U.S. SYNTHETIC ORGANIC DYE INDUSTRY: ITS COMPETITIVENESS IN THE WORLD MARKET

Investigation No. 332-120 Under Section 332 of the Tariff Act of 1930

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EXECUTIVE SUMMARY

On December 10, 1980, the United States International Trade Commission instituted Investigation No. 332-120 under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) to assess the overall competitiveness of the U.S. synthetic organic dye (SOD) industry relative to that of the other major SODproducing countries. The analysis was to focus on a comparison of such important competitive factors as trade trends, research and development (R. & D.) expenditures, productivity, and management strategies. Other factors include marketing, pricing, Government regulations, and foreign influence in the domestic SOD industry.

Sales of SOD's in the United States exceed \$1 billion per year. The industry is located mainly in New Jersey, New York, Pennsylvania, and South Carolina. Of the 37 SOD manufacturers, 7 are subsidiaries of European chemical companies. In 1980, 10 companies held more than 80 percent of the U.S. market; the majority of these were the foreign subsidiaries. Production of SOD's in 1980 was about 260 million pounds; imports were 29 million pounds and exports about 40 million pounds. The number of production workers was about 8,000. Two-thirds of SOD consumption is for coloring textile products and the remainder is split between paper products and a group of miscellaneous products including leather and plastics.

Background

The U.S. synthetic organic chemical industry, particularly the SOD industry including SOD intermediate chemicals, began during World War I when the flow of German dyes and related chemicals to this country was stopped. After the war, it became U.S. Government policy to encourage the continued development of a strong synthetic organic chemical industry. This new industry was protected by a system of high tariffs and the American selling price (ASP) method of valuation for assessments of duties on SOD's and other benzenoid chemical imports. Under this protection, the domestic SOD industry grew quickly during the period between the two world wars as U.S.-owned and European firms built plants in the United States to supply the growing domestic market. The position of the U.S. SOD industry in the world market improved during World War II because of heavy war damages in the European countries housing the leading world SOD producers.

In 1947, the U.S. SOD industry dominated the world SOD market with approximately 65 percent of the world trade in SOD's by value. In that year, 4 of the largest U.S.-owned chemical companies accounted for approximately 75 percent of U.S. sales of SOD's compared to less than 5 percent for the foreign subsidiaries. After the war, the European firms, particularly the West German SOD firms, sought to re-establish their prominent position in the world and U.S. markets. In the United States, subsidiaries of West German firms reestablished local operations. They did so in order to compete more effectively in this large SOD market and to circumvent the U.S. tariffs on SOD's. They, as well as Swiss and British subsidiary firms, continued to expand as the years passed, both by acquisitions of U.S.-owned plants and entire companies and also by construction of new SOD plants. The major U.S.-owned companies, on the other hand, turned most of their attention to the newer and more dynamic segments of synthetic organic chemicals--plastics, synthetic fibers, synthetic rubber, synthetic detergents, pesticides, and medicinal chemicals. Eventually SOD production accounted for only a small part of the U.S. synthetic organic chemical industry--sales of SOD's were less than 2 percent of total synthetic organic chemical sales in 1980. While the major European chemical companies likewise participated in these new areas of chemistry, they continued to maintain their interest and leadership in SOD's. This included a growing investment in U.S. production facilities.

As the foreign-owned SOD firms in the United States grew, the market share of the above-mentioned 4 largest U.S.-owned SOD producers declined. In 1977, the last year all 4 firms reported production and sales data to the Commission, they accounted for only about 30 percent of total U.S. sales of SOD's. By 1980, 3 of these companies had dropped out of the SOD-producing business entirely, and the 4th all but ceased SOD production; all 4 companies cited declining profits and increased competition from foreign SOD firms as the main reason for their withdrawal. In contrast, the combined sales of the 7 U.S. subsidiaries of foreign-owned firms along with SOD imports in 1980 accounted for approximately 50 percent of the total domestic sales value of SOD's. As a result of all these developments, the domestic SOD industry's share of the world SOD export market declined to an estimated 4 percent in 1980.

Worldwide, dyes are produced in 26 countries, 5 of which--West Germany, Switzerland, the United Kingdom, the United States, and Japan--are the production and technical leaders. Of the 1.6 billion pounds of dyes produced in 1980, these 5 countries accounted for about 60 percent. In 1980, of the hundreds of companies in the world which produce dyes, 20 are regarded as "major" producers (i.e., sales exceed \$40 million); 12 of these are European (including 3 German and 2 Swiss firms); 5 are Japanese, and the remaining 3 are domestically-owned firms in the United States. The value of world sales in 1980 approached \$5 billion.

Comparison of the competitive position of the United States with that of the other SOD-producing countries

The assessment of the competitiveness of the overall domestic SOD industry is based on published information and data supplied by both U.S.-owned firms and foreign subsidiaries. The U.S. data have been compared to similar information from West Germany, Switzerland, the United Kingdom, and Japan. The assessment is based on factors which ordinarily are indicators of competitiveness, and is summarized below.

Imports and exports.--During 1975-80, U.S. SOD imports averaged about 28 million pounds per year, and the imports-to-consumption ratio remained relatively constant at approximately 12 percent during this period. In 1979, the United States had by far the lowest imports-to-consumption ratio among the 5 major SOD-producing countries (West Germany, Switzerland, the United Kingdom, Japan, and the United States). This is an indicator of strong competitiveness; however, it is generally understood that absent the foreign-owned U.S. companies, SOD imports would be greater.

U.S. exports in the past 5 years have ranged from 40 to 47 million pounds per year, or only about 17 percent of U.S. production while the Western European SOD industry annually exported over 50 percent of its SOD production and Japan annually exported about 30 percent. The low level of U.S. exports ordinarily would be seen as indicative of a weakly competitive industry. But in the U.S. SOD industry, the relatively low level of exports is partly the decision of the European parent companies to limit their U.S. subsidiaries to supplying the U.S. market.

Because the volumes of U.S. imports and exports are so strongly influenced by foreign ownership of the largest U.S. producers, which now account for about one-third of domestic production, it is also instructive to compare exports-to-imports ratios for the various countries. The U.S. exportsto-imports ratio in 1979 was 1.5, lower than that of most of the other major SOD-producing countries (e.g., the West German ratio was 4.5 in 1979). This and the other export-import comparisons confirm that most SOD's produced in the United States are for domestic consumption, while the other major SOD producers in the world also concentrate on export markets.

<u>R. & D.--</u>In spite of the great age of the SOD industry, it is still a dynamic and fertile field for research achievements. The SOD products are constantly changing in response to changing preferences for colors and textile fibers, to Government regulations regarding toxicity of SOD's and their intermediates, and to improvements still being made in ease of application and resistance to fading from washing and sunlight. More than 1,000 dyes are produced on a commercial scale in the United States, and a far greater number in some of the other leading SOD-producing countries.

U.S. R. & D. expenditures for SOD's in 1979 (and probably 1980) were among the lowest of the five major SOD-producing nations at an estimated \$12 million; only Japan's was lower, at \$4 million. Estimated R. & D. expenditures for Switzerland, for example, were \$76 million. The main reason the United States spent this small amount on R. & D. is that most of the foreign-owned SOD-producing firms in the United States do little or no R. & D. work. It is done by the parent firms in the home country. During 1975-79, the SOD producers in West Germany, Switzerland, and the United Kingdom are believed to have spent approximately 4 percent, 8 percent, and 5 percent, respectively, of their total SOD sales per year for R. & D. activities. In comparison, the U.S. SOD producers spent an estimated 1 to 2 percent per year of sales for R. & D. during this period.

Productivity.--Available data seem to indicate that production per worker in the U.S., which has exceeded 32,000 pounds annually in recent years, is 50 percent higher than in West Germany and more than double the productivity of the other leading SOD nations. However, this strong indicator of U.S. competitiveness again must be related to the effect of foreign ownership. The foreign-owned U.S. plants are limited to a relatively narrow line of largevolume dyes. The parent company makes the full line of dyes and exports to the United States the small-volume high-priced specialty SOD's, as evidenced by the average unit values of the U.S. market: \$3.50 per 1b. for domestic production and \$6.29 per 1b. for imports. A negative aspect of U.S. productivity is that it increased only 5 percent during 1975-79, whereas the increase was 62 percent for West Germany and about 35 percent for the other 3 leading SOD-producing countries. In 1980, the U.S. productivity index declined an estimated 4 percent because of the economic slowdown. This occurred in spite of the lower costs enjoyed by the United States for certain starting materials, namely crude oil and natural gas liquids.

<u>Production and capital investment</u>.--In 1979, U.S. production of dyes was 266 million pounds compared with 323 million pounds for West Germany, and about 120 million pounds or less for each of the other 3 leading nations. During 1975-79, West Germany had the highest average annual growth rate of SOD production at 14 percent. By comparison, U.S. SOD production grew only 7 percent per year during the period covered, and Japan and Switzerland were midway between. To maintain their growth, West German and Swiss companies have continued to invest in production facilities; a \$500 million joint venture of German and Swiss interests was recently announced; this new plant will produce dye intermediates.

Summary and outlook

In summary, in spite of a recent declining trend, the competitiveness of the U.S. SOD industry is strong. The domestic industry still has the highest output per worker and the lowest market penetration by imports, but it trails in R. & D. effort, export trade, and investment in the SOD industries of other countries.

Leaders in competitiveness are West Germany followed by Switzerland. These countries lead in quality and breadth of their product lines, in exports and foreign investment, and in R. & D. expenditures. They have aggressive worldwide marketing networks. West Germany is by far the leader in production of chemical intermediates for dyes, which are exported worldwide to competing SOD producers. This country also benefits from membership in the European Economic Community and from a low rate of inflation.

What are the prospects for U.S. SOD competitiveness in coming years? First, although control of most of the industry will continue to be in the hands of German, Swiss, and British companies, it is hardly likely that their policies will be unsupportive of their U.S. SOD investments. The foreignowned U.S. subsidiaries will remain highly competitive though they are not likely to outperform the parent companies. The U.S.-owned half of the domestic SOD industry is now composed of relatively small chemical companies whose main product is SOD's. Although their R. & D. potential is limited, their stated policy is to give maximum attention to remaining competitive in SOD's. Some have increased their export promotion. The proximity of the United States to Mexico and Canada--neither of which produces SOD's--offers an opportunity for U.S. exports. U.S. trade relationships with Taiwan, South Korea, Peoples Republic of China, and Latin American nations also offer such opportunities. The problem of environmental regulations has largely been dealt with in the United States, while a number of such regulations are only now being implemented in Europe; this also is an economic advantage for the domestic industry. The fact that the United States is the largest single market for SOD's in the the world continues to offer a great opportunity to increase U.S. competitiveness; the scale factor advantage operates for SOD's just as it does for other industrial products. The withdrawal from the SOD industry of 4 of the largest U.S. chemical companies dealt a blow to potential R. & D. accomplishments, but the remaining U.S.-owned SOD companies will be attempting to advance their technological standing. Considering all factors, it is the Commission staff's belief that the competitiveness of U.S. SOD industry will not match that of the 2 leading SOD-producing countries but it should decline no further and in the future will match or exceed that of the remaining SOD-producing nations.



INTRODUCTION

On December 10, 1980, the United States International Trade Commission, on its own motion, instituted Investigation No. 332-120 under section 332(g) of the Tariff Act of 1930, as amended (19 U.S.C. 1332(g)), for the purpose of obtaining, to the extent practicable, information on overall competitiveness of the synthetic organic dye (SOD) industry in the United States relative to that in other major SOD-producing countries. This investigation focused on such factors as trade trends, research & development (R. & D.) expenditures, productivity, technological and raw material advantages, and management strategies; and the effect that changes in these factors have had on the domestic SOD industry regarding its ability to compete both domestically and in world SOD markets.

Notice of the institution of the investigation appeared in the <u>Federal</u> <u>Register</u> on December 24, 1980 (45 F.R. 85189). No public hearings were scheduled for this study.

Background

Dyes are color-producing substances that are used to impart color to other materials. Dyes are mainly used (about 56 percent) in the coloring of textiles (natural and man-made); the remainder is consumed mainly in foods, drugs, leather, paper, and plastics. Dyes from vegetable and other natural sources have been available since the beginning of recorded history; however, synthetic organic dyes (SOD's) are of more recent vintage, being developed in the latter 1800's and early 1900's. Today there are thousands of SOD's which have almost entirely replaced the natural dyes because of lower costs and superior properties.

