in recent years; in 1964 they aggregated a little less than 1 million pounds, valued at $168,000.

Description and uses

Potassium chromate, K_2CrO_4, is made from imported chrome ore (item 601.15). It is used principally in the manufacture of other chromium compounds (particularly potassium dichromate) and chrome pigments, and, to a lesser extent, as a laboratory chemical reagent, as a textile mordant, and in leather finishing. Potassium dichromate, $K_2Cr_2O_7$, industrially a more important chemical than potassium chromate, is made either from potassium chromate or from sodium chromate (item 420.98) and potassium chloride (item 480.50). The dichromate is used chiefly in tanning leather, in the manufacture of chrome pigments, and in textile dyeing and printing; it is also used as an oxidizing agent in electroplating, and in the manufacture of pyrotechnics and safety matches.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.08	Potassium chromate and dichromate------	2.25¢ per lb.

This rate of duty was provided for in the original Tariff Act of 1930; it is not a trade-agreement rate. Based on the imports reported in 1965, the ad valorem equivalent of the 2.25-cent rate was 30 percent.

U.S. consumption and production

Domestic consumption of potassium chromate and dichromate is supplied almost entirely from domestic sources. Domestic production, however, has not been separately reported in official statistics since 1959, when it was 6.2 million pounds. Current annual production is estimated at 6 million to 8 million pounds, with potassium dichromate accounting for the bulk of the output.

Potassium chromate and dichromate are manufactured by six producers with plants situated in Maryland, Missouri, New Jersey, Ohio, Pennsylvania, and Texas. All of these producers have diversified operations, and for none do these two compounds constitute a major source of income.

U.S. exports and imports

Exports declined from 1.2 million pounds in 1961 to 653,000 pounds in 1962, then increased to 947,000 pounds, with a value of $168,000, in 1964. The principal markets for exports were Canada, Mexico, and Argentina (table 1).

Imports in 1965--156,000 pounds, valued at $12,000--were larger than the combined imports of the preceding 4 years (table 2). During recent years, therefore, imports were much smaller than exports. West Germany was almost the sole supplier in the period 1961-64, and Canada was the predominant source in 1965.

Foreign production and trade

Capacity for producing potassium chromate and dichromate is known, or believed, to exist in the United Kingdom, West Germany, and other major industrialized countries. In most of these countries the raw material, chrome ore, is imported. International trade in potassium chromate and dichromate is negligible, compared with that in the ore.

Table 1.--Potassium chromate and dichromate: U.S. exports of domestic merchandise, by principal markets, 1961-64

Country	1961	1962	1963	1964
	Quantity (1,000 pounds)			
Canada	238	322	109	460
Mexico	126	108	212	198
Argentina	352	44	188	149
Chile	29	-	10	61
Uruguay	43	17	-	40
All other	422	162	194	39
Total	1,210	653	713	947
	Value (1,000 dollars)			
Canada	47	68	19	85
Mexico	21	19	38	34
Argentina	53	6	37	25
Chile	5	-	1	10
Uruguay	7	3	-	6
All other	65	25	33	8
Total	198	121	128	168

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

Note.--Exports were not separately reported for 1965.

Table 2.--Potassium chromate and dichromate: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Canada	-	-	-	-	147
West Germany	8	8	4	13	9
United Kingdom	1	1	-	-	-
Total	9	9	4	13	156
	Value (1,000 dollars)				
Canada	-	-	-	-	10
West Germany	1	1	1	2	1
United Kingdom	1	1	-	-	-
Total	2	2	1	2	1/ 12

1/ Because of rounding, figures do not add to the total shown.

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

POTASSIUM FERRICYANIDE, POTASSIUM FERROCYANIDE, AND SODIUM FERROCYANIDE

Commodity	TSUS item
Potassium ferricyanide	420.14
Potassium ferrocyanide	420.16
Sodium ferrocyanide	421.04

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

U.S. trade position

Precise information on output of these complex cyanides is not available, but domestic production of potassium ferricyanide and sodium ferrocyanide is probably in excess of imports. Domestic requirements of potassium ferrocyanide are believed to be met by imports. Imports of these three chemicals in 1965 had an aggregate value of nearly $1.1 million. Exports are small or negligible.

Description and uses

Potassium ferrocyanide (yellow prussiate of potash), $K_4Fe(CN)_6 \cdot 3H_2O$, and sodium ferrocyanide (yellow prussiate of soda), $Na_4Fe(CN)_6 \cdot 10H_2O$, are yellow crystalline compounds. The potassium compound is produced from calcium cyanide (item 418.20), ferrous sulfate (item 418.92), and potassium chloride (item 480.50). The sodium compound is produced from calcium cyanide, ferrous sulfate, and sodium carbonate (item 420.84). Potassium ferricyanide (red prussiate of potash), $K_3Fe(CN)_6$, is a red crystalline compound produced by oxidizing potassium ferrocyanide electrolytically or with chlorine. In Europe these chemicals are also obtained from "spent oxide," a waste product of the purification of coal gas. In the TSUS, sodium ferricyanide is classified as a sodium compound (in item 421.62); it is of minor commercial significance.

The three chemicals included in this summary are used in the production of blue pigments and blueprint paper, and in dyeing and printing textiles. In addition, potassium ferricyanide is used in the production of photographic papers and leather; potassium ferrocyanide, in electroplating, lithographing, and engraving; and sodium ferrocyanide, as a brightening agent for steel and a caking preventative for road salt.

U.S. tariff treatment

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
420.14	Potassium ferricyanide	2.3¢ per lb.
420.16	Potassium ferrocyanide	1.6¢ per lb.
421.04	Sodium ferrocyanide	0.6¢ per lb.

These rates, effective since July 1, 1963, reflect concessions granted by the United States in the General Agreement on Tariffs and Trade. The concessions became operative in two annual stages. For products of East Germany (consisting of the Soviet zone and the Sovie sector of Berlin) and the U.S.S.R., which accounted for a portion of the imports entered in recent years under item 420.14, the current rates of duty are the column 2 rates (as indicated in pt. e of the general headnote 3 mentioned above), e.g., 7 cents per pound for item 420.14.

The ad valorem equivalents of the column 1 rates, based on 1965 imports, were 7.1 percent for item 420.14, 7.9 percent for item 420.16, and 4.7 percent for item 421.04. The ad valorem equivalent of the column 2 rate for item 420.14, based on imports from East Germany and the U.S.S.R., was 27.2 percent.

U.S. consumption, production, and exports

One large, diversified photographic company produces potassium ferricyanide in New York State for use in its integrated operations. Potassium ferrocyanide is not known to be produced domestically. Sodium ferrocyanide is produced in New Jersey and New York by two large, diversified chemical companies, which use the bulk of their output in their integrated operations. A third small company produces sodium ferrocyanide intermittently at a plant situated in Pennsylvania.

Owing to the lack of information on production for captive consumption, it is not possible to estimate the volume of domestic output of potassium ferricyanide and sodium ferrocyanide, but annual U.S. production of these chemicals is believed to exceed imports.

Exports of the chemicals dealt with here, which have not been separately reported in official statistics, are believed to be small.

U.S. imports

In terms of both quantity and value, aggregate annual U.S. imports of the three chemicals considered here more than doubled from 1961 to 1965. Nearly half of the 1965 imports of 5.1 million pounds, valued at $1.1 million, consisted of potassium ferrocyanide, which is not known to be produced in the United States. The Netherlands was the principal supplier of U.S. imports of this chemical in 1961-65 (table 1). The principal sources of U.S. imports of potassium ferricyanide in those years are shown in table 2 and those of U.S. imports of sodium ferrocyanide in table 3. In 1965 approximately 13 percent of the imports of potassium ferricyanide originated in East Germany, and approximately 3 percent, in the U.S.S.R.