All SOD's are benzenoid in structure 1/ and are of complex molecular structure; for example, the structure of some dyes (e.g., sulfur dyes) is still unknown. Because of this, SOD's are most frequently classified and referred to by their <u>Colour Index 2</u>/ name and number. For example, Vat Black 25 (the <u>Colour Index</u> name and number) has the common name of Olive T, while its systematic chemical name is 3-(1-anthra-quinonylamino)-anthra[2,1,9m]naphtha[2,3-h] acridine-5,10,15-(1-H)-trione.

The following table lists SOD's by their class of application 3/ and the principal materials to which they are applied.

1/ The term "benzenoid", as used in this report, refers to cyclic organic chemicals having a benzenoid, quinoid, or modified benzenoid structure and to certain cyclic and acyclic chemicals obtained therefrom, provided for in part 1 of schedule 4 of the Tariff Schedules of the United States Annotated 1981 (TSUSA). For a definition of the term "modified benzenoid" see U.S. International Trade Commission, Imports of Benzenoid Chemicals and Products, 1979, p.1.

2/ Society of Dyers and Colourists, <u>Colour Index</u>, Research Triangle Park, Revised Third Edition, 1975.

3/ For example, "direct" dyes can be used effectively without assistants; while "vat" dyes can be easily reduced (i.e., vatted) to a soluble and usually colorless form in which they readily impregnate fibers.

Dyes: Class of application and principal use

Class of application	Major materials to which dyes are applied
Acid	Nules (soluceides) used silk and somulies
AC10:	Nyion (polyamides), wood, slik, and acrylics.
Azoic compositions:	wool, and fur.
Basic:	Acrylics, cotton and other cellulosic fibers, leather, nylon, paper, polyester, and wool.
Direct:	Cotton and other cellulosic fibers, paper, and nylon.
Disperse:	Polyester, nylon, acrylics, cellulose acetate and
	rayon.
Fiber-reactive:	Cotton and other cellulosic fibers, rayon, silk, and wool.
Fluorescent brightening :	
agents:	In soaps, washing powders, and detergentscounter- acts "yellowness" in textiles.
Food, drug, and cosmetic:	
colors:	Food, drugs, and cosmetics.
Mordant:	Cotton, linen, and rayon.
Solvent:	Soluble in organic solventsused in inks, stains,
	varnishes, gasoline, lacquers, coloration of
	candles, sealing waxes and polishes, and plastics.
Vat:	Cotton, linen, rayon, and cellulose acetate.
All other 1/:	Cotton for sulfur; cotton and linen for ingrain; and
- :	cotton, fur, and hair for oxidation bases.
8 a	

1/ Includes principally oxidation bases, ingrain dyes, and sulfur dyes.

Source: Society of Dyers and Colourists, <u>Colour Index</u>, Research Triangle Park, Revised Third Edition, 1975.

Pigments <u>1</u>/ are the other principal type of colorants and are available both as inorganic and organic products. Inorganic pigments include many of mineral origin, while virtually all organic pigments are obtained synthetically. Pigments differ fundamentally from SOD's in that nearly all of them are insoluble coloring materials which are applied to the end product (e.g., paint, plastic, and so forth) without prior solubilization. In other words, pigments are held to the substrate by a binding agent and are not adsorbed by the substrate. 2/

1/ "In U.S.A. . . . the term, "Toners" covers all full strength pigments." Colour Index, Research Triangle, Revised Third Edition (1975), V. 3, p. 3267.

2/ Although pigments are not specifically covered in this report, certain countries, such as the United Kingdom, combine their SOD and pigment data. In these cases, every effort has been made to estimate, where possible, data for SOD's alone. Some countries, such as Switzerland, report insufficient data to permit a valid assessment of either their SOD industry alone or their overall chemical industry.

Prior to World War I, there was practically no U.S. SOD industry. Domestic production accounted for approximately 10 percent of consumption with the remainder supplied by imports, principally from Germany. The war stopped imports from Germany, resulting in a severe shortage not only of SOD's but also a variety of other chemicals such as intermediates and drugs.

After that war, both the U.S. Government and the domestic chemical industry were committed to the establishment of a strong, independent, domestic chemical industry primarily in the areas of SOD's and other related chemicals. This was undertaken in order to avert such shortages in the event of another major conflict. This commitment resulted in a system of protection for the domestic producers of SOD's and of other coal-tar (benzenoid) chemicals in which the duty was not only relatively high but was also assessed on the American selling price (ASP) of an imported SOD or coal-tar chemical if it was competitive <u>1</u>/ with a domestic product. If noncompetitive, <u>2</u>/ the imported SOD's and other coal-tar products were valued for customs purpose on the basis of the United States value.

The ASP and the United States value <u>3</u>/ methods of customs valuation were used to assess duty on imported competitive and noncompetitive SOD's, respectively, as well as other related coal-tar chemicals. These valuation methods were adopted by Congress and included in the Tariff Act of 1922 (The Fordney-McCumber Act) and reaffirmed by the Tariff Act of 1930 (The Smoot-Hawley Act).

In spite of the protectionist legislation used to protect SOD's and other benzenoid chemicals, European SOD firms were able to increase their control of the U.S. industry. By 1939, a U.S. subsidiary of a German SOD producer accounted for approximately 15 percent of all SOD's produced and sold in the United States. 4/ This was accomplished by acquiring existing SOD firms and

1/ According to Imports of Benzenoid Chemicals and Products, 1979, U.S. International Trade Commission, p. 1, "competitive" imports are products that are similar to domestic products and that accomplish results substantially equal to those accomplished by the similar domestic product when used in substantially the same manner.

2/ Products classified as "noncompetitive" by the U.S. Customs Service do not accomplish results substantially equal to those accomplished by similar domestic products when used in substantially the same manner.

3/ Imports of Benzenoid Chemicals and Products 1979, . . ., p. 1, states that "the essential difference between these two values is that the American selling price is based on the wholesale price in the United States of the competitive domestic product, whereas U.S. value is based on the wholesale price in the United States of the imported product less transportation and most of the selling expenses." For additional information concerning U.S. methods of customs valuation see <u>Customs Valuation</u>, Report of the U.S. Tariff Commission to the Committee on Finance and the Subcommittee on International Trade, United States Senate, March 14, 1973.

4/ In 1939, a U.S. subsidiary of Swiss SOD producers accounted for approximately 8 percent of U.S. production of SOD's.

by building new plants in the United States. With the onset of World War II, the U.S. Government seized the German-owned SOD producer; it was eventually sold to U.S. investors.

During both World War II and the years immediately following World War II, the U.S. SOD industry dominated the major world SOD markets. In 1947, the U.S. SOD industry represented approximately 65 percent of the value of world trade in these products. Two reasons accounted for this large share. First, it was relatively easy for the United States to convert from a war-oriented industry to a consumer-oriented industry. Second, many of the major foreign SOD producers had been devastated during war. However, this dominance by the U.S. SOD industry proved to be only temporary as the domestic industry did not aggressively seek to maintain foreign markets because the domestic market constituted a substantial share (25 percent during 1947-50) of the world SOD market. Therefore, exports became secondary to domestic competition. In contrast, the German firms sought to re-establish their position in both the U.S. and other world markets, in addition to rebuilding at home. As in the period up to 1939, they captured a major share of the U.S. market by a combination of imports, acquisition of U.S. firms and facilities, and construction of new manufacturing plants.

The apparent superior competitiveness of the European firms, as indicated by the strength with which they re-entered world markets, reportedly is due to a slightly higher product quality of the foreign SOD products and to more aggressive marketing by the foreign SOD producers. 1/ Because foreign SOD producers generally invest more in R. & D. than do U.S. SOD producers, foreign SOD producers are reported to have a slight edge in quality over their U.S. counterparts. 2/ For example, West German SOD producers invested \$60 million in 1979 versus \$12 million by the U.S. SOD industry. In addition, the major foreign SOD companies usually produce a broader SOD product line than do the leading domestically-owned SOD producers. 3/ As a result, the foreign SOD products consistently have been favored in world markets, particularly in the European and U.S. markets. While the European companies were establishing a strong position in the U.S. market, the major domestic companies were reducing their commitments to SOD R. & D. owing in part to their belief that high R. & D. expenditures on SODs were not justified by the potential profits from the R. & D. efforts. 4/

In the area of international trade, the United States has actively supported trade cooperation among nations. This was done mainly through negotiations such as those which established the General Agreement on Tariffs and Trade (GATT) in 1947 and which have continued in subsequent years. These negotiations, which resulted in reductions of tariffs on many items including

1/ Based on information developed during fieldwork.

2/ "Outlook Clouds for Color Chemicals Business," Chemical and Engineering News, February 26, 1979, p. 20.

3/ Based on information obtained in part from Synthetic Organic Chemicals, United States Production and Sales, annual reports, U.S. International Trade Commission, and official statistics of the U.S. Department of Commerce, and in part from trade data available on the European SOD industry.

4/ "The European Inroads into U.S. Dyestuffs," Chemical and Engineering News, April 7, 1980, p. 47. SOD's, afforded the U.S. SOD industry and, even more, foreign SOD producers, 1/ opportunity to increase their exports of SOD products.

In recent years, the United States as a contracting party to the GATT has been working with other nations to further lower tariff rates and also to eliminate non-tariff barriers. To this end, the Tokyo Round of Multilateral Trade Negotiations, the seventh round of negotiations since the GATT was organized in 1947, was completed in 1979. The agreements reached during this round of negotiations concerning benzenoid chemicals and products (including SOD's) became effective for the United States on July 1, 1980, with final rates to be reached in the United States by January 1, 1987, through 8 annual staged duty reductions. These agreements include the elimination of the American selling price (ASP) and the United States value methods of U.S. customs valuation for benzenoid chemicals and products (including SOD's). Imports of these chemicals and products are now assessed duties primarily on the basis of transaction value. 2/

Some SOD producers opposed the elimination of ASP because of the increasing foreign competition in domestic and world markets. This position was directly related to the re-emergence of the European chemical industries (particularly the West German firms) after World War II. In 1976, imports by U.S. subsidiaries of foreign firms accounted for 78 percent of the value of all imported SOD's and 14 to 82 percent of the value of other groups of benzenoid chemicals. Imports of benzenoid chemicals and products dutiable under the ASP had increased from about \$200 million in 1969 to \$850 million in 1976 and \$1.18 billion in 1978. Some domestic firms feared that imports would increase even faster without the protection afforded by ASP.

Another factor with a significant effect on competitiveness is Government regulations relating to environmental problems. Many benzenoid chemical products, including SOD's, are considered to be potentially hazardous substances. According to some industry sources, 3/ U.S. Government environmental and health regulations on plant operations, which were imposed beginning in the late 1960's and early 1970's, have had an adverse effect on the profit level of the U.S. SOD industry. The decline in profit levels for domestic SOD producers caused many U.S. companies to curtail expenditures

1/ In the Kennedy Round, the sixth in a series of tariff negotiations, tariff reductions by the United States were far greater than those by the European countries. The difference would have been evened out had the United States subsequently met a commitment to phase out the ASP method of Customs valuation, but the U.S. negotiators could not meet that agreement because of Congressional opposition.

2/ The transaction value of imported merchandise is the price actually paid or payable for the merchandise when sold for exportation to the United States plus additional minor expenses such as packing cost, commissions, royalties, or license fees.

3/ "Dye Producers Have Overcome Overcapacity and Pollution Ills," Chemical Marketing Reporter, August 29, 1980, p. 7.

in R. & D. 1/ At the same time, foreign SOD firms have benefited because environmental and health regulations affecting the chemical industry, particularly in European and other major SOD-producing countries, are being imposed years later than in the United States and in some cases are less severe than in the United States. 2/ As previously stated, strong R. & D. programs for SOD's have paid off for foreign firms by providing them with an edge in quality of new products.

U.S. regulations limiting exposure to, and consumption of, certain SOD intermediates (e.g. benzidine) have led to abrupt changes in domestic market shares of certain dyes. These banned or restricted SOD's frequently have been replaced by products from foreign firms partly because of the foreign SOD firms' commitment to R. & D. on SOD's and partly to the unwillingness of U.S. SOD producers to invest capital in developing and testing a replacement product without assurance of the marketability of this product. 3/

According to industry sources, the readiness of foreign SOD companies to supply a product lacking in the U.S. market is attributed to the large and varied output of new products they have introduced over the years. 4/ These products are usually tested in foreign markets prior to their introduction into the United States. Because the foreign SOD producers are confident their products will find acceptance in the United States, they are willing to incur the expense of additional tests in order to obtain approval by the U.S. Government.