Table 1.--Potassium ferrocyanide: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Netherlands	879	1,406	1,336	1,642	1,742
Belgium and Luxembourg	23	20	28	30	558
West Germany	60	20	35	-	5
Total	962	1,446	1,399	1,672	2,305
	Value (1,000 dollars)				
Netherlands	169	255	236	299	331
Belgium and Luxembourg	4	3	3	5	133
West Germany	10	4	6	-	1
Total	183	262	245	304	465

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

Table 2.--Potassium ferricyanide: U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Belgium and Luxembourg	199	405	383	570	633
West Germany	209	232	193	325	355
East Germany	149	114	176	162	165
All other	81	13	11	5	142
Total	638	764	762	1,062	1,295
	Value (1,000 dollars)				
Belgium and Luxembourg	65	128	122	182	205
West Germany	62	73	57	102	115
East Germany	38	29	45	42	41
All other	18	3	3	1	44
Total	183	233	227	327	405

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

Table 3.--Sodium ferrocyanide: U.S. imports for consumption, by sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
West Germany	310	240	404	440	684
Netherlands	141	86	85	170	464
Belgium and Luxembourg	533	444	224	405	290
United Kingdom	40	45	40	40	40
Total	1,024	815	753	1,055	1,478
	Value (1,000 dollars)				
West Germany	31	25	42	45	72
Netherlands	16	10	11	17	81
Belgium and Luxembourg	60	47	24	44	34
United Kingdom	4	5	4	5	4
Total	111	87	81	111	191

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

Commodity	TSUS item
Potassium hydroxide (caustic potash)-----	420.18

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

U.S. trade position

Domestic production of potassium hydroxide totaled almost 250 million pounds in 1964. Exports in recent years have averaged less than 5 percent of domestic production but have been several times as large as imports. Imports in 1965 amounted to nearly 2 million pounds, valued at $194,000.

Description and uses

Potassium hydroxide (also known as caustic potash) is a white crystalline alkali compound which is made by the electrolysis of potassium chloride (item 480.50). It is marketed in lumps and flakes and in water solution. Potassium hydroxide is used chiefly in the manufacture of soaps and detergents. Substantial quantities are also used in the manufacture of several potassium compounds, in the manufacture of dyes, and in the bleaching and mercerizing of cotton fibers and fabrics.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.18	Potassium hydroxide (caustic potash)------	0.2¢ per lb.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages. The ad valorem equivalent of the duty on total imports of potassium hydroxide in 1965 was 2.0 percent. For imports from individual countries, it ranged from 0.7 percent (from the Netherlands) to 3.5 percent (from France); for imports from West Germany, the principal source, it was 3.0 percent.

U.S. consumption and production

Domestic consumption rose from 213 million pounds in 1961 to 237 million pounds in 1964, or by 11 percent (table 1). Over the same period production increased by a somewhat larger percentage, as exports more than doubled and imports remained approximately stable.

Potassium hydroxide is produced by nine large, diversified chemical companies with plants situated in Alabama, California, Illinois, Kentucky, New York, Texas, and West Virginia. Production increased from 215 million pounds in 1961 to 247 million pounds in 1964. The 1964 output reportedly utilized only about 70 percent of production capacity.

U.S. exports

Exports of potassium hydroxide increased from 4.7 million pounds, valued at $399,000, in 1961 to 11.3 million pounds, valued at $666,000, in 1965 (table 2). Canada was the most important export market; it took 50 percent or more of the total in 1961, 1963, and 1964. Exports to Canada probably consisted in substantial part of liquid caustic potash. Other important but sporadic export markets included Brazil, Colombia, India, Mexico, and Pakistan.

U.S. imports

Imports of potassium hydroxide increased from 1.9 million pounds in 1961 to 2.5 million pounds in 1962 and ranged between 1.8 million and 2.1 million pounds in the following 3 years. Imports in 1965 were 1.9 million pounds, valued at $194,000 (table 3). Sweden and West Germany were the principal suppliers, and France and the Netherlands were occasional suppliers. Japan became a supplier in 1964 for the first time in recent years. Capacity to produce potassium hydroxide is known to exist also in East Germany and Spain. European producers export potassium hydroxide mainly to European markets, with only small amounts going to Australia, South America, and the United States.

Table 1.--Potassium hydroxide (caustic potash): U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-65

Year	Production	Imports	Exports	Apparent consumption
	Quantity (1,000 pounds)			
1961	215,440	1,917	4,675	212,682
1962	241,134	2,520	7,271	236,383
1963	227,958	2,089	8,123	221,924
1964	246,562	1,845	11,722	236,685
1965	1/	1,943	11,290	1/
	Value (1,000 dollars)			
1961	1/	176	399	1/
1962	1/	234	395	1/
1963	1/	185	648	1/
1964	1/	187	751	1/
1965	1/	194	666	1/

1/ Not available.

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

Table 2.--Potassium hydroxide (caustic potash): U.S. exports of domestic merchandise, by principal markets, 1961-65

Market	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Canada	2,359	2,637	5,117	5,933	5,597
Brazil	127	633	740	162	2,412
Turkey	47	16	28	201	665
Mexico	245	358	599	834	369
Argentina	87	36	28	184	752
Venezuela	173	106	155	105	210
Colombia	84	42	72	2,237	-
India	267	211	58	504	-
Pakistan	22	-	179	331	-
Hong Kong	-	-	149	175	-
Spain	-	-	-	245	-
Uruguay	4	-	-	208	-
All other	1,260	3,232	998	603	1,285
Total	4,675	7,271	8,123	11,722	11,290
	Value (1,000 dollars)				
Canada	181	161	371	390	302
Brazil	11	52	62	14	122
Turkey	6	3	3	18	42
Mexico	22	31	51	56	37
Argentina	12	3	3	17	30
Venezuela	18	12	17	12	24
Colombia	8	4	7	47	-
India	24	21	4	46	-
Pakistan	2	-	16	31	-
Hong Kong	-	-	17	24	-
Spain	-	-	-	18	-
Uruguay	1/	-	-	14	-
All other	115	108	97	64	109
Total	399	395	648	751	666

1/ Less than $500.

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

Table 3.--Potassium hydroxide (caustic potash): U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Sweden	387	565	376	514	489
West Germany	1,473	1,768	1,624	1,187	1,152
France	57	42	58	97	220
Netherlands	-	2	8	25	8
All other	-	143	23	22	74
Total	1,917	2,520	2,089	1,845	1,943
	Value (1,000 dollars)				
Sweden	79	111	75	97	97
West Germany	94	112	102	79	78
France	3	3	4	6	13
Netherlands	-	1/	2	3	2
All other	-	8	2	2	4
Total	176	234	185	187	194

1/ Less than $500.

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

Commodity	TSUS item
Potassium iodide	420.20

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

U.S. trade position

U.S. consumption of potassium iodide has been supplied by domestic production in recent years. Exports have been small and imports negligible. U.S. production in 1964 amounted to 1.3 million pounds, with an estimated value of $1.8 million.

Comment

Potassium iodide, a white crystalline solid produced from iodine (item 415.25) and potassium hydroxide (item 420.18), is used chiefly in the manufacture of photographic emulsions, in the preparation of iodized salt, as a reagent in analytic chemistry, as a livestock feed additive, in organic chemical synthesis, and as a swimming pool disinfectant. In medicine, it is used as an expectorant and in the treatment of thyroid disorders. It is the principal iodide of commerce.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A of this volume) is as follows:

TSUS item	Commodity	Rate of duty
420.20	Potassium iodide	25¢ per lb.

This rate was provided for in the original Tariff Act of 1930; it is not a trade-agreement rate. In 1965, the only recent year for which imports of potassium iodide were reported, there was only one entry, valued at nearly $14 a pound. On this entry the ad valorem equivalent of the duty was 2 percent. Had there been imports with an average foreign value equivalent to the quoted price at U.S. plants in 1965 for the U.S.P. grade in 500-pound drums--$1.35 a pound--the ad valorem equivalent of the 25-cent rate would have been 19 percent.

U.S. requirements have been supplied almost entirely by domestic production in recent years. Production rose from 1.0 million pounds in 1961 to 1.3 million pounds in 1964, or by 34 percent, as shown in

the following tabulation compiled from official statistics of the Department of Commerce:

Year	Quantity (1,000 pounds)	Value 1/ (1,000 dollars)
1961	980	1,397
1962	1,094	1,637
1963	1,122	1,624
1964	1,310	1,808

1/ Estimated from unit value of shipments.

Nine diversified chemical firms produce potassium iodide at nine plants situated in California (two), Missouri (one), New Jersey (three), New York (one), and Pennsylvania (two). For most of these firms the sale of potassium iodide is a minor source of revenue, but for some it is more significant.

Separate statistics on exports of potassium iodide are not available, but it is believed that only a small part of domestic output is exported. There have been no imports in recent years until 1965, when they amounted to only 22 pounds, valued at $300.

Commodity	TSUS item
Potassium nitrate (other than crude)----------	420.24

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

U.S. trade position

Annual imports of the potassium nitrate included here have fluctuated widely in recent years, being equivalent to 25 to 40 percent of the estimated domestic production. Imports in 1965 aggregated 2.7 million pounds, valued at $155,000. Exports are believed to be substantially smaller than imports.

Description and uses

Potassium nitrate (other than crude) is a minor industrial chemical; however, significant quantities enter international trade. Crude potassium nitrate, sometimes called saltpeter, is used as a fertilizer, as the raw material for refined potassium nitrate, and, depending on its purity, in some of the same uses as the refined product. The crude nitrate is specially provided for in item 480.60, which is discussed in a separate summary. The potassium nitrate considered here is a water-soluble, white crystalline material marketed in various particle sizes and usually of a purity in excess of 99 percent. It is customarily produced by the reaction of potassium chloride (item 480.50) with sodium nitrate (item 480.25); it is also produced by mixing potassium chloride with nitric acid and by refining crude potassium nitrate. Potassium nitrate (other than crude) is used as a heat-treating salt in metallurgy; in the production of frits and ceramics; in meat curing; in the manufacture of black powder, matches, pyrotechnics and other explosives; and as an oxidizer in solid rocket propellants.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.24	Potassium nitrate (other than crude).	0.85¢ per lb.

This rate, in effect since June 1958, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. For products of East Germany (consisting of the Soviet zone and the Soviet sector of Berlin), which accounted for about 12 percent of the imports of potassium nitrate (other than crude) in 1961-65, the current rate of duty is the column 2 rate (as indicated in pt. e of the general headnote 3 mentioned above), i.e., 1 cent per pound.

On the basis of the imports entered in 1965, the ad valorem equivalent of the column 1 rate of duty was 15 percent and that of the column 2 rate was 18 percent.

U.S. consumption, production, and trade

U.S. consumption of the potassium nitrate considered here is believed to have decreased slightly in recent years as a result of the continuing decline in the production of black powder. Potassium nitrate is produced in the United States by one large diversified chemical corporation at a plant in New York State. Production is estimated to have been about 10 million pounds in 1964.

Exports are not separately reported but are believed to be substantially smaller than imports. The major foreign markets for the U.S. product have been in Central and South America. Imports, chiefly from West Germany and Italy, rose from 4.9 million pounds in 1961 to 7.0 million pounds in 1963, then declined to 2.7 million pounds in 1965.

Production facilities are known to exist in most Western European countries and in many Eastern European countries. Other producing countries include India and Japan.

Potassium nitrate, other than crude: U.S. imports for consumption, by principal sources, 1961-65

Country	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
West Germany	2,763	3,282	3,791	3,075	1,277
Italy	1,349	1,748	1,781	198	703
Spain	-	243	664	1,146	304
East Germany	837	974	480	640	287
Poland	-	-	33	220	110
Belgium and Luxembourg	-	-	260	88	-
Yugoslavia	-	-	-	77	33
All other	-	25	24	88	-
Total	4,949	6,272	7,033	5,532	2,714
	Value (1,000 dollars)				
West Germany	187	192	221	180	72
Italy	85	104	112	11	38
Spain	-	16	44	74	21
East Germany	53	52	26	36	16
Poland	-	-	2	12	6
Belgium and Luxembourg	-	-	19	4	-
Yugoslavia	-	-	-	4	2
All other	-	2	2	5	-
Total	325	366	426	326	155

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

Commodity	TSUS item
Potassium perchlorate--------	420.26

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

U.S. trade position

Imports of potassium perchlorate have increased in recent years; in 1965 they totaled 1.1 million pounds, valued at $134,000, and were equivalent to approximately one-third of domestic consumption. Exports are not separately reported, but they are estimated to be only about 10 to 15 percent as large as imports.

Description and uses

Potassium perchlorate, $KClO_4$, a chemical of minor industrial importance, is produced as colorless crystals or a white crystalline powder by the interaction of sodium perchlorate (in item 421.62) and potassium chloride (item 480.50).

Potassium perchlorate is an oxidizing agent and an important ingredient in solid rocket propellants. It is also used in the manufacture of explosives, flares, and fireworks. Potassium perchlorate is a more stable chemical than potassium chlorate (item 420.06), with which it competes in many applications.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.26	Potassium perchlorate----------	1.5¢ per lb.

This rate was provided for in the original Tariff Act of 1930; it is not a trade-agreement rate. The ad valorem equivalent of the 1.5-cent rate, on the basis of 1965 imports, was 11.9 percent.

U.S. consumption, production, and exports

Consumption of potassium perchlorate is believed to be increasing. The output of six diversified domestic companies has probably supplied the bulk of U.S. requirements in recent years. For none of these firms does potassium perchlorate constitute a major source of income. Three producing plants are situated in New Jersey and one each in Nevada, New York, and Ohio. Data on domestic production are not separately reported in official statistics, but the annual output is estimated to range between 1 million and 3 million pounds. Exports are estimated to be about 100,000 pounds annually.

U.S. imports

Imports of potassium perchlorate supply a substantial part of domestic consumption. They amounted to 471,000 pounds, valued at $63,000, in 1958 and increased to 1.1 million pounds, valued at $134,000, in 1965 (see accompanying table). Imports were not separately reported from January 1960 to August 1963, but are estimated to have been about 650,000 pounds in 1960, 615,000 pounds in 1961, 940,000 pounds in 1962, and 945,000 pounds in 1963. Sweden and Switzerland were the principal sources of imports, and France and the United Kingdom were occasional suppliers.

Potassium perchlorate: U.S. imports for consumption, by sources, 1958-59 and 1964-65 1/

Country	1958	1959	1964	1965
	Quantity (1,000 pounds)			
Sweden	278	381	354	547
Switzerland	116	278	415	464
France	66	22	-	53
United Kingdom	11	6	-	-
Total	471	687	769	1,064
	Value (1,000 dollars)			
Sweden	37	47	42	68
Switzerland	15	44	50	59
France	9	3	-	7
United Kingdom	2	1	-	-
Total	63	95	92	134

1/ Imports of potassium perchlorate were not separately reported for the years 1960-63.