Although Government regulations are an important factor limiting export growth, industry sources also attribute the slow growth in domestic SOD exports to other factors such as the lack of competition between a foreign parent firm and its U.S.-based subsidiary, the lack of corporate funds / available to establish and conduct business abroad, and the departure of a number of major U.S. SOD producers from the market.

In 1980, there were 38 producers of SOD's in the United States operating about 48 plants located primarily on the east coast of the United States. Seven of these are U.S. subsidiaries of foreign-owned companies. During 1975-80, the number of U.S.-owned SOD firms in the United States declined from 34 in 1975 to 31 in 1980. In addition, one of the largest U.S. SOD producers withdrew from the SOD business after the first half of 1980. These firms either closed their plants or sold them to foreign companies. The decline in the number of U.S.-owned SOD companies, coupled with increased foreign investments in the U.S. SOD market, has caused increasing concern within the U.S.-owned portion of the domestic SOD industry about the competitiveness of the domestic industry in world markets. 5/

4/ Ibid.

^{1/ &}quot;Outlook Clouds for Color Chemicals Business," . . ., p. 20.

^{2/} See Sixth Amendment to the Directives 67/548/EEC.

 $[\]overline{3}$ / Based on information developed during fieldwork.

^{5/} Based on information developed during fieldwork.

The volume of U.S. SOD exports has grown only about 2 percent a year over the past 6 years (1975-80) so that the U.S. share of world trade in SOD's in 1980 had declined to an estimated 4 percent-down from a level of 65 percent in 1947. This sharp decline is attributed to aggressiveness by the major foreign SOD producers in all world markets, to Government trade disincentives and regulations, to marketing policies of the foreign onwers of U.S. SOD subsidiaries, and to the lack of effective R. & D. effort by major U.S.-owned chemical companies-companies which once were the mainstay of the U.S. SOD business. It remains to be seen whether U.S. SOD exports will revive through the efforts of U.S.-owned firms or through increasing foreign investments in the domestic SOD industry, and to what extent, if any, these investments will lead to increased U.S. SOD exports.

INDUSTRY STRUCTURE

World Synthetic Organic Dye Industry

Companies

. Origin and development.--The world SOD industry started in Europe after 1856, when an Englishman, William Perkin, inadvertently synthesized a lavender substance called mauviene, which could be used to impart that color to textiles. 1/ This event caught the attention of alert European entrepreneurs who recognized the potential of SOD's to augment the supply of natural dyes which were then in use.

The first SOD industries were developed in England and in Germany. The principal English and German producers of SOD's expanded their markets throughout the world over the years. During the late 1880's, the Germans were much more aggressive than their English counterparts and eventually secured a large share of the foreign market for German SOD's. 2/ It is generally acknowledged throughout the SOD industry that the effectiveness of the Germans was due principally to the great importance they placed on chemical R. & D. in building and maintaining a strong chemical industry. The Germans used Government officials, businesspersons, and university professors in developing foreign markets for their chemical industry. 3/ The Germans believed, as did many countries, that a large dynamic chemical industry was the basis for military strength since SOD's and chemical intermediates, coupled with related technology, can also be used to produce military commodities.

The SOD industry in Switzerland was modelled after the German industry owing to the close association between Swiss and German businesses. Initially, there was one major Swiss SOD producer which subsequently divided into three

1/ Kirk-Othmer, Encyclopedia of Chemical Technology, New York, Vol. 8, 1978, p. 159.

2/ "Outlook Clouds for Color Chemicals Business," . . ., p. 18. 3/ Based on information developed during fieldwork. major firms. Today Switzerland has two major SOD companies, both of which are very active in the U.S. and other world markets.

The interruption of German SOD trade which ensued during the first World War gave rise to SOD producers in many other countries, particularly France and Italy. The major producing firms in all these countries are still active today. The Soviet Union and Japan rapidly expanded their SOD industries in the 1930's.

With the exception of the SOD producers in England, Germany, and the United States, the SOD producers in most other nations did not make their own dye intermediates. As a result, these SOD producers became dependent on imports, for their intermediates came mainly from Germany. German exports of dye intermediates dominated the world market because of German expertise and extensive R. & D. in this area coupled with their large and modern production facilities.

Organization and ownership.--At the present time, the world SOD industry consists of more than 26 SOD-producing countries of which at least five are major world SOD producers. These five countries are West Germany, Switzerland, the United States, the United Kingdom, and Japan. Four of these countries--West Germany, Switzerland, the United Kingdom, and Japan--have a total of 11 major SOD-producing firms. 1/ The United States alone has a total of 3 such leading (domestically-owned) firms.

There are approximately 20 major SOD-producing firms in the world, most of which are multinational in scope. Twelve firms are headquartered in Western Europe, where 6 firms are owned by West German, Swiss, and British interests, and the remaining 6 firms by other Western European interests. These 12 companies located in Western Europe also control, in whole or in part, more than 50 subsidiaries throughout the world. The remaining 8 major SOD producers are located in Japan and in the United States.

Production and sales.--During 1975-79, world SOD production increased by more than 30 percent from 1.3 billion pounds in 1975 2/ to over 1.7 billion pounds in 1979. 3/ The growth during this period parallels the growth in demand for the textile and fiber industries, major SOD users, of almost 4 percent per year. However, industry sources 4/ estimate that worldwide production of SOD's in 1980 declined by approximately 4 percent from 1979. This decline reflects the economic slowdown which occurred worldwide in the developed nations in 1980 especially in the textile industry.

 $\frac{1}{2}$ SOD sales of each of these firms exceeded \$40 million in 1979. $\frac{1}{2}$ "Color Removal by Adsorption," <u>American Dyestuff Reporter</u>, March 1980, p. 38.

3/ "Outlook Clouds for Color Chemical Business," . . ., p. 16.

4/ Based on information developed during fieldwork.

During 1975-78, the United States, West Germany, Japan, the United Kingdom and Switzerland accounted for, on the average, over 60 percent of world SOD production. 1/ U.S. SOD production was primarily used for dometic consumption, while Western European nations and Japan exported a substantial portion of their production. During this period, the Western European SOD industry in the aggregate annually exported over 50 percent while Japan annually exported about 30 percent of its SOD production. 2/

In 1979, world sales of SOD's totaled about \$4.5 billion. Although industry sources estimate a decline in the quantity of world sales, they believe the value of these sales approached \$5 billion in 1980.

Employment.--Consolidated data for world SOD employment are not available. However, based on employment data for the United States and the United Kingdom, which totalled about 16 thousand SOD production workers in 1979, a reasonable estimate for world employment in that year is about 65,000 workers.

Government regulations.--The Governments of the major SOD-producing countries have played an important role in determining the competitiveness of their SOD industries in the world market. These Governments have been enacting effluent and toxic substances control laws which will affect the major SOD producers located in these countries. These laws will bring all the European Economic Community (EEC) members under the same directives, which are similar to those affecting all the Organization for Economic Cooperation and Development (OECD) members, including the United States. With such regulations, the EEC and OECD members will begin using similar methods both to identify potentially hazardous substances and also to bring under uniform standards their production, handling, and disposal of chemicals. Recently, the West German Government adopted its own toxic substances act, which is to be implemented in West Germany on January 1, 1982. 3/ This law states that notification concerning any new substance, whether produced or imported, must be submitted to the Government 45 days before the substance is introduced into the domestic market. This law encompasses West Germany's total chemical industry, including SOD's.

In 1973, Japan enacted major legislation calling for control of toxic substances. Switzerland also passed toxic substances control laws in 1969, 1973, and 1979. In the United States, President Ford signed into law the Toxic Substances Control Act (TSCA) in 1976. (However, laws on pollution control in the United States had been enacted several years earlier.)

Products

Materials and processes. -- The raw materials used to produce SOD's are principally cyclic intermediate chemicals. These intermediate chemicals are in turn made from primary petrochemicals and are, therefore, subject to the rising cost of natural gas liquids and crude oil feedstocks.

1/ Based on data obtained from the U.N.'s Yearbook of Industrial Statistics, General Industrial Statistics, 1978, V. II, N.Y. 1980, p. 346.

2/ See tables 4, 7, 10, and 13.

3/ See the Sixth Amendment to the Directives 67/548/EEC.

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In the production of SOD's, two or more cyclic intermediates are brought together in a large vat or steel tank. Through the use of pumps, agitators, heat exchangers and settling tanks, these chemicals react to form a more complex chemical product. This product is often transferred to another vat to be further reacted with another SOD intermediate chemical. Frequently, this procedure is repeated many times usually in small quantities or batches; hence the name "batch process." Finally, when the crude dye has been formed and sufficiently purified, it is filtered, compressed into a cake, and then dried. After drying, the solid dye is ground into a fine powder form and packaged for sale.

Relation to other products.--Many synthetic organic chemical intermediates are the building blocks not only for SOD's but also for a wide variety of other chemical products that are essential both for a strong domestic economy as well as a source for military supplies. Therefore, the production facilities for these intermediates are often considered by Governments to be part of the basis for a strong national defense as well as for the public good. Examples of the public good include the contribution of these intermediates to the rapid advancement in medicinal chemicals, synthetic fibers, synthetic rubber, synthetic detergents, and many other consumer products of the chemical industry. These chemical plants can be easily converted to produce materials necessary to satisfy military requirements such as explosives, poison gas, smoke screens, and the color in uniforms and in military equipment. This flexibility is one of the factors which originally led many of the major SOD-producing countries to protect both their SOD and dye intermediate industries by relatively high tariffs.

Marketing

In most of the major world SOD markets, the key factor for success is the nature of the SOD itself. The demand for a given SOD is dependent to a certain extent on how well the SOD will enhance the commercial success of the product to which it is applied. 1/ Therefore, the SOD demand is determined to a great extent by consumer preference for textile and paper products of a particular color.

It is estimated that textiles account for over 56 percent of world SOD consumption, pigment production for 24 percent, paper and leather production for 14 percent, with the remainder consumed in relatively small quantities by numerous other industries. 2/

The U.S. market, the largest in the world, is especially attractive to SOD manufacturers as the domestic consumption of textiles fibers is large and increased by 14 percent from 11.1 billion pounds in 1974 to 12.7 billion pounds in 1979. <u>3</u>/ This represents an average annual growth rate of 2.7 percent which, while not as large a growth rate as some other end-use markets, does make the textiles industry the largest volume consumer of SOD's;

1/ "Color It Right and It Will Sell", <u>Chemical Week</u>, September 10, 1980, p. 33.
2/ "Color Removal by Adsorption," . . ., p. 38.

3/ Chemical Week, February 20, 1980, p. 54.

continued growth is expected in the future because of a continuing demand for textiles (i.e., clothing, rugs, and so forth). Therefore, both domestic and foreign SOD producers are interested in increasing their share of the U.S. market.

Financial status

Since the world's major SOD producers are usually diversified chemical companies which produce a variety of chemicals in addition to SOD's, their financial reports do not separately indicate the financial status of their SOD operations. A comparison of the financial data obtained from U.S. and European firms must also include an explanation of the different financial philosophies practiced by these firms. For example, a chemical firm in Europe normally leverages its investment with substantial debt. In the United States, the average debt-to-capital ratio in mid-1980 was 36 percent, while a European firm tends to leverage with more debt. The large West German multinational companies often have over one Deutsche mark of debt for each Deutsche mark of equity. 1/

The high debt-to-equity ratio is achieveable because of German Government support and the fact that the leading banks and other financial institutions are permitted to participate in the management of chemical and other firms by placing bank officers on the German equivalent of their boards of directors. This permits the lending institutions to effectively assess the risk of debt and to influence the financial actions of the commercial firms. A high debt ratio is a competitive advantage in a country where the government will act to assist companies in recessionary periods when it otherwise might be difficult to meet the interest payments. Interest on debt is tax deductible, and is usually the cheapest source of capital for investment. It is often acceptable to high-debt foreign companies to earn a satisfactory return on equity alone, whereas the low-debt U.S. companies usually require a similar return on total capital employed (debt plus equity). A high-debt company can sell products at lower prices than a low-debt company and still achieve the same return on (equity) investment.

U.S. Synthetic Organic Dye Industry

The U.S. SOD industry has been in existence since before World War I, although its size and world influence has varied over time because of many factors, including the activities of foreign participants, and the extent of tariff protection. In 1980, there were 38 SOD producers, 2/ 7 of which were affiliated in whole or in part with foreign firms; SOD employment of production workers was estimated at 8,000. This is in contrast to more than 100 firms during World War I and about half that number during World War II. U.S. production of SOD's increased between 1975 and 1979, going from 206 million pounds to 266 million pounds, or at an average annual rate of 6.6 percent.