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

Commodity	TSUS item
Potassium persulfate	420.30

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

U.S. trade position

Potassium persulfate is of minor importance in international trade. In recent years, U.S. imports and exports have been approximately equal in quantity. Imports, which have been equal to about 10 percent of domestic consumption, amounted to 724,000 pounds, valued at $89,000, in 1965.

Comment

Potassium persulfate, $K_2S_2O_8$, a chemical of minor industrial importance, is a white crystalline compound made by the electrolysis of a saturated solution of potassium sulfate (item 480.55). Potassium persulfate is used chiefly as a bleaching agent. It is also used in the manufacture of soap, in the modification of starch, in defiberizing wet-strength paper, in desizing textiles, and as an oxidizing agent. In photography it is used to remove the last traces of thiosulfate from plates and paper.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.30	Potassium persulfate	8.5% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

Potassium persulfate is produced in the United States by three large chemical companies that manufacture a diversified line of products; for none of them is it a major source of income. Producing plants are situated in Michigan, New York, and Pennsylvania. Domestic production (presumed to approximate domestic consumption) is not reported in official statistics, but the annual output is believed to range between 4 million and 8 million pounds and to be increasing.

Exports, which are estimated to have been equivalent to imports in recent years, account for about 10 percent of domestic production.

Annual imports of potassium persulfate, which were not separately reported in official statistics before September 1963, are estimated to have been between 700,000 and 1 million pounds during the years 1961-63. The imports in 1964 and 1965, principally from the Netherlands, are shown in the following tabulation:

Country	1964		1965	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
Netherlands	523	65	646	79
West Germany	46	5	29	4
Switzerland	7	1	24	3
Spain	-	-	25	3
Total	576	71	724	89

Commodity	TSUS item
Potassium compounds not elsewhere enumerated--------	420.36

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

U.S. trade position

Annual domestic production in recent years of the potassium compounds not elsewhere enumerated is estimated to have ranged from 125 million to 150 million pounds, and annual exports, from 5 million to 10 million pounds. Imports in 1965 amounted to 1.8 million pounds, valued at $815,000.

Description and uses

This summary deals with approximately 150 commercially known inorganic potassium compounds that are not provided for by name in the TSUS. Of these, potassium pyrophosphate is the most important. About 45 of the compounds considered here are produced on a commercial scale in the United States, but the majority of these 45 are of minor industrial importance. The inorganic potassium compounds provided for by name in the TSUS are discussed in separate summaries; such compounds provided for in items 420.00 and 420.04-420.30 are discussed in this volume; the compound in item 420.02, in volume 4:2; those in items 420.32 and 420.34, in volume 4:4; and those in items 480.50-480.60, in volume 4:11.

The following tabulation lists the principal uses for a number of the significant domestic potassium compounds included in this summary:

Potassium compound	Principal use
Pyrophosphate----------	Liquid detergent builder.
Bromate----------	Oxidizing agent; analytical reagent.
Cyanate----------	Herbicide.
Metabisulfite----------	Photographic developing agent.
Silicofluoride----------	Ceramics raw material.
Periodate----------	Oxidizing agent.

U.S. tariff treatment

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.36	Potassium compounds not elsewhere enumerated.	8.5% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

U.S. consumption, production, and exports

Domestic consumption of the inorganic potassium compounds included here is supplied almost entirely by U.S. producers. About 40 chemical companies, including both large and small firms, make these products. The large producers generally make more than one, whereas the small firms tend to specialize in one or two. Producing plants are dispersed among 20 States, with all major regions of the United States represented.

Production data are reported in official statistics only for potassium pyrophosphate, output of which increased from 50.3 million pounds in 1959 to 103.4 million pounds in 1964. There are six producers of this compound, operating plants in California, Illinois, Indiana, Missouri, New Jersey, and Ohio. Their total annual capacity is estimated to be 119 million pounds, but their productive facilities reportedly are used alternately for making several phosphate products, depending on demand. Current annual aggregate production of the inorganic potassium compounds included in this summary is estimated at 125 million to 150 million pounds.

U.S. exports of inorganic potassium compounds are not separately reported in official statistics; however, exports of the compounds discussed here are estimated to have been between 5 million and 10 million pounds in recent years.

U.S. imports

Before September 1963, imports of the potassium compounds considered here were included in the official statistics with certain organic potassium salts. Imports of potassium compounds not elsewhere enumerated aggregated 1,805,000 pounds, valued at $815,000, in 1965 (see accompanying table). They included borofluoride from

Israel, cyanate from West Germany and Japan, fluotantalate and metabisulfite from West Germany, periodate and silicate from the United Kingdom, silicofluoride from the Netherlands, and potassium chrome alum 1/ from the Netherlands, the United Kingdom, and West Germany.

World production and trade

Large deposits of potassium minerals are located in West Germany, East Germany, the U.S.S.R., and Canada. Major producers of potassium compounds (including those discussed in other summaries in this volume) are the United States, West Germany, East Germany, France, and Spain. International trade in the inorganic potassium compounds provided for in part 2C of schedule 4 is probably sizable because of the relatively large number of uses for these products.

Potassium compounds not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1964 and 1965

Country	1964		1965	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
West Germany	901	305	845	417
Japan	436	183	711	372
Netherlands	22	2	198	14
United Kingdom	331	28	40	9
France	32	3	-	-
Belgium and Luxembourg	19	2	-	-
All other	14	1	11	3
Total	1,755	524	1,805	815

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

1/ Potassium chrome alum, a compound with two cations (chromium and potassium), is classifiable under item 420.36 because chromium is not one of the named cations in the alphabetical list of schedule 4, pt. 2C, of the TSUS. (See headnote 1 to pt. 2C of schedule 4.)

Commodity	TSUS item
Rhodium compounds----------	420.40

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

U.S. trade position

The value of annual production of rhodium compounds in recent years is estimated at not more than $500,000. Imports have been negligible and exports have probably been nil.

Comment

This summary deals with about 15 inorganic compounds produced from rhodium, a metal of the platinum group (in item 605.02), which has been selling at approximately $200 a troy ounce in recent months. The principal compounds are rhodium chloride, hydroxide, oxide, and sulfate. The rhodium content of the foregoing compounds generally varies from about 36 percent (for the sulfate) to 60 percent (for the hydroxide). The chloride is used in the preparation of catalysts; the oxide, in the production of alloys containing rhodium; the hydroxide, in the preparation of other inorganic rhodium compounds; and the sulfate, in rhodium plating. Inorganic rhodium compounds are unimportant in international trade, and only a few--principally the chloride--are produced in the United States.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.40	Rhodium compounds----------	10% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

The production of rhodium compounds, amounting to not more than $500,000 a year, is supplied by two small firms with plants in New Jersey and Pennsylvania. There are no recorded exports. The imports from September 1963, when they were first reported separately, through December 1965 were valued all together at only $2,240, of which $1,893 was accounted for by compounds from West Germany and $347 by those from the United Kingdom.

Commodity	TSUS item
Selenium compounds:	
Dioxide	420.50
Salts	420.52
Other	420.54

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

U.S. trade position

Production of the inorganic selenium compounds discussed in this summary was valued at approximately $1 million in 1964. During that year, exports were negligible or nil, and imports, consisting almost entirely of selenium dioxide, had an aggregate value of about $62,000.

Comment

The principal selenium compounds covered by this summary are selenium dioxide, a white crystalline powder, and selenium oxychloride, a yellow liquid. Selenates and selenites are included in appropriate summaries according to the positive ion (cation) contained in the compound. For example, sodium selenate and sodium selenite are covered in the summary on sodium compounds (item 421.62 in vol. 4:4).

Selenium is obtained from anode slimes, a byproduct of the refining of copper and lead, and its compounds are used principally as analytical reagents, oxidants and antioxidants, catalysts, and intermediates.