1/ "How the Germans Dominate the World Chemical Industry," Forbes, October 13, 1980, p. 159.

2/ One major firm withdrew from the SOD business in the latter part of 1980.

The value of U.S. sales 1/ increased from \$476 million to \$797 million over the same period, or at an average annual rate of 14 percent. A large part of this increase was caused by the increase in energy and feedstock costs, and general inflation. In spite of all the changes, the U.S. SOD industry remains viable. In 1980 it had a 6.3 percent profit to sales ratio, only slightly below the 6.6 percent achieved by the entire basic chemical industry.

Background

During World War I, the domestic SOD industry quickly expanded to more than 100 firms to meet the sharp increase in demand created by the cessation of SOD imports. The SOD industry developed its own SOD intermediates to be consumed in its SOD production which accounted for nearly all U.S. SOD consumption. Exports increased as U.S.-produced SOD's replaced some of their German counterparts in world markets owing to the disruption of trade caused by the war. After the war, the German SOD industry regained these world SOD markets because the range of U.S. SOD products was less complete and the overall quality was inferior to that of the German products.

The U.S. market, however, was not recaptured by German SOD imports to the pre-war level because the U.S. Congress decided to protect the newly developed domestic industry by both tariff and non-tariff barriers. The Revenue Act of 1916 placed a duty of 5 cents per pound on all dyes except indigo, alizarin, and the vat colors. In addition, the Dye and Chemical Control Act of 1921 prohibited, for a time, the importation of SOD's and other coal-tar derivatives into the United States. Finally, the Tariff Act of 1922 introduced the American selling price (ASP) and the United States value methods of valuation for determining the duty on competitive and noncompetitive imports, respectively. These barriers to trade, however, ultimately provided an incentive for the establishment of foreign subsidiaries in the United States. In 1923, the duty on SOD's was 60 percent ad valorem; it was reduced to 45 percent by the end of 1924. With this strong tariff protection, U.S. producers of SOD's supplied 90 percent of domestic requirements in 1925, and also increased U.S. SOD export trade.

Following a period of accelerated growth for SOD producers after World War I, the number of U.S. SOD producers gradually declined from a high during the mid-1920's, because of mergers and outright sales, to approximately 47 producers operating 57 plants and employing about 8,000 persons by 1942. However, only five of the 47 domestic producers made a comprehensive line of SOD's; while an additional four large domestic SOD producers offered a somewhat less complete line of SOD's. The five leading domestic SOD producers (three were U.S.-owned) accounted for approximately 80 percent of the total domestic SOD production in 1942.

1/ These are sales of domestic merchandise as reported to the United States International Trade Commission. In 1979, total sales including imports of SOD's exceeded \$1 billion. See <u>Chemical and Engineering News</u>, February 26, 1979, p. 19. During World War II, the U.S. Alien Property Custodian seized all assets of the U.S. subsidiary of the major German producer of SOD's and other chemicals. The patents held by this firm and its German parent were distributed to the domestic SOD producers, greatly improving their technology of SOD intermediate production and, ultimately, improving the quality of the final SOD products. After the war, subsidiaries of German firms quickly became re-established in the United States by repurchasing their original facilities as well as other domestically-owned SOD firms, and also by building new plants.

From 1947 to 1975, the number of SOD producers in the United States remained relatively constant, numbering between 40 to 44. During 1975-79, the number of companies reporting production or sales of SOD's to the U.S. International Trade Commission declined from 41 SOD producers in 1975 to 38 in 1979. During this period, the number of operational SOD plants in the United States declined from 57 in 1975 to 50 in 1979 as several companies closed their plants. In most cases, these plants had been owned by U.S. companies.

The U.S. SOD industry developed mainly in New Jersey, New York, Pennsylvania, and South Carolina because of both the availability of soft water (low mineral content) required in the production of quality SOD's, and also because of their proximity to the major textile producing states (North Carolina, South Carolina, and Georgia), and to the refineries and chemical plants (in New Jersey) that provide raw materials to the SOD industry.

In 1980, 12 of the domestic SOD producers were affiliated with or were part of multinational firms, while the remaining 26 were U.S.-owned firms. In 1980, another major U.S. SOD producer left the SOD business and shut down its 2 domestic plants. The top 10 domestic SOD producers controlled 82 percent of the U.S. market in 1980; most of these producers are affiliated with European firms. Nearly all of the domestic SOD producers imported SOD's and/or SOD intermediates during 1975-80, but less than 20 percent of these SOD producers had significant SOD exports. During this period most of the foreign subsidiaries in the United States were not major exporters of SOD's.

Nearly all the SOD companies in the United States import some SOD intermediates. There is little integration back to the starting materials in the domestic SOD industry because, in most cases, the cost involved to build manufacturing facilities for the relatively small amounts required is not economically feasible. However, approximately 6 of the 37 companies own or are affiliated with petrochemical companies and have the capacity to modify their operations to produce a wider range of chemical products including SOD intermediates. These domestic SOD producers, which are multinational firms, already market a wide variety of chemical products (in addition to SOD's and their intermediates).

Production and sales

During 1975-79, the annual domestic production of SOD's fluctuated with the state of the U.S. economy, particularly the textile industry. 1/ That is, SOD production increased when textile production increased and vice versa.

From 1975 to 1977, SOD production increased by more than 28 percent, from 206 million pounds in 1975 to 264 million pounds in 1977, and then declined in 1978 by 5 percent to 251 million pounds. In 1979, domestic SOD production increased by 6 percent over 1978 to 266 million pounds. 2/ During 1975-79, this represents an increase of 29 percent, or an average annual growth rate of nearly 6.6 percent.

Unlike the fluctuating pattern of production quantity during 1975-79, the sales value of SOD's increased steadily from \$476 million in 1975 to \$797 million in 1979. Inflationary increases in the cost of production, including SOD intermediates, have been cited as probable reasons for this increase. <u>3</u>/ This upward trend is believed to have continued through 1980.

Employment

Industry sources estimate that there were approximately 8,100 production workers employed by the domestic SOD firms in 1979. However, in many cases these workers also engaged in the production of certain SOD intermediates or related chemicals that oftentimes make up or enhance the final SOD product. Because most SOD companies also manufacture other chemicals and because their workers have flexibility of assignments, it is difficult to estimate the exact number of employees exclusively manufacturing SOD's. However, estimates of the number of such production workers for 1975-80 are as shown in the following tabulation:

	SOD	production
Year		workers
1975		6,564
1976		7,038
1977		7,335
1978		7,270
1979		8,100
1980		8,000

1/ "Dye Producers Have Overcome Overcapacity and Pollution Ills," . . ., p. 7.

2/ Although official data for 1980 SOD production are not yet available, it is believed to have decreased 2 percent from the previous year to 260 million pounds in 1980. This figure is estimated on preliminary reports of the SOC, industry sources, and textile fiber consumption in that year.

3/ "Time-saving Dyeing Methods Fight Inflation," American Dyestuff Reporter, March 1981, p. 22. Industry sources estimate that the average wages of workers in the U.S. SOD industry exceed the average for workers in the overall chemical industry. In 1979, the average annual wages per SOD worker were approximately \$18,000 <u>1</u>/ as compared to \$16,500 average annual wages for the overall chemical industry. <u>2</u>/ Productivity as defined herein revealed that for 1979 the average value of SOD sales per employee was estimated in excess of \$98,000 as compared to \$133,000 for the entire chemical industry. Thus, the SOD industry had higher labor costs with lower productivity as compared to the labor costs and productivity figures for the entire chemical industry. This was to be expected since most SOD's are made in a multiplicity of shades and colors in relatively small-scale batch equipment. Such processes are difficult, if not impossible, to mechanize or automate and considerable labor is required to clean the equipment between batches.

Government regulations

Stringent environmental and health regulations require substantial expenditure of both capital and labor. Government regulations and controls are considered to be an important factor contributing to the decline of U.S.-owned SOD plants in the United States. 3/ These regulations are also affecting the competitiveness between certain classes of domestic SOD's and similar imported products. For example, vat dyes have been affected to a greater extent than other SOD classes because of the controls on effluents from the vat dye production process. Consequently, the increased cost of domestically produced vat dyes owing to pollution control costs is expected to decrease the competitiveness of these products until and if foreign regulations impose similar costs on foreign producers. Another example of the effect of Government regulations on the domestic SOD industry is the withdrawal by the Food and Drug Administration of certain SOD's which are considered to be potentially harmful to man. 4/ Finally, the introduction of new SOD products into the domestic and world markets by domestic SOD producers will probably be slowed in the coming years owing to increased testing for carcinogenicity and toxicity to comply with Government regulations. 5/

Products

Materials and processes.--At the present time, the domestic SOD firms collectively produce more than 1,000 different SOD's. Production of SOD's is a labor-intensive operation. As stated above, SOD's are normally produced in batches (figure 1) instead of the continuous flow systems used to produce many

 $\overline{2}$ / "Facts and Figures for the Chemical Industry," <u>Chemical and Engineering</u> News, June 9, 1980, p. 69.

3/ "Dye Producers Have Overcome Overcapacity and Pollution Ills," . . ., p. 7; also based on information developed during fieldwork.

4/ Baker's Digest, April 1977, p. 58.

5/ Based on information developed during fieldwork.

^{1/} Based on information developed during fieldwork.

Feedstock : material :	Intermediate					of dyes
: 	Benzene	Nitrobenzene	Aniline	Sulfanilic acid	Acid Basic Mordant Solvent Other	
: etroleum، : :	Toluene	Toluidine		Ē	Sulfur Indigo Other	
		Naphthionic acid : : :		Ē	Acid Basic Direct Other	
	Naphthalene → ÷	Peri acid;		<u> </u>	Sulfur Other	
	* * *	Naphthols	Tobias acid	Amino J acid	Solvent Direct Other	
	H	Alpha-nitro	Alpha-naphthylamine		Basic Mordant Other	
: :	Anthracene →: :	Anthraquinone	Bromamine acid		Acid, o	ther

Figure 1.--Flow chart of certain SOD's

large-volume chemicals, including some SOD intermediates. The batch type of production process results in a more costly final product principally because of increased labor costs. Starting with petrochemical feedstocks, the cost of which is about 20 cents per pound, the unit values of the finished SOD's averaged \$3.30 in 1979.

Relation to other products.--The demand for SOD's depends largely on the demand for the end-use products of SOD's because SOD's are rarely used captively; that is, the producers of textiles, paper products, and so forth normally do not produce the SOD's used to give their products color. About 66 percent of the SOD's produced in the United States are used by the domestic textile industry; therefore, the textile industry has had an influence on the quantity and types of SOD's produced. The largest share of SOD's sold to the textile industry is used on cotton, wool, rayon, nylon, polyester, acrylic and cellulose acetate textiles, apparel, carpets, and so forth.

The development of new SOD's depends on color trends in the textile industry. In other words, the textile industry analyzes consumer color preferences and trends in new fashions and informs the SOD industry of these preferences and trends. Since more than one SOD can be used to color the same fabric, the industrial consumer must consider the characteristics of the SOD when applying it to his product. These characteristics range from different "fastness" properties to different shades of color. For "fastness," the industrial consumer selects an SOD which ideally will "grip" or bind to the fabric either chemically or physically through adsorption. Thus, when the fabric is washed, the SOD's washfastness is determined by its retention in the fabric. Another aspect of fastness is the effect of light on SOD's. This lightfastness is determined by the degree of fading that occurs over a period of time.

Another characteristic affecting the demand for an SOD is its ease of application. The method of application varies with the SOD as well as with the physical shape of the substrate, and usually includes control of temperature and pressure. The product receiving the SOD becomes the substrate because it behaves as a carrier or foundation for the SOD.

Marketing

In recent decades, the trend in fabrics has been from 100 percent cotton or wool to blends of cotton and man-made fibers. As a result, cotton fiber consumption by U.S. textile mills declined by about 8 percent from 3,330 million pounds in 1974 to 3,048 million pounds in 1979. Consequently, SOD's used primarily on cotton have declined in importance. (An exception was indigo, used to color blue jeans, for which demand has increased.) From 1974 to 1979, the trend in consumption of certain textile fibers was as follows: nylon increased by 35 percent from 1,887 million pounds to 2,540 million pounds; polyester increased by almost 55 percent from 2,377 million pounds to 3,683 million pounds; rayon decreased by almost 35 percent from 777 million pounds to 508 million pounds; cellulose acetate decreased by 24 percent from 333 million pounds to 254 million pounds; and wool decreased by more than 49 percent from 250 million pounds to 127 million pounds. 1/ The trends in consumption of these textile fibers show a corresponding demand for textile dyes. During 1975-79, acid, basic, and disperse dyes showed annual growth rates by quantity of 17 percent, 11 percent, and 8 percent, respectively, primarily because of their use on nylon and polyester fibers. On the other hand, those SOD's applied to the other textile fibers either showed limited average annual growth rates, as in the case of direct dyes (3.2 percent), or showed a decrease such as fluorescent brightening agents with an average annual decline of 3.4 percent.