The current column 1 rates of duty applicable to imports (see general headnote 3 in appendix A) are as follows:

TSUS item	Commodity	Rate of duty
	Selenium compounds:	
420.50	Dioxide	Free.
420.52	Salts	Free.
420.54	Other	9% ad val.

The duty-free treatment of imports of selenium dioxide and selenium salts was provided for in the original Tariff Act of 1930 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). The 9-percent rate of duty for other selenium compounds, which has been in effect since January 1, 1966, reflects the first stage of a U.S. concession in the GATT. The concession is to become fully effective in five annual stages, the last (5 percent ad valorem) on January 1, 1970 (see Presidential Proclamation No. 3694, dated Dec. 27, 1965). The previous rate (10.5 percent ad valorem), also a result of a U.S. concession in the GATT, had been in effect since June 1958.

U.S. producers' shipments of all inorganic selenium compounds including those covered in other summaries (presumed to be roughly equivalent to consumption) amounted to $1.4 million in 1964. Some seven corporations, principally refiners of copper, are engaged in the production of these compounds at plants in Maryland, New Jersey, Pennsylvania, and Utah. For none of the producers are selenium compounds a major source of revenue. Exports, if any, are small.

Imports are believed to consist almost entirely of selenium dioxide from Canada, West Germany, and Japan. The imports of this compound in 1964 and 1965 were as follows:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)
1964	16.5	61.5
1965	15.1	52.5

Official statistics for 1964 and 1965 also included imports under items 420.52 and 420.54. A sampling of the entries under these two items, however, indicates that the imports were predominantly of sodium selenate, sodium selenite, iron selenide, and nickel selenide. The imports reported under item 420.52 were valued at $100,000 in 1964 and at $86,000 in 1965, and those reported under item 420.54, at $76,000 and $3,000, respectively.

International trade in selenium compounds is of minor significance.

August 1966
4:3

Commodity	TSUS item
Silver compounds	420.60

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

U.S. trade position

The estimated value of domestic production of inorganic silver compounds in 1964 was $80 million. Imports during that year were valued at $373,000, and exports are estimated to have been valued at less than $300,000.

Comment

There are about 50 common inorganic silver compounds, including silver chloride, chromate, cyanide, iodide, nitrate, and nitrite. About 25 silver compounds are made on a commercial scale in the United States. Although most are not produced in large volume, they are important in certain applications and, in some applications, no substitutes exist. Silver chloride and silver iodide are used in photography; silver cyanide, in silverplating; silver nitrate, in coating photographic film, in silvering mirrors, and in the preparation of other silver compounds; and silver nitrite, in the preparation of aliphatic nitro compounds. Silver nitrate is the most important of the inorganic silver compounds.

The current column 1 rate of duty applicable to imports (see general headnote 3 in appendix A) is as follows:

TSUS item	Commodity	Rate of duty
420.60	Silver compounds	10% ad val.

This rate, effective since July 1, 1963, reflects a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession became operative in two annual stages.

Silver compounds are produced in the United States by about 16 chemical companies, with plants in California, Illinois, Missouri, New Jersey, New York, Ohio, Oklahoma, and Pennsylvania. For most of the companies the output of silver compounds represents a small part of their total annual production.

Data on domestic production are published for silver cyanide and silver nitrate only. The value of silver cyanide production increased from $1.5 million in 1961 to $2.2 million in 1964 (table 1). The value of silver nitrate production increased from $50 million in 1961 to $74 million in 1964. The estimated value of production of the remaining silver compounds was $3.1 million in 1961 and $3.5 million in 1964. Domestic consumption is estimated to be roughly equivalent to domestic production.

Data on exports of inorganic silver compounds are not separately reported in official statistics, but it is estimated that the annual value of exports in recent years has been less than $300,000. Imports of such silver compounds have been separately reported only since August 31, 1963. The imports, shown in table 2, amounted to 28,500 pounds, valued at $373,000, in 1964, and 11,300 pounds, valued at $153,000, in 1965. France and West Germany were the principal sources, with small amounts received from the United Kingdom, Canada, and Sweden.

Table 1.--Silver cyanide and silver nitrate: U.S. production, 1961-64

Year	Silver cyanide		Silver nitrate	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
1961	118	1,457	5,120	49,501
1962	146	2,007	5,851	65,005
1963	123	1,816	5,909	64,706
1964	148	2,191	6,030	74,049

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

Table 2.--Silver compounds: U.S. imports for consumption, by principal sources, 1964 and 1965

Country	1964		1965 1/	
	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
France	12.6	166	10.8	142
West Germany	15.8	205	.5	11
All other	.1	2	.1	1
Total	28.5	373	11.3	153

1/ Because of rounding, figures do not add to the totals shown.

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

A P P E N D I X E S

Tariff Schedules of the United States: General Headnotes and Rules of Interpretation, and Excerpts Relating to the Items Included in This Volume

GENERAL HEADNOTES AND RULES OF INTERPRETATION

1. Tariff Treatment 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. Customs Territory of the United States. The term "customs territory of the United States", as used in the schedules, includes only the States, the District of Columbia, and Puerto Rico.

3. Rates of Duty. The rates of duty in the "Rates of Duty" columns numbered 1 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.

(i) 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 1 of the schedules, except that all articles the growth or product of any such possession, or manufactured or produced in any such possession from materials the growth, product, or manufacture of any such possession or of the customs territory of the United States, or of both, which do not contain foreign materials to the value of more than 50 percent of their total value, coming to the customs territory 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.

(ii) 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.

(b) Products of Cuba. 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 1 of the schedules. Preferential rates of duty for such products apply only as shown in the said column 1. 1/

(c) Products of the Philippine Republic.

(i) 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 1 of the schedules or to fractional parts of the rates in the said column 1, as hereinafter 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)(iv) 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 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 1 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.

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), 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".

(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.

(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 article imported into the customs territory of the United States.

(d) Products of Canada.

(i) 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)(ii) 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.

(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/
Czechoslovakia
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 Mongolia
Rumania

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 amended, 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.

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.

(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 1 of the schedules.

(g) Effective Date; Exceptions - Staged Rates of Duty. Except as specified below or as may be specified elsewhere, pursuant to section 501(a) of the Tariff Classification 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 1, 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 1 has only one part (i.e., 8¢ (10¢) per lb.), the parenthetical rate (viz., 10¢ per lb.) shall be effective as to articles entered before July 1, 1964, and the other rate (viz., 8¢ per lb.) shall be effective as to articles entered on or after July 1, 1964.

(ii) If the rate in column numbered 1 has two or more parts (i.e., 5¢ per lb. + 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 lb. + 8% (9%) ad val.", the rate applicable to articles entered before July 1, 1964, would be "4.5¢ per lb. + 9% ad val."; the rate applicable to articles entered on or after July 1, 1964, would be "4¢ per lb. + 8% ad val.".

(iii) If the rate in column numbered 1 is marked with an asterisk (*), the foregoing provisions of (i) and (ii) shall apply except that "January 1, 1964" shall be substituted for "July 1, 1964", wherever this latter date appears.

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 terminates the existing rates of duty in both column numbered 1 and column numbered 2 unless otherwise specified in the amending statute;

(b) a rate of duty proclaimed pursuant to a concession granted in a trade agreement shall be reflected in column numbered 1 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 1 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.

5. Intangibles. For the purposes of headnote 1 --

(a) corpses, together with their coffins and accompanying flowers,
(b) currency (metal or paper) in current circulation 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 schedules.

6. Containers or Holders for Imported Merchandise. For the purposes of the tariff schedules, containers or holders are subject to tariff treatment as follows:

(a) Imported Empty: Containers or holders if imported 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:

(i) 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.