Recently, there have been attempts by the SOD industry to establish new markets, such as in paper, plastics, or leather. The paper market presently accounts for about 18 percent of all domestic SOD consumption, while leather and other smaller markets account for approximately 16 percent. These other markets include plastics, automobile fabrics, furnishings and equipment for schools and institutions, and packaging. 2/ SOD's are used in these applications to promote safety, to ease operations and repairs, to increase the attractiveness of industrial surroundings, or to increase the appeal of both the package and the product.

Financial status

Estimates of the financial status of the U.S. SOD industry in 1979 show that net profits were approximately \$50 million 3/, on sales of \$797 million, or a 6.3 percent profit margin as compared to \$4.7 billion net profit for the entire basic chemical industry on sales of about \$71 billion, or a 6.6 percent profit margin. 4/ The lower profit margin for the SOD industry is probably due to increased competitive pricing of SOD's resulting from a general overcapacity in the domestic SOD industry. In 1979, the gross physical assets of the domestic SOD industry were valued at approximately \$537 million, with inventories totalling an estimated \$131 million. 5/ The net worth or shareholder's equity of the domestic SOD industry was approximately \$292 million.

<u>Pricing</u>.--The increasing quantity of imported SOD's in part influences decisions concerning price. But, like other chemicals, the average price of SOD's has been steadily increasing during the period covered here, mainly because petroleum prices have increased regularly ever since the petroleum and energy crisis of 1973-74. During 1975-1979, the average price of dyes rose

1/ Chemical Week, February 20, 1980. p. 54.
2/ "Outlook Clouds for Color Chemicals Business," , pp. 18 and 19.
3/ From data submitted to the Commission.
4/ Federal Trade Commission, Quarterly Financial Report for Manufacturing,
Mining, and Trade Corporations, 1979, p. 25.
5/ From data submitted to the Commission.

from \$2.28 to \$3.30 per pound, an increase of nearly 45 percent. By comparison, the OPEC price of crude petroleum increased by 133 percent or from \$11.02 per barrel to \$25.65 per barrel during this period. 1/ This increase in SOD price was also due in part to a rise in demand for the more expensive, better colors. Future prices of these products will probably continue to increase at least in line with the rising price of intermediates which parallels the rise in price of petroleum feedstocks. In addition, the price of SOD products will be affected by increasing transportation, energy, and labor costs.

Foreign participation

U.S. SOD producers have a very limited role in price leadership. 2/ Because the chemistry of SOD manufacturing is well known and because most new discoveries are made in Europe, the U.S. SOD producer is a follower rather than a leader in promoting a new product at a high price. 3/ The price level for SOD's usually is determined by the European SOD producers and then implemented here by their U.S. subsidiaries. The U.S. subsidiaries usually import SOD intermediates from the parent firms which, though duties must be paid, represents intracompany transfers giving the subsidiaries a competitive price advantage over the domestically-owned SOD producers which frequently must import part of their SOD intermediate needs from their foreign SOD competitors at market prices. In 1980, sales of SOD's by domestic subsidiaries of foreign firms accounted for over 38 percent (by value) of total U.S. SOD consumption. 4/ Imports accounted for another 12 percent.

The SOD-producing subsidiaries in the United States are owned primarily by West German and Swiss firms. There is also one SOD-producing subsidiary owned by a firm headquartered in the United Kingdom. These subsidiaries, together with the domestically-owned SOD firms, are encountering competition from other foreign nations, both in SOD's and SOD intermediates from Japan, India, and some Eastern European countries. For example, in 1979, these latter countries or areas accounted for 15 percent of U.S. imports by quantity compared to 7 percent in 1975. The cost to produce most SOD's in the United States exceeds production costs in Japan, India, and some Eastern European countries primarily due to higher labor costs which are a main factor in this labor intensive industry.

1/ Central Intelligence Agency, Economic and Energy Indicators, June 4, 1981, p. 11.

2/ Based on information developed during fieldwork.

3/ Ibid.

 $\overline{4}$ / Estimated from preliminary data reported to the U.S. International Trade Commission for 1980.

COMPETITIVENESS

The competitiveness of the world SOD industry is discussed in terms of the following economic indicators: productivity, R. & D. expenditures, marketing, world trade, and production costs. Each of these indicators is discussed in relation to the major world SOD producers: the United States, West Germany, Japan, the United Kingdom, and Switzerland. Where industry information regarding these factors were not available, data have been estimated and so noted. Additionally, marketing and distribution information, specifically from foreign SOD producers, was not available.

The following tabulation shows key indicators used to characterize the SOD industries:

	Average and rate,	nual growth 1975-79	:				1979	- - -			
Source	Production	Produc-	:	R. & D. expendi-		:	Ratio of				
	Froduction	tivity <u>1</u> /		: tures <u>2</u> /		: :	Exports to : Imports to imports :consumption				
	: :		:	Millio	n	:			:		
	Perc	ent	:	dollar	s	:		Pei	ccei	nt	
	•	1.1	:			:			:		
United States	6.6 :	1.1	:		12	:		147	:	12.3	
West Germany	14.0 :	12.9	:	· · · · · ·	60	:		438	:	23.1	
Japan	10.7 :	7.8	:		4	:		128	:	25.6	
United Kingdom	5.3 :	7.7	:		24	:		192	:	47.4	
Switzerland	8.1 :	8.1	:		76	:	3/	180	:	68.9	
	1		:			:			:		

1/ For a definition of productivity, see the "Competitiveness" section for the United States.

2/ R. & D. figures based on data developed during fieldwork.

3/ Estimated from table 15.

United States

The U.S. SOD industry remains the most productive of all the SOD producing nations, despite a steady decrease in productivity between 1976 and 1980. This decline is evident in relation to both labor and capital. Meanwhile, R. & D. expenditures have remained below those of other SODproducing nations while U.S. SOD labor costs have continued a steady climb. U.S. producers have attempted to improve their situation by improving services to customers. Although the United States exports a greater quantity of SOD's than are imported, there is a negative balance of trade in terms of value because of higher quality and higher priced SOD imports compared to the less expensive exported SOD's.

Productivity

The U.S. SOD industry had the highest output per worker during 1975-80 of all major SOD-producing countries. The productivity declined, however, from 36,400 pounds per worker in 1976 to a level of about 32,000 pounds per worker in 1980.

Between 1976 and 1980, the productivity index, based upon output per production worker (with the output in 1975=100) for the U.S. SOD industry declined by approximately 12 points, from 116 in 1976 to 104 in 1980, as shown in the following tabulation:

		Productivity indexes, 1975=100								
	Industry -	1976	:	1977	:	1978	:	1979	:	1980
U.S. U.S.	dye industry <u>1</u> /: chemical industry 2/:	115.9 116.0	::	114.7 109.7	::	110.0 107.7	:	104.6 108.3	:	103.6 108.6
	:	1	:		:		:	s	:	

1/ Employment data obtained from industry sources, see page 22; production, see table 1.

2/ "Facts and Figures for the Chemical Industry," <u>Chemical and Engineering</u> News, June 9, 1980, p. 65.

The productivity of the total U.S. chemical industry also declined by about 7 points from 116 in 1976 to 109 points in 1980. One reason for this decline in both SOD productivity and overall chemical productivity was the complacency of the U.S. industry owing to the protection of high tariffs. It failed to take effective action with regard to two aspects of foreign competitiveness: (1) the foreign SOD producers increased their sales in world markets and they had also re-entered the U.S. market by imports and by capital investment; and (2) the cost of U.S. feedstocks increased, thus reducing the economic advantage of the U.S. chemical industry relative to other world producers. These two factors--a decline in sales and a change in economic conditions--combined to create an adverse impact on productivity. 1/ Also, many of the U.S. manufacturing plants were very old; it was difficult and expensive to modify them to meet new environmental pollution standards.

In terms of unit output per dollar of total assets, the productivity of the U.S. SOD industry decreased 23 percent, from .65 pounds per dollar of assets in 1975 to .50 pounds per dollar in 1979, as shown in the following tabulation:

1/ "Becoming More Competitive in the 1980's," Chemical Purchasing, March 1981, p. 40.

Year	Output	: Total : assets 1/	:Unit output :per dollar
	Million	: Million	:
	pounds	: dollars	:
1975	206	: 316	: 0.65
1976:	256	: 344	: .74
1977:	264	: 501	: .53
1978:	251	: 568	: .44
1979:	266	: 537	: .50
•		:	:

1/ Total assets estimated from data developed during fieldwork.

However, productivity increased almost 14 percent between 1978 and 1979, compared to a concurrent increase of 7 percent for the entire U.S. chemical industry.

R. & D. expenditures

During 1975-79, the domestic SOD industry is estimated to have spent less than 2 percent of net sales on R. & D., or about \$12 million in 1979. 1/ In comparison, during the same period the U.S. industrial organic chemical industry spent between 2 and 3 percent of its total sales on R. & D. 2/ Thus, the SOD industry reflects the trend in R. & D. investments of the U.S. chemical industry.

Industry sources reported 3/ that the U.S. SOD industry invested less annually on R. & D. in current dollars than West Germany, Switzerland, or the United Kingdom during 1975-79. SOD producers in the European countries are estimated to have spent between 4 and 8 percent of their total sales during this period. Although data on R. & D. expenditures for the Japanese SOD industry were not available, it is estimated that R. & D investment is no less than 2 percent of the Japanese industry's total sales. 4/

The principal objectives of the U.S. industry's R. & D. program is the improvement of SOD's and expansion of SOD markets. Foreign producers, especially the West Germans and the Swiss, tend to concentrate on the development of new dye molecules superior in overall quality to the older products. The U.S. SOD producers attribute their lack of basic research to the high risk factor involved in this activity. Large amounts of capital must

1/	Based on	information	developed during	fieldwork.
2/	"Facts &	Figures for	Chemical R & D,"	Chemical and Engineering News,
1	20 1020	- EQ		

July 28, 1980, p. 58.

3/ "The European Inroads into U.S. Dyestuff," . . ., p. 47.

4/ Based on information developed during fieldwork.

be committed to a product of unknown commercial value. In an industry with small profits and limited capital, this high-risk area of investment is not accorded a high priority.

Marketing

The SOD producer employs various methods of promotion, using sales and technical representatives who have expertise in textiles, and who possess a good rapport with clients. SOD's are also promoted through advertising in trade journals. Because of the high standard of quality throughout the industry, sales are often determined by factors other than quality. As an added service, the producer will often assist buyers in determining the most efficient dyeing methods for their products. The technical assistance rendered to a buyer by an SOD producer often accounts for the sale of a particular SOD.

Price relationships.--The prices of SOD's in the United States have been increasing steadily in recent years. During 1975-79, prices climbed almost 45 percent, faster than all chemical prices as shown in the following tabulation:

	Price indexes 1975=100										
Industry -	1976	:	1977	:	1978	:	1979				
:		:		:	- the standard - the spray - sp	:					
U.S. SOD industry 1/:	108.8	:	118.9	:	138.2	:	144.7				
U.S. chemical industry 2/:	103.3	:	106.3	:	109.7	:	122.6				
West German SOD industry 3/:	94.2	:	93.7	:	93.8	:	96.6				
Japanese SOD industry 3/:	120.1	:	108.6	:	100.4	:	116.8				
British SOD industry 37:	102.2	:	118.3	:	138.7	:	144.2				
Swiss SOD industry 4/:	96.6	:	98.3	:	84.8	:	81.0				
-		:		:		:					

1/ Based on unit value derived from sales quantity and value.

 $\overline{2}$ / "Facts and Figures for the Chemical Industry," . . ., p. 45.

 $\overline{3}$ / Refer to tables 4, 7 and 10 for the unit values of production for West Germany, Japan and the United Kingdom, respectively.

4/ Prices based on unit value of exports.

Sales.--Between 1975 and 1979, U.S. SOD sales increased by almost 67 percent, compared to the 66 percent increase in sales of all chemicals and allied products. 1/ Sales value of SOD's rose from \$476 million, in 1975, to \$797 million in 1979. During the same period, sales quantity increased only 15 percent, from 209 million pounds in 1975 to 241 million pounds, in 1979.