(ii) 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 dutiable 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 (ii) above for usual or ordinary types of shipping or transportation containers or holders designed for, or capable of, reuse.

7. Commingling of Articles. (a) Whenever articles subject 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:

(i) 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 --

(i) that the value of the commingled articles is less than the aggregate value would be if the shipment were segregated;

(ii) 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 dutiable 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
%	-	percent
+	-	plus
ad val.	-	ad valorem
bu.	-	bushel
cu.	-	cubic
doz.	-	dozen
ft.	-	feet
gal.	-	gallon
in.	-	inches
lb.	-	pounds
oz.	-	ounces
sq.	-	square
wt.	-	weight
yd.	-	yard
pcs.	-	pieces
prs.	-	pairs
lin.	-	linear
I.R.C.	-	Internal Revenue Code

9. Definitions. For the purposes of the schedules, 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 withdrawn 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;

(e) the term "ton" means 2,240 pounds, and the term "short ton" means 2,000 pounds;

(f) the terms "of", "wholly of", "almost wholly of", "in part of" and "containing", when used between the description 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;

(ii) "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 de minimis rule apply.

10. General Interpretative Rules. 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 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;

(e) in the absence of special language or context which otherwise requires --

(i) 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 necessarily 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.

General Headnotes and Rules of Interpretation

11. Issuance of Rules and Regulations. The Secretary of the Treasury is hereby authorized to issue rules and regulations 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.

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Part 1 - Benzenoid Chemicals and Products
- A. Organic Chemical Crudes
- B. Industrial Organic Chemicals
- C. Finished Organic Chemical Products

Part 2 - Chemical Elements, Inorganic and Organic Compounds, and Mixtures
- A. Chemical Elements
- B. Inorganic Acids
- C. Inorganic Chemical Compounds
- D. Organic Chemical Compounds
- E. Chemical Mixtures

Part 3 - Drugs and Related Products
- A. Natural Drugs, Crude or Advanced
- B. Alkaloids, Antibiotics, Barbiturates, Hormones, Vitamins, 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; Essential Oils
- A. Flavoring Extracts, and Fruit Flavors, Essences, Esters, and Oils
- B. Essential Oils

Part 6 - Glue, Gelatin, and Related Products

Part 7 - Aromatic and Odoriferous Substances; Perfumery, Cosmetics, and Toilet Preparations
- A. Aromatic and Odoriferous Substances
- B. Perfumery, Cosmetics, and Toilet Preparations

Part 8 - Surface-Active Agents; Soaps and Synthetic Detergents
- A. Surface-Active Agents
- B. Soap and Synthetic Detergents

Part 9 - Dyeing and Tanning Products; Pigments and Pigment-Like Materials; Inks, Paints, and Related Products
- A. Dyeing and Tanning Products
- B. Pigments and Pigment-Like Materials
- C. Inks, Paints, and Related Products

Part 10 - Petroleum, Natural Gas, and Products Derived Therefrom

Part 11 - Fertilizers and Fertilizer Materials

Part 12 - Explosives

Part 13 - Fatty Substances, Camphor, Chars and Carbons, Isotopes, Waxes, and Other Products
- A. Fatty Substances
- B. Camphor, Chars and Carbons, Isotopes, Waxes, and Other Products
- C. Miscellaneous Medical Supplies

Schedule 4 headnotes:

1. This schedule does not include --
   (i) any of the mineral products provided for in schedule 5;
   (ii) metal-bearing ores and other metal-bearing materials, provided for in part 1 of schedule 6; or
   (iii) metals provided for in part 2 of schedule 6.

2. (a) The term "compounds", as used in this schedule, means substances occurring naturally or produced artificially by the reaction of two or more ingredients, each compound --
   (i) consisting of two or more elements,
   (ii) having its own characteristic properties different from those of its elements and from those of other compounds, and
   (iii) always consisting of the same elements united in the same proportions by weight with the same internal arrangement.

The presence of impurities which occur naturally or as an incident to production does not in itself affect the classification of a product as a compound.

(b) The term "compounds", as used in this schedule, includes a solution of a single compound in water, and, in determining the amount of duty on any such compound subject to duty in this schedule at a specific rate, an allowance in weight or volume, as the case may be, shall be made for the water in excess of any water of crystallization which may have been in the compound.

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Schedule 4 headnotes--Continued

3. (a) The term "mixtures", as used in this schedule, means substances consisting of two or more ingredients (i.e., elements or compounds), whether occurring as such in nature, or whether artificially produced (i.e., brought about by mechanical, physical, or chemical means), which do not bear a fixed ratio to one another and which, however thoroughly commingled, retain their individual chemical properties and are not chemically united. The fact that the ingredients of a product are incapable of separation or have been commingled in definite proportions does not in itself affect the classification of such product as a mixture.

(b) The term "mixtures", as used in this schedule, includes solutions, except solutions defined as compounds in headnote 2(b) of this schedule.

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Item	Articles	Rates of duty	
		1	2
	PART 2. - CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES		
	Part 2 headnotes:		
	1. This part covers chemicals, except those provided for elsewhere in this schedule and those specially provided for in any of the other schedules.		
	2. For the purpose of this part, inorganic compounds (including salts) are compounds not containing carbon, except carbides and such carbon-containing compounds as inorganic cyanides and cyanates, metallic carbonates, and oxides of carbon which are inorganic in nature.		
	3. For the purpose of this part, organic compounds are compounds containing carbon except such carbon-containing compounds as carbides, inorganic cyanides and cyanates, metallic carbonates, and oxides of carbon.		
	* * * * * * *		
	Subpart C. - Inorganic Chemical Compounds		
	Subpart C headnote:		
	1. This subpart does not include any organic compounds. For the purposes of this subpart, inorganic compounds containing only one kind of cation are classifiable according to the cation constituent as indicated in the alphabetical listing set forth in this subpart; and inorganic compounds containing two or more different kinds of cations are classifiable according to the cation constituent thereof first named in the alphabetical listing in this subpart. Inorganic compounds, having no cations or none of the cation constituents of which are named in this subpart, are covered by the provision for other inorganic compounds (item 423.00).		
	* * * * * * *		
	Ammonium compounds:		
	* * * * * * *		
417.28	Molybdate.....	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
	* * * * * * *		

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Item	Articles	Rates of duty	
		1	2
	PART 2. - CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES--Con.		
	Subpart C. - Inorganic Chemical Compounds--Con.		
	Calcium compounds:		
418.10	Arsenate	Free	Free
[418.12]	[Borate, crude]		
418.14	Carbide	0.425¢ per lb.	1¢ per lb.
	Chloride:		
418.16	Crude	Free	Free
418.18	Other	10.5% ad val.	25% ad val.
[418.20]	[Cyanide]		
418.22	Hypochlorite	12.5% ad val.	25% ad val.
418.24	Lime, chlorinated, containing not more than 40% of available chlorine (bleaching powder)	0.25¢ per lb.	0.3¢ per lb.
418.26	Molybdate	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
418.28	Phosphate dicalcium	9.5% ad val.	25% ad val.
[418.30]	[Tungstate]		
418.32	Other	10.5% ad val.	25% ad val.
	Cerium compounds:		
418.40	Chloride	30% ad val.	35% ad val.
418.42	Oxide	30% ad val.	35% ad val.
418.44	Other	30% ad val.	35% ad val.
	Cesium compounds:		
418.50	Chloride	12.5% ad val.	25% ad val.
418.52	Other	10.5% ad val.	25% ad val.
	Cobalt compounds:		
418.60	Oxide	1.5¢ per lb.	20¢ per lb.
418.62	Sulfate	1.5¢ per lb.	10¢ per lb.
418.68	Other	12% ad val.	30% ad val.
	Copper compounds:		
[418.69]	[Cyanide]		
	Iodide:		
418.70	Crude	Free	Free
418.72	Other	1.275¢ per lb. + 10.5% ad val.	3¢ per lb. + 25% ad val.
418.74	Oxide (cupric)	1.275¢ per lb. + 10.5% ad val.	3¢ per lb. + 25% ad val.
418.76	Sulfate	1.7¢ per lb. on copper content	4¢ per lb. on copper content
418.78	Other	1.275¢ per lb. + 10.5% ad val.	3¢ per lb. + 25% ad val.
418.80	Gold compounds	10% ad val.	25% ad val.
	Iron compounds:		
418.90	Sulfide (pyrites)	Free	Free
418.92	Sulfate (ferrous) (copperas)	Free	Free
418.94	Other	9% ad val. 1/	25% ad val.

1/ This rate, effective Jan. 1, 1966, reflects the first stage of a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession is to become fully effective in five annual stages, the last (5% ad val.) on Jan. 1, 1970 (see Presidential Proclamation No. 3694, dated Dec. 27, 1965).

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Item	Articles	Rates of duty	
		1	2
	PART 2. - CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES--Con.		
	Subpart C. - Inorganic Chemical Compounds--Con.		
	Lead compounds:		
419.00	Arsenate	1.5¢ per lb.	3¢ per lb.
419.02	Nitrate	1.5¢ per lb.	3¢ per lb.
419.04	Other	15% ad val.	30% ad val.
[419.10]	[Lithium compounds]		
	Magnesium compounds:		
	Carbonate:		
419.20	Not precipitated	8.5% ad val.	25% ad val.
419.22	Precipitated	0.35¢ per lb.	1.5¢ per lb.
	Chloride:		
419.24	Anhydrous	1¢ per lb.	1¢ per lb.
419.28	Other	0.42¢ per lb.	0.625¢ per lb.
419.32	Oxide (calcined magnesia)	2¢ per lb.	7¢ per lb.
	Sulfate:		
419.34	Epsom salts	0.375¢ per lb.	0.75¢ per lb.
419.36	Kieserite (except calcined)	Free	Free
419.38	Other	8.5% ad val.	25% ad val.
	Manganese compounds:		
419.40	Borate	10% ad val.	25% ad val.
419.42	Sulfate	10% ad val.	25% ad val.
419.44	Other	14% ad val.	25% ad val.
	Mercury compounds:		
	Chloride:		
419.50	Mercuric (corrosive sublimate)	18.5¢ per lb. + 12.5% ad val.	22¢ per lb. + 25% ad val.
419.52	Mercurous (calomel)	18.5¢ per lb. + 12.5% ad val.	22¢ per lb. + 25% ad val.
419.53	Cyanide	Free	Free
419.54	Other	18.5¢ per lb. + 12.5% ad val.	22¢ per lb. + 25% ad val.
419.60	Molybdenum compounds	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
	Nickel compounds:		
419.70	Chloride	10.5% ad val.	25% ad val.
419.72	Oxide	Free	Free
419.74	Sulfate	10.5% ad val.	25% ad val.
419.76	Other	9% ad val. 1/	25% ad val.
	Phosphorus compounds:		
419.80	Oxychloride	3¢ per lb.	6¢ per lb.
419.82	Trichloride	6¢ per lb.	6¢ per lb.
419.84	Other	10.5% ad val.	25% ad val.

1/ This rate, effective Jan. 1, 1966, reflects the first stage of a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession is to become fully effective in five annual stages, the last (5% ad val.) on Jan. 1, 1970 (see Presidential Proclamation No. 3694, dated Dec. 27, 1965).

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Item	Articles	Rates of duty	
		1	2
	PART 2. - CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES--Con.		
	Subpart C. - Inorganic Chemical Compounds--Con.		
419.90	Platinum compounds	10% ad val.	25% ad val.
	Potassium compounds:		
420.00	Bicarbonate	1¢ per lb.	1.5¢ per lb.
[420.02]	[Bromide]		
420.04	Carbonate	0.625¢ per lb.	0.75¢ per lb.
420.06	Chlorate	1.5¢ per lb.	1.5¢ per lb.
420.08	Chromate and dichromate	2.25¢ per lb.	2.25¢ per lb.
[420.12]	[Cyanide]		
420.14	Ferricyanide	2.3¢ per lb.	7¢ per lb.
420.16	Ferrocyanide	1.6¢ per lb.	4¢ per lb.
420.18	Hydroxide (Caustic potash)	0.2¢ per lb.	1¢ per lb.
420.20	Iodide	25¢ per lb.	25¢ per lb.
420.22	Molybdate	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
420.24	Nitrate	0.85¢ per lb.	1¢ per lb.
420.26	Perchlorate	1.5¢ per lb.	1.5¢ per lb.
420.28	Permanganate	6¢ per lb.	6¢ per lb.
420.30	Persulfate	8.5% ad val.	25% ad val.
[420.32]	[Tungstate]		
[420.34]	[Vanadate]		
420.36	Other	8.5% ad val.	25% ad val.
420.40	Rhodium compounds	10% ad val.	25% ad val.
	Selenium compounds:		
420.50	Dioxide	Free	Free
420.52	Salts	Free	Free
420.54	Other	9% ad val. 1/	25% ad val.
420.60	Silver compounds	10% ad val.	25% ad val.
	Sodium compounds:		
	* * * * * * *		
421.04	Ferrocyanide	0.6¢ per lb.	2¢ per lb.
	* * * * * * *		
421.10	Molybdate	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
	* * * * * * *		

1/ This rate, effective Jan. 1, 1966, reflects the first stage of a concession granted by the United States in the General Agreement on Tariffs and Trade. The concession is to become fully effective in five annual stages, the last (5% ad val.) on Jan. 1, 1970 (see Presidential Proclamation No. 3694, dated Dec. 27, 1965).

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Item	Articles	Rates of duty	
		1	2
	PART 2. - CHEMICAL ELEMENTS, INORGANIC AND ORGANIC COMPOUNDS, AND MIXTURES--Con.		
	Subpart C. - Inorganic Chemical Compounds--Con.		
	Mixtures of two or more inorganic compounds:		
	* * * * * * *		
423.86	In chief value of mercury.....	18.5¢ per lb. + 12.5% ad val.	22¢ per lb. + 25% ad val.
423.88	In chief value of molybdenum.....	20¢ per lb. on molybdenum content + 6% ad val.	50¢ per lb. on molybdenum content + 15% ad val.
423.90	In chief value of nickel oxide.....	Free	Free
	* * * * * * *		

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, 1965

(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)