Although 1980 data for U.S. SOD sales were not yet available, sales quantity in that year is estimated by industry sources to have declined from

1/ "Facts and Figures for the Chemical Industry," . . ., p. 45.

1979. This decrease in SOD sales was due primarily to the recession in sales of textiles and other commodities which use SOD's. 1/

World trade

The United States is the largest consumer of SOD's in the world. In 1979, the United States accounted for about 22 percent of the \$4.5 billion world SOD market. 2/

<u>Imports</u>.--Between 1975 and 1980, the ratio of U.S. SOD imports to consumption, in terms of value, increased from approximately 12 percent in 1975 to about 19 percent in 1980. In terms of quantity, the imports-toconsumption ratio increased from 10 percent in 1975 to about 13 percent in 1978. In 1980, the ratio declined to less than 12 percent as shown in table 1.

The United States has the lowest ratio of imports to consumption compared with other large consumer coutries, as shown in the following tabulation:

(In percent)										r	
Country	1975	:	1976	: :.	1977	:	1978	:	1979	:	1980
:		:		:		:				:	
United States:	9.77	:	11.80	:	11.90	:	12.53	:	12.31	:	11.81
West Germany:	30.7	:	20.2	:	29.4	:	21.3	:	23.1	:	20.7
Switzerland:	58.1	:	57.4	:	60.2	:	66.2	:	68.9	:	71.5
United Kingdom:	55.0	:	57.0	:	60.1	:	43.4	:	47.4	:	40.5
Japan:	19.7	:	22.8	:	18.1	:	20.8	:	25.6	:	18.1
:		:		:		:		:		:	

In 1979, subsidiaries of West German, Swiss, and British companies in the United States sold more than \$323 million of SOD's in the United States, accounting for a 34 percent share of apparent domestic consumption.

In 1980, principal sources of U.S. SOD imports were West Germany, Switzerland, Japan, and the United Kingdom, as shown in table 2. These four countries accounted for over 82 percent of total SOD imports in that year.

Exports.--During 1975-80, U.S. SOD exports increased almost 8 percent, from 37 million pounds in 1975 to 40 million pounds in 1980. A decline between 1977 and 1980 of 7 million pounds is attributed to depressed sales of textiles in 1978 and again in 1980. In terms of value, U.S. SOD exports during 1975-80 accounted for approximately 10-11 percent of domestic production. 3/

1/ Union Bank of Switzerland, Economic Survey of Switzerland, 1980, January 1981, p. 54.

2/ "DuPont to Sell 80 percent of its Dyes Business," Chemical and Engineering News, December 10, 1979, p. 8. 3/ See table 1, for additional details.
In 1980, the principal markets for U.S. SOD exports were Canada, Hong Kong, Brazil, Taiwan, and the United Kingdom as shown in table 3. These markets accounted for about 47 percent of all U.S. SOD exports in that year. The U.S. share of these export markets in 1979 (excluding the United Kingdom) is compared with the shares of West Germany, Switzerland, the United Kingdom, and Japan in the following tabulation: $\underline{1}/$

(In perce	en	t)						
	Brazil	:	Canada	:	Hong Kong	:	Korea	:	Taiwan
		:	18 F	:		:	())	:	
United States:	8.5	:	36.5	:	3.6	:	14.5	:	9.6
West Germany:	38.7	:	37.0	:	30.5	:	22.0	:	27.4
Switzerland:	32.4	:	1/	:	21.3	:	17.1	:	1/
United Kingdom:	7.0	:	9.8	:	13.0	:	7.1	:	11.7
Japan:	2.7	:	1.0	:	12.0	:	35.2	:	50.5
		:		:		:		:	

1/ Not available.

Production costs

<u>Raw materials</u>.--The U.S. SOD producers obtain their raw materials from domestic producers of SOD intermediates as well as from German and Swiss sources. There is only minor variation in prices worldwide. However, there is a competitive advantage for the U.S. subsidiaries of West German companies whose raw materials are supplied by the parent firm. These shipments are often at values well below the market price of these SOD intermediates.

Labor.--In 1980, the average wages of a U.S. production worker were estimated to be \$20,000. This was an increase of approximately 9 percent from the average wages of \$18,000 in 1979. During 1975-79, the unit labor cost for the domestic SOD industry increased at a higher rate than that of the entire chemical industry. In that period, the unit labor cost index for the SOD industry jumped 39 points while the index for the chemical industry rose only 10 points, as shown in the following tabulation:

	Unit labor cost indexes, 1975=100								
Industry	1976	1977	1978	1979					
U.S. SOD <u>1</u> /: U.S. chemicals <u>2</u> /:	98.8 99.3	105.7 102.1	: 125.6 : 106.7	: : 138.7 : 110.5					

2/ "Facts and Figures for the Chemical Industry," . . ., p. 65.

1/ U.S. Department of Commerce, Market Share Reports, 1979, 1981.

The increase in the unit labor cost is greater for the SOD industry partly because of the specialized methods which the worker must employ in SOD production.

The unit labor cost for 1980 was estimated to be about 62 cents per pound for the SOD industry, about a 2 percent increase from the previous year. This unit labor cost increase was well below the 13 percent rate of inflation in 1980.

<u>Capital investment</u>.--According to industry sources, the annual growth of capital expenditures for the SOD industry has exceeded that of the entire chemical industry as shown in the following tabulation:

	: Industry	Capital expenditures indexes, 1975=100								
		1976	:	1977	:	1978	:	1979		
U.S.	SOD industry <u>1</u> /:	110	:	159	:	307	:	170		
U.S.	chemical industry <u>2</u> /:	107	:	109	:	114	:	137		

1/ Based on data developed during fieldwork.

2/ "Facts and Figures for the Chemical Industry," . . ., p. 48.

During 1975-79, the index of capital expenditures of the SOD industry rose sharply to 307 points in 1978 and then fell to 170 points in 1979. The increase in capital expenditures in the SOD industry in 1978 was mainly owing to large investments by foreign firms in the United States, both for new plants and equipment and also for the acquisitions of existing plants. In contrast, capital expenditures for the chemical industry grew steadily to 137 points in 1979.

West Germany

The West German SOD industry has been growing steadily over the past 6 years, increasing its labor force, and concurrently increasing its productivity. West German R. & D. expenditures, already among the highest of producing nations, have also continued to increase in proportion to sales. West Germany continued to enjoy an extremely favorable balance of trade; exports exceeded imports in quantity by a factor of about four and in value by a factor of close to six. West Germany also has raw material advantages over other countries, as West Germany supplies SOD intermediates to the remainder of the world SOD producers.

Productivity

During 1975-77, productivity in the West German chemical industry apparently increased in terms of output per worker. The 1975 output per worker of 135,270 Deutsche mark (DM) (\$55,095) increased by 43 percent to DM 193,166 (\$83,214) in 1977. <u>1</u>/ Data are not available for later years.

During 1975-79, total employment in the West German chemical industry grew by 4 percent, from 462,000 employees in 1975 to 481,000 employees in 1979. Similar statistics are not separately available for the SOD industry. However, in the same period, production of SOD's increased nearly 69 percent from 191 million pounds in 1975 to 323 million pounds in 1979, as shown in table 4. Productivity has varied as shown in the following tabulation:

Year :		Production <u>1</u> /	: :	SOD production workers 2/	:::::::::::::::::::::::::::::::::::::::	Ratio of production to labor	::	Produ in	ctivity dex
	:	1,000 pounds	:		:	· · · · · · · · · · · · · · · · · · ·	:		
	:		:		:		:		
1975	:	191,491	:	12,618	:	15,180	:		100
1976	:	331, 317	:	12,743	:	26,000	:		171.3
1977	:	297,280	:	12,869	:	23,100	:		152.2
1978	:	299, 518	:	13,006	:	23,030	:		151.7
1979	:	323,137	:	13,125	:	24,620	:		162.2
1980	:	300,000	:	<u>3</u> / 13,125	:	22,860	:		150.6
	:		:		:		:		

1/ See table 4.

2/ Estimated from "Facts and Figures for the Chemical Industry," . . ., p. 74, and from the U.N.'s <u>Yearbook of Industrial Statistics</u>, General <u>Industrial</u> Statistics, 1978, . . ., p. 180.

3/ Estimated from information developed during fieldwork.

The economic downturn in 1975 affected the entire West German chemical industry 2/ including the production of SOD's which was down 41 percent from the 1974 level of 326 million pounds. However, in 1976 the production of SOD's climbed to a record level of 331 million pounds. Although official production data for 1980 are not available, SOD production is believed to have dropped about 7 percent from the previous year to 300 million pounds. 3/

1/ United Nations, Yearbook of Industrial Statistics, General Industrial Statistics, 1978, . . , p. 179.

2/ "Outlook Clouds for Color Chemicals Business," . . ., p. 16. 3/ Based on data developed during fieldwork.

R. & D. expenditures

Expenditures on R. & D. continued to increase for all segments of the West German chemical industry from 1975 to 1979. In 1975, R. & D. spending totalled \$903 million, but it more than doubled to \$1,814 million by 1979. 1/ The industry has devoted from 3.5 percent to 4.5 percent of its annual sales to R. & D. for the past decade. Industry sources estimate that individual SOD producers in West Germany do not vary much from the industry average. In 1979, R. & D. expenditures for the West German SOD industry were estimated to total about \$60 million. 2/ In 1980, R. & D. expenditures are estimated to have increased only slightly, if at all, from the 1979 level. 3/

World trade

Imports.--West German SOD apparent consumption totaled about 182 million pounds in 1979, with imports accounting for approximately 23 percent of consumption. During 1975-79, the volume of SOD imports increased at an average annual rate of 11.6 percent, as shown in table 5. From 1975 to 1977, SOD imports increased from almost 27 million pounds to about 54 million pounds; they decreased, however, to 36 million pounds in 1978 owing mostly to the European textile industry slump, but imports increased again in 1979, reaching 42 million pounds as the European textile market regained its vigor. Estimates for 1980 indicate a decline in SOD imports of 7 percent from 1979, or to less than 40 million pounds.

In terms of value, SOD imports into West Germany followed the same trend as quantity of imports, increasing from DM 188 million (\$76.6 million) in 1975 to DM 274 million (\$118 million) in 1977, then declining in 1978 to DM 265 million (\$132 million) but rising again in 1979 to more than DM 314 million (\$171 million). Estimates for 1980 indicate a small decrease of about 1.4 percent in value of imports from 1979.

Although West Germany is very strong in its production of SOD's, nonetheless it cannot fully satisfy every aspect of its domestic SOD market. 4/ Therefore, certain imports, mainly shades of colors not produced domestically, are necessary. Its major SOD suppliers have been the United Kingdom, France, Switzerland, and Italy. These major suppliers in the aggregate accounted for over 66 percent, in terms of quantity, and approximately 77 percent, in terms of value, of West Germany's SOD imports in 1979.

Exports.--West German exports of SOD's annually averaged more than 57 percent of production. During 1975-79, exports increased at an average annual rate of 9 percent as shown in table 6. Exports increased sharply from 130 million pounds in 1975 to more than 180 million pounds in 1976; then they

^{1/ &}quot;Facts and Figures for the Chemical Industry," . . ., p. 74.

 $[\]overline{2}$ / Based on information developed during fieldwork.

^{3/} Ibid.

 $[\]overline{4}$ / No country can economically afford to make all the known dyes; therefore, imports are essential even in the most progressive SOD-producing nations.

decreased to 166 million pounds in 1977, and then increased again to more than 183 million pounds in 1979. In 1980, exports were estimated to have totalled less than 152 million pounds or 17 percent less than in the previous year.

In terms of value, exports increased at a rate of 10 percent per year, in terms of DM, from DM 1,290 million (\$525 million) in 1975 to DM 1,884 million (\$1,027 million) in 1979. In 1980, however, the estimated value showed a decline of 11 percent to DM 1,681 million (\$926 million).

West Germany is the major supplier to most of the European Economic Community countries, such as the United Kingdom, France and Italy. In addition, West Germany controls sizable markets in the United States and in Japan. These 5 markets account for over 39 percent of the volume of West German SOD exports. Furthermore, West Germany is very export-competitive in other SOD markets such as Canada, Taiwan, Brazil, Hong Kong, and South Korea.

Production costs

Raw materials.--It is estimated by industry sources that 33 percent of the annual consumption of basic raw materials used in the manufacture of SOD's in West Germany is coal-tar based. 1/ This made the SOD industry the largest consumer of coal-tar based chemicals. The remainder of the SOD raw materials come from petroleum which is the usual source of the raw materials used by the world's SOD industries. Overall production costs for SOD's were not available as they are considered confidential data by these firms.