TSUS item	All countries		First supplier		Second supplier		Third supplier	
	Amount in 1965	Percent change from 1964	Country	Value	Country	Value	Country	Value
Calcium arsenate (p. 5)								
418.10	-	-	-	-	-	-	-	-
Calcium carbide (p. 7)								
418.14	728	-5.4	Canada	727	Canal Zone	1	-	-
Calcium chloride (p. 11)								
418.16	97	1/22.5	Canada	42	Belg.& Lux.	38	W. Germany	12
418.18	3	1/77.7	W. Germany	3	-	-	-	-
Calcium hypochlorite (p. 15)								
418.22	147	2.9	Japan	145	Phil. Rep.	2	-	-
Chlorinated lime (bleaching powder) (p. 21)								
418.24	83	43.4	U.K.	63	Denmark	13	W. Germany	7
Dicalcium phosphate (p. 25)								
418.28	177	-55.1	Belg.& Lux.	167	Canada	10	-	-
Calcium compounds not elsewhere enumerated (p. 29)								
418.32	316	32.3	Japan	294	W. Germany	9	U.K.	7
Cerium compounds (p. 33)								
418.40 2/	-	-	-	-	-	-	-	-
418.42	3/	-94.7	Switzerland	3/	-	-	-	-
418.44	8	4/	France	8	-	-	-	-
Cesium compounds (p. 35)								
418.50	15	152.7	W. Germany	13	U.K.	2	-	-
418.52	14	-75.7	W. Germany	13	U.K.	1	-	-
Cobalt oxide (p. 37)								
418.60	1,011	-28.9	Belg.& Lux.	954	Canada	56	-	-
Cobalt sulfate (p. 41)								
418.62	30	10.8	U.K.	27	W. Germany	3	-	-
Cobalt compounds not elsewhere enumerated (p. 43)								
418.68	133	5/	W. Germany	110	U.K.	17	Canada	6
Copper iodide (p. 45)								
418.70 2/	-	-	-	-	-	-	-	-
418.72	-	-100.0	-	-	-	-	-	-
Copper sulfate (p. 47)								
418.76	131	3.5	Mexico	130	Canada	1	-	-
Copper (cupric) oxide and copper compounds not elsewhere enumerated (p. 51)								
418.74	-	-	-	-	-	-	-	-
418.78	73	1/ 5/	U.K.	58	W. Germany	11	Belg.& Lux.	4

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, 1965--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)

TSUS item	All countries		First supplier		Second supplier		Third supplier	
	Amount in 1965	Percent change from 1964	Country	Value	Country	Value	Country	Value
Gold compounds (p. 53)								
418.80 2/	-	-	-	-	-	-	-	-
Iron sulfide (pyrites) (p. 55)								
418.90	76	57.2	Canada	76	-	-	-	-
Ferrous sulfate (p. 57)								
418.92	22	-8.3	Japan	12	U.K.	8	W. Germany	2
Iron compounds not elsewhere enumerated (p. 59)								
418.94	221	5/	Sweden	140	W. Germany	42	Canada	17
Lead arsenate (p. 61)								
419.00	-	-100.0	-	-	-	-	-	-
Lead nitrate (p. 63)								
419.02	45	8.9	U.K.	21	Rep. S. Af.	18	Belg.& Lux.	6
Lead compounds not elsewhere enumerated (p. 65)								
419.04	11	9.3	U.K.	7	W. Germany	4	-	-
Magnesium carbonate (p. 67)								
419.20	2	5/	Japan	2	-	-	-	-
419.22	225	7.1	U.K.	180	Italy	20	France	18
Magnesium chloride (p. 71)								
419.24	-	2/	-	-	-	-	-	-
419.28	11	1/-52.5	W. Germany	9	Netherlands	2	E. Germany	3/
Magnesium oxide (calcined magnesia) (p. 75)								
419.32	47	-6.6	U.K.	39	Australia	6	Canada	2
Magnesium sulfate (epsom salts) (p. 79)								
419.34	126	-40.7	W. Germany	125	U.K.	1	Netherlands	3/
Magnesium sulfate (kieserite) (p. 81)								
419.36	471	9.7	W. Germany	471	-	-	-	-
Magnesium compounds not elsewhere enumerated (p. 83)								
419.38	134	129.2	W. Germany	130	U.K.	4	Switzerland	3/
Manganese sulfate (p. 87)								
419.42	7	91.7	W. Germany	7	-	-	-	-
Manganese borate, potassium permanganate, and manganese compounds not elsewhere enumarated (p. 89)								
419.40	-	-100.0	-	-	-	-	-	-
419.44	242	89.4	Japan	172	U.K.	58	Belg.& Lux.	6
420.28	36	49.0	U.K.	36	-	-	-	-

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, 1965--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)

TSUS item	All countries		First supplier		Second supplier		Third supplier	
	Amount in 1965	Percent change from 1964	Country	Value	Country	Value	Country	Value
Mercury compounds and mixtures (p. 93)								
419.50	-	-	-	-	-	-	-	-
419.52	-	-	-	-	-	-	-	-
419.53	-	-	-	-	-	-	-	-
419.54	85	5/	Japan	75	Spain	4	U.K.	3
423.86	99	4/	Canada	99	-	-	-	-
Molybdenum compounds and mixtures (p. 97)								
417.28	3/	-97.0	U.K.	3/	-	-	-	-
418.26	-	-	-	-	-	-	-	-
419.60 2/	-	-	-	-	-	-	-	-
420.22	-	-	-	-	-	-	-	-
421.10	-	-	-	-	-	-	-	-
423.88	-	-	-	-	-	-	-	-
Nickel compounds and mixtures of nickel oxide (p. 101)								
419.70	2	38.2	U.K.	2	Norway	3/	-	-
419.72 2/	-	-	-	-	-	-	-	-
419.74	66	163.1	Finland	54	W. Germany	8	U.K.	4
419.76	9	92.6	W. Germany	4	France	2	U.K.	1
423.90	11	4/	W. Germany	11	-	-	-	-
Phosphorus compounds (p. 105)								
419.80	-	-	-	-	-	-	-	-
419.82	-	-	-	-	-	-	-	-
419.84	74	5/	Canada	63	Switzerland	5	Mexico	3
Platinum compounds (p. 109)								
419.90 2/	-	-	-	-	-	-	-	-
Potassium bicarbonate (p. 111)								
420.00	32	176.5	France	29	Canada	3	-	-
Potassium carbonate (p. 113)								
420.04	9	-74.7	W. Germany	7	Hong Kong	1	Ireland	1
Potassium chlorate (p. 115)								
420.06	105	53.6	Sweden	80	Czecho.	25	-	-
Potassium chromate and dichromate (p. 117)								
420.08	12	5/	Canada	10	W. Germany	2	-	-
Potassium ferricyanide, potassium ferrocyanide, and sodium ferrocyanide (p. 121)								
420.14	405	23.9	Belg.& Lux.	205	W. Germany	115	E. Germany	41
420.16	465	52.9	Netherlands	332	Belg.& Lux.	133	W. Germany	1
421.04	191	72.0	Netherlands	81	W. Germany	72	Belg.& Lux.	34

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, 1965--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)

TSUS item	All countries		First supplier		Second supplier		Third supplier	
	Amount in 1965	Percent change from 1964	Country	Value	Country	Value	Country	Value
Potassium hydroxide (caustic potash) (p. 125)								
420.18	194	3.7	Sweden	97	W. Germany	78	France	13
Potassium iodide (p. 131)								
420.20	3/	4/	W. Germany	4/	-	-	-	-
Potassium nitrate (p. 133)								
420.24	155	-52.6	W. Germany	72	Italy	38	Spain	21
Potassium perchlorate (p. 137)								
420.26	134	44.6	Sweden	68	Switzerland	59	France	7
Potassium persulfate (p. 141)								
420.30	89	24.9	Netherlands	79	W. Germany	4	Switzerland	3
Potassium compounds not elsewhere enumerated (p. 143)								
420.36	814	55.4	W. Germany	417	Japan	372	Netherlands	14
Rhodium compounds (p. 147)								
420.40	2	5/	W. Germany	1	U.K.	3/	-	-
Selenium compounds (p. 149)								
420.50	53	-14.7	Canada	33	W. Germany	19	U.K.	3/
420.52 2/	-	-	-	-	-	-	-	-
420.54 2/	-	-	-	-	-	-	-	-
Silver compounds (p. 151)								
420.60	153	-58.9	France	142	W. Germany	11	Canada	1

1/ Computed from 1964 data that were adjusted subsequent to publication; see text.
2/ A study of reported imports established that the published data are incorrect; see text.
3/ Less than $500.
4/ No imports reported for 1964.
5/ More than 200 percent.

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

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4:3

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