Labor.--The average hourly wage for a chemical worker was DM 11.99 (\$4.88) in 1976, and it increased to DM 14.15 (\$7.72) in 1979 or by 18 percent in terms of DM. 2/ Although this represents the hourly wage for the chemical industry as a whole, it is also believed representative of the hourly wage in the SOD industry. However, U.S. industry sources believe that the SOD worker in West Germany may be paid above the average wage as this worker is among the more skilled in the industry. The sophistication involved in batch process manufacturing of SOD's requires a more skilled worker than for chemicals in general. 3/ In 1980, the hourly wage was estimated to have reached DM 14.90 (\$8.21). In terms of annual income, the average chemical production worker in West Germany earned about DM 32,154 (about \$17,700) in 1980. 4/

Japan

Japanese SOD producers increased their output by more than 50 percent during 1975-1979, while productivity increased concurrently by 35 percent. From 1975 to 1976, unit values of the SOD's increased both in terms of the domestic currency and in U.S. dollars. However, by 1979, the variable

1/	European	Chemical	News,	August	4.	1978,	p.	23.	
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2/ Wirstschaft und Statistik, Statistisches Bundesamt Wiesbaden, February 1981, p. 123.

3/ Based on information developed during field work.

4/ Wirstschaft und Statistik, . . ., p. 123.

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currency exchange rates caused the value of SOD production to decline in terms of the domestic currency, while increasing in terms of U.S. dollars. Japan is now attempting to develop new SOD's, through increased R. & D., which would be competitive with the West German SOD's. Japan currently enjoys a favorable balance of trade, in terms of both quantity and value, despite increasing production costs.

Productivity

The SOD production output per employee in Japan for 1979 was about 12 thousand pounds per production worker. Actual 1979 production increased by more than 50 percent, from 88 million pounds in 1975 to 132 million pounds in 1979. Although employment for all chemical producers in Japan declined by 12 percent 1/ during 1977-79, employment in the SOD industry is estimated to have increased as shown in the following tabulation:

Year	Production $\underline{1}/$::	SOD production workers 2/	: : :	Ratio of production to labor	::	Productivity index
:	1,000 pounds	:		:		:	
:		:		:		:	
1975:	87,859	:	10,000	:	8,780	:	100.0
1976:	113,859	:	10,000	:	11,270	:	128.4
1977:	119,046	:	10,800	:	11,020	:	131.2
1978:	119,645	:	10,900	:	10,980	:	125.1
1979:	131,987	:	11,100	:	11,890	:	135.4
1980:	92,300	:	3/ 11,100	:	8,320	:	94.8
:		:	-	:		:	

1/ See table 7.

2/ 1975-77, estimated from Japan Economic Yearbook, 1977/78, 1977, pp. 207 and 226, while 1978 and 1979 were estimated from "Facts and Figures for the Chemical Industry," . . ., p. 80.

3/ Estimated from data developed during fieldwork.

R. & D. expenditures

The major Japanese SOD-producing companies annually invest an estimated 2 percent of their total sales in R. & D. There is no evidence that they are subsidized by their government in this respect.

Japan's R. & D. program for SOD's is reported to be focused on developing a better understanding of the mechanisms of SOD usage, with a special emphasis on the reactive SOD's. 2/ Trade sources believe that Japan wants to develop a product line of high quality reactive SOD's in order to reduce imports of those particular products.

1/ "Synthetic Dye Imports Continue to be High," Japan Chemical Week, Sept. 4, 1980, p. 28.

2/ "Dye Makers Say 'Wait Until Next Year'," Chemical Week, Feb. 8, 1978, p. 28.

Marketing

The average value per pound of Japanese SOD's increased almost 13 percent, from 816 yen (\$2.75) per pound in 1975 to 919 yen (\$3.10) per pound in 1976. There were further price increases of 15 percent in 1977, and an additional 10 percent increase in 1978. However, the Japanese unit value declined to 779 yen (\$3.73) per pound in 1978. It then increased to 791 yen (\$3.62), or by 1.5 percent in 1979 (table 7). In 1980, domestic sales of SOD's totaled approximately 51 billion yen (\$226 million). 1/

World trade

Imports.--Imports of SOD's increased irregularly by 110 percent during 1975-79, going from 15 million pounds in 1975 to 32 million pounds in 1979, as shown in table 8. In 1980, imports of SOD's declined because of slumping demand for textiles, the largest industrial consumer of SOD's. In terms of value, SOD imports showed an irregular growth trend similar to that of import volume; the average rate of growth during 1975-79 was 16 percent per year.

In terms of unit value, Japanese SOD imports increased about 3 percent from 1,136 yen (\$3.83) per pound in 1975 to 1,165 yen (\$4.35) per pound in 1977. Since then, the unit value of Japanese SOD imports has dropped by more than 15 percent to 986 yen (\$4.52) per pound in 1979. The unit value of SOD imports for 1980 was greater than in the previous year according to data for January-November 1980.

The principal sources of imported SOD's for Japan are West Germany, the United Kingdom, Switzerland, and the United States (table 8). Together these four suppliers provided Japan with about 30 percent of its domestic market requirements in 1980. The majority of the SOD imports find their way into high-valued products which require certain sophisticated SOD's not domestically available.

Exports.--Japanese exports of SOD's increased steadily during 1975-79. In 1975, exports totalled about 26 million pounds, growing to about 40 million pounds in 1979, or by 53 percent, as shown in table 9. This represents an annual growth rate of 11 percent.

During 1975-79, the value of exports increased by almost 27 percent from over 22 billion yen (\$74 million) in 1975 to 33 billion yen (\$151 million) in 1979. The value of exports is projected to have dropped in 1980 to 31 billion yen (\$137 million). The average unit value of exports decreased from 846 yen (\$2.85) per pound in 1975 to 818 yen (\$3.75) per pound in 1979, a decrease of 3 percent. Data available for the first 11 months of 1980 indicate an increase in the SOD export unit value.

/ "Synthetic Dye Imports Continue to be High," . . . , p. 28.

Japan has taken advantage of its proximity to the sizeable markets in neighboring Asian countries to become the major SOD exporter to this region. The principal foreign markets for Japan's SOD's include Hong Kong, Indonesia, South Korea, and Taiwan (table 9). These markets accounted for 41 percent of Japan's total SOD exports by value in 1979. Japan competes with the United States, West Germany, Switzerland, and the United Kingdom for the SOD markets in these Asian nations.

Production costs

Labor.--The cost of labor in the SOD industry of Japan is estimated to have been just over 33 billion yen (\$123 billion) in 1977. 1/ In terms of hourly wages, for an estimated 10,000 employees, which includes an unknown number of workers employed in SOD intermediate production, the rate was about 1,470 yen (\$5.49) per hour or close to about 3.06 million yen (\$11,427) per employee per year. This rate compares with salaries of approximately \$15,000 in the United States in 1977.

<u>Capital.--Capital expenditures supporting SOD production are estimated at</u> more than 33 billion yen (\$111 million) for 1976 and for 1977. 2/ It is believed that most of these funds were used for pollution control equipment.

The United Kingdom

The production of SOD's in the United Kingdom has been increasing irregularly over the past 6 years, despite a decline in the number of production workers. In recent years, the United Kingdom has devoted 5 percent of its annual SOD sales revenue to R. & D. in an effort to improve its market position. Sales of the United Kingdom's SOD's increased by 20 percent during 1975-79, although there was an apparent decline in 1980. The United Kingdom has maintained a positive trade balance in SOD's, although the margin narrowed by 25 percent during 1975-1980. Since 1975, production costs and other capital expenditures have increased steadily in terms of current pounds sterling.

Productivity

The SOD industry in the United Kingdom increased its output per worker during 1975-1980. During this period, production increased from 95 million pounds in 1975 to 110 million pounds in 1980, as shown in table 10. During the same period, the SOD labor force decreased from an estimated 9,000

1/ Japan Economic Yearbook, 1977/78, Japan, August 1977, p. 206.
2/ "Dye Makers Say 'Wait Until Next Year'," . . ., p. 29.

production workers in 1975, to an estimated 7,900 in 1980. 1/ As a result SOD production per worker increased from 10,560 pounds in 1975 to 13,920 pounds in 1980.

:	ng nan dar dara separat dara serang na serang s	:	SOD	:	Ratio of	:	Desaluationities
Year :	Production 1/	:	production	:	production	:	roductivity
:	-	:	workers 2/	:	to worker	:	Index
:	1,000 pounds	:	1. Sec 19 - 19	:		:	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -
:		:		:		:	
1975:	95,040	:	9,000	:	10,560	:	100.0
1976:	114,400	:	8,800	:	13,000	:	123.1
1977:	118,140	:	8,600	:	13,740	:	130.1
1978:	106,260	:	7,900	:	13,450	:	127.4
1979:	116,600	:	8,200	:	14,220	:	135.7
1980:	110,000	:	7,900	:	13,920	:	131.8
:		:		:		:	

1/ See table 10.

2/ Estimated from Annual Abstract Statistics, 1981 Edition, Central Statistical Office, p. 152.

R. & D. expenditures

It is estimated that the SOD industry in the United Kingdom devotes about 5 percent of its annual SOD sales to R. & D. 2/ Further, it is believed by industry sources that the British SOD industry does not receive any subsidies from its Government. In 1979, the SOD industry in the United Kingdom spent about ±11.5 million (\$24.4 million) on R. & D. or 60 percent more than the ±7.2 million (\$16.0 million) expended in 1975. 3/ By comparison, R. & D. for all chemicals in the United Kingdom is estimated to have increased by more than 70 percent during this period. 4/

Marketing

Price relationships.--The average unit value of sales for SOD's in the United Kingdom increased during 1975-79 (table 10). During that period, the price for SODs increased by 44 percent in pounds sterling, reflecting the steady rise from ±1.41 (\$3.13) in 1975 to ±2.03 (\$4.31) in 1979. However, this average unit value represents a wide range of actual values, including the values of higher quality, newer SOD products.

1/ Although the batch process used to produce SOD's is not as efficient as the continuous process (e.g., used in manufacture of polyethylene resins), it has been possible to modify the batch process to be more capital- and less labor-intensive. For example, computers are now used to determine when a dye has reached the proper shade; this eliminates the trial-and-error process of human judgment.

2/ Based on data developed during fieldwork.

3/ Estimated from Annual Abstract of Statistics, Central Statistical Office, London, England, 1981, p. 306 and 307.

4/ Ibid.

Sales.--United Kingdom sales of SOD's, in terms of quantity, are estimated to have increased during 1975-79. During that period, sales increased more than 20 percent from 94 million pounds in 1975 to about 113 million pounds in 1979. 1/ The value of sales are not available for this period. Data for 1980 were not available, but sales are believed to have declined slightly from 1979.

World trade

Imports.--In 1979, SOD imports into the United Kingdom supplied more than 47 percent of domestic consumption. During 1975-80, SOD imports, increased irregularly from 23 million pounds in 1975 to 28 million pounds in 1980, as shown in table 11. For the same period, the value of SOD imports also increased irregularly, from ±56 million (\$124 million) in 1975 to ±58 million (\$135 million) in 1980.

The British textile market, like those in other developed countries, offers a wide variety of sophisticated and expensive goods. Therefore, it requires the type and quality of SOD's available principally from the major SOD-producing countries.

The major sources of SOD imports to the United Kingdom from 1975 through 1980 were West Germany, Switzerland, France, and the United States (table 11). These four suppliers accounted for 78 percent in terms of quantity, and 84 percent in terms of value, of SOD's imported into the United Kingdom in 1980. The single most important source was West Germany which supplied 38 percent of the total quantity and 41 percent of the total value of all imported SOD's.

Exports.--The United Kingdom's SOD exports supplied approximately 9 percent of the world market in terms of volume in 1979. These exports accounted for 63 percent of British SOD production that year. The high ratio of exports to production is due in part to the proximity of the United Kingdom to important markets in Europe and to membership in the European Economic Community. During 1975-79, the United Kingdom's SOD exports decreased from 76 million pounds to 74 million pounds as shown in table 12. Exports in 1980 further decreased by 6 percent from 1979, to about 69 million pounds. This downturn is further evidence of the weakened textile market in Europe. In terms of value, these exports increased from about ±96 million (\$213 million) in 1975 to more than ±130 million (\$302 million) in 1980, or by 37 percent.

The major SOD markets for the United Kingdom are Switzerland, West Germany, the Netherlands, France, and Italy (table 12). These markets accounted for almost 37 percent in terms of quantity, and for about 35 percent in terms of value, of all British SOD exports. Additional significant SOD markets for the United Kingdom since 1975 include Canada, Taiwan, Brazil, Hong Kong, and South Korea.

1/ Estimated from production figures in table 10. Also see "Outlook Clouds for Color Chemical Business," . . ., p. 16.

Production costs

The production costs include both SOD's and pigments and are limited to the cost of raw materials, labor, and capital expenditures. Raw materials cost SOD producers ± 179 million (\$343 million) in 1978. 1/ Labor costs increased by 41 percent from ± 70.4 million (\$156 million) in 1975, to ± 99.2 million (\$190 million) in 1978. By comparison, labor costs for all chemicals increased 26 percent, from ± 839 million (\$1,864 million) in 1975 to $\pm 1,057$ million (\$2,028 million) in 1978. Capital expenditures on new buildings, on land, and on plant and machinery also increased during the same period. In 1975, capital expenditures totalled ± 35.7 million (\$79 million), but by 1978, that sum had more than doubled to ± 81.7 million (\$157 million). Although official data for 1980 are not available, the United Kingdom SOD companies are believed to have increased their capital expenditures in 1980 by as much as 4 percent from 1978 to ± 84.9 million (\$197 million). 2/

Switzerland

The production of SOD's in Switzerland increased irregularly during 1976-80. The quantity of SOD's produced in 1980 reflected a decline of approximately 8 percent from the peak production in 1979. During this period, however, the Swiss SOD industry maintained a constant level of production workers. Switzerland expends a larger percentage of its sales revenue, 8 percent, for R. & D. than any other country discussed. In reference to international trade, the Swiss export nearly 80 percent of their domestic product. As a result, the Swiss have a positive balance of trade regarding SOD's; there is a larger margin in terms of value as Swiss SOD exports are generally more expensive than the SOD's imported by Swiss textile manufacturers and other SOD customers.

Productivity

In 1980, estimated output per employee for the Swiss SOD industry was about 11,000 pounds, as estimated from data shown in the following tabulation:

Year	Production	:	SOD production workers 1/	::	Ratio of production to worker	:	Produc	tivity lex
	1,000 pounds	:		:	а а а	:		
· · · · · · · · · · · · · · · · · · ·	6	:		:		:		
1975:	66,000	:	7,500	:	8,800	:		100.0
1976:	79,000	:	7,500	:	10,533	:		119.7
1977:	78,500	:	7,500	:	10,469	:		118.9
1978:	81,000	:	7,500	:	10,800	:		122.7
1979:	90,000	:	7,500	:	12,000	:		136.4
1980:	82,000	:	7,500	:	10,933	•		124.2
:		:		:		:		- /

1/ Estimated from the 1979 annual reports of Ciba-Geigy and Sandoz.

/ This is the only year for which these data are available. / Based on information developed during fieldwork. After the 20 percent increase in production volume from 1975 to 1976, growth slowed considerably. During 1976-80, the production of SOD's increased from approximately 79 million pounds to 82 million pounds, or less than 4 percent. Worker productivity also stagnated during 1976-80, also increasing only by 4 percent.

R. & D. expenditures

There is no evidence that the Swiss government subsidizes any aspect of R. & D., either for SOD's or for other chemicals. Therefore, it is believed that the Swiss SOD industry obtains most of the funds for R. & D. from retained earnings. These funds in 1979 accounted for approximately 8 percent of sales or S.Fr. 127 million (\$76 million). R. & D. expenditures on SOD's accounted for about 25 percent of all the R. & D. expenditures of the SOD companies in Switzerland in 1979.

The reported main objective of the Swiss R. & D. on SOD's has been to improve the application and cost effectivess of products, and to lessen their environmental impact.

Marketing

Price relationships.--In 1980, export prices for SOD's increased by about 4.5 percent from the previous year (table 15) as opposed to a 1.3 percent average increase in export prices for all chemical products. <u>1</u>/ During 1979, export prices of all chemical products had increased by more than 10 percent. <u>2</u>/

Sales.--In Switzerland, sales of SOD's are believed to have increased by about 7 percent from an estimated S.Fr. 1.5 billion (\$844 million) in 1978 to S.Fr. 1.6 billion (\$962 million) 3/ in 1979. This increase is greater than the 4.2 percent increase in sales of chemicals for the entire Swiss chemical industry during the same period. 4/

World trade

Imports.--During 1975-80, Swiss imports of SOD's increased by 110 percent from 20 million pounds in 1975 to more than 42 million pounds in 1980 (table 14). However, an undetermined amount of SOD imports are actually re-exported. Therefore, since exports have been adjusted, the imports-to-consumption ratio is 72 percent as shown in table 13. In contrast to the United States which is a final consumer only, Switzerland imports, modifies, and re-exports SOD's.

1/	Economic Surve	y of Switzerland,	1980,, p. 53.	
2/	Union Suisse d	u Commerce et de	1'Industrie, 1979/80,	Switzerland, August

1980, p. 202.

3/ Estimated from the 1979 annual reports of Ciba-Geigy and Sandoz.

4/ Economic Survey of Switzerland, 1980, . . ., p. 53.

In addition, the Swiss market is less than one-fifth the size of the United States market and foreign subsidiaries do not control their domestic market. In terms of value, imports increased by 91 percent from S.Fr. 196 million (\$76 million) in 1975 to over S.Fr. 375 million (\$224 million) in 1980. During the same period, however, the average unit value of these imports actually decreased by about 6 percent, from S.Fr. 9.61 (\$3.72) per pound in 1975, to S.Fr. 9.08 (\$5.42) per pound in 1980.

The major suppliers of SOD's for the Swiss during 1975-80 were West Germany, France, the United Kingdom, and Spain (table 14). In terms of quantity, these sources accounted for about 90 percent of Swiss SOD imports in 1980.

Exports.--It is estimated that exports annually accounted for nearly 80 percent of Swiss SOD production during 1975-80 (table 13). During this period, Swiss SOD exports increased at an average rate of growth of about 5.4 percent per year in terms of quantity, and increased by almost 2 percent per year in terms of value (table 15). Exports increased from 73 million pounds in 1975 to about 105 million pounds in 1979, but declined to less than 96 million pounds in 1980. Similarly, the value of exports also followed an oscillating trend, from S.Fr. 1.1 billion (\$426 million) in 1975, to a peak value of S.Fr. 1.4 billion (\$560 million) in 1976, but then declined steadily to S.Fr. 1.2 billion (\$716 million) in 1980.

Exports have decreased steadily in average unit value over the past 6 years from S.Fr. 14.88 (\$5.76) per pound in 1975 to S.Fr. 12.59 (\$7.52) per pound in 1980, or at an average annual rate of decrease of 3.4 percent in terms of Swiss francs. During this period, commodity-type SOD's accounted for an increasing share of exports. Swiss SOD producers are especially competitive worldwide in disperse SOD's.

The principal foreign markets for the Swiss are West Germany, France, the United Kingdom, Japan, and the United States (table 15). In 1980, these markets accounted for 37 percent of all Swiss SOD exports, in terms of both quantity and value. Other SOD markets in which Switzerland competes effectively because of its large variety of SOD's and customer liaison <u>1</u>/ include Hong Kong, Brazil, and South Korea.

Production costs

<u>Raw materials</u>.--Like most other SOD-producing countries in the world, Switzerland is dependent on West Germany for most of its SOD intermediates. However, in 1979, certain Swiss companies established a local joint venture with a West German firm for the production of certain SOD intermediates. 2/ This will enable these firms to supply themselves with these products at reduced costs. It is believed that the Swiss SOD producers will continue to depend on West Germany for the bulk of their SOD intermediate needs.

 $\frac{1}{2}$ Based on data developed during fieldwork. $\frac{1}{2}$ Chemical Week, January 28, 1981, p. 47. Labor.--In Switzerland, total wages for the chemical industry were S.Fr. 2,192 million (\$1,318 million) and the average employee earned about S.Fr. 16.93 (\$10.18) per hour in 1979, or an increase in wages of nearly 3 percent over the previous year. 1/ For the SOD industry, trade sources estimate that in 1979 total wages were S.Fr. 304.8 million (\$183 million), or S.Fr. 19.54 (\$11.75) per hour per employee.

<u>Capital</u>.--Capital investment in 1979 is believed to have increased by about 10 percent from 1978. Approximately 65 percent of the capital investment reportedly went into replacement of production equipment and pollution control. Although data for 1980 were not available, it is believed capital expenditures either remained constant, or slightly increased from the levels of the previous year. 2/

Other Countries

This section was compiled from data available on SOD producers considered by U.S. industry sources to have the capacity to export SOD's in large quantities. Such producers are located primarily in developing countries, such as India, Brazil, and South Korea; SOD producers in the Communist bloc are located primarily in Poland and the People's Republic of China (PRC). However, domestic industry sources also believe that most of the SOD producers located in these countries or regions do not presently possess sufficient sophisticated technology to be highly competitive.

In most of the Communist bloc countries, and in certain developing countries, the Government subsidizes most of the R. & D. In other cases, a developing country will restrict the growth of certain end-products which in turn limits the growth of the SOD production. For example, India imposes a limit on the production growth of textiles which limits expansion of the domestic SOD market and in turn, limits production growth.

The average unit values of SOD's are generally less in developing and Communist countries mainly because of lower costs. For example, in 1978 the average unit value of SOD's in India was approximately 23.07 rupees (RS.) (\$2.87) per pound; <u>3</u>/ thus, exports of their SOD's compete effectively in certain markets where price is the deciding factor, particularly since their prices have not increased as rapidly as the prices of other leading SODproducing nations, such as the United States.

The countries of the Communist bloc, together with Brazil, South Korea, and India, accounted for about 860 million pounds of the world demand for

3/ Commerce India, April 22, 1978, p. 1 and 3.

^{1/} Estimated from the 1979 annual reports of Ciba-Geigy and Sandoz.

 $[\]overline{2}$ / Based on information developed during fieldwork.

SOD's, in 1977 or roughly 45 percent of the world total. 1/ In some countries, such as the PRC, domestic production accounts for almost all of their consumption. 2/ In other countries, such as Brazil, South Korea, and Poland, SOD imports accounted for approximately 3 percent of their SOD requirements in 1978.

West Germany, Switzerland, the United Kingdom, the United States, and Japan have been the principal suppliers to these countries, either for specialized intermediates or for specific SOD's. In each case, the major source tended to be the supplier with the closest proximity. For example, Japan has been the main source for South Korea, while West Germany has been the principal supplier to Poland, and so on.

While most of these developing and Communist countries do export some SOD's, most of them do not export in appreciable quantities to any major markets. In 1979, Poland, PRC, South Korea, and Brazil each had SOD exports equivalent to approximately 3 percent of their production. India, however, exported one-third of its production. India's SOD exports were high because of specific Government exported-oriented incentives to domestic SOD producers.

The principal markets for these developing and Communist countries are neighboring countries where the major competitive advantage of the product lies in the price and not the quality of the product. Since shipping charges increase the price of any product, it is expected that developing countries tend to establish markets nearby in order to compete more effectively.

Since most of the complex SOD intermediates require more costly, sophisticated equipment for production, they are usually imported from countries with facilities for the production of SOD intermediates, such as West Germany. Developing countries often sell their intermediates worldwide at competitive prices. The simpler remaining SOD intermediates are usually produced domestically at lower costs compared to production costs in the developed SOD-producing countries; this is due in part to subsidies from the Governments (e.g., Brazil) to SOD producers.

Industry sources state that the wages paid in developing countries are normally less than those of the western industrialized countries. 3/ In the Communist countries, wages, like product prices, are controlled by the Government; thus the factors of competitiveness cannot be properly evaluated.

FUTURE OUTLOOK

World Synthetic Organic Dye Industry

During 1975-80, the West German and Swiss firms were the most competitive SOD producers in the world. The factors used in this study to analyze the

1/ United	Nations, Yearbook of Industrial Statistics, General Industrial
Statistics,	1978, VI,, p. 346.
2/ "China	Now Self-Dependent In Supplies of Most Dyes," Japan Chemical Week,
January 29,	1981, p. 1.
3/ "India	Hopes Japan to Use Her Cheap Labor,", p. 8.

major SOD-producing countries consistently showed the West German and Swiss firms to be the leading manufacturers. The West German SOD industry had an increase in productivity during 1975-80 of 51 percent versus 3.6 percent in the United States, and an average annual production growth rate of 9.4 percent versus 4.8 percent in the United States. In 1980, West Germany also had an exports-to-imports ratio for SOD's of 389 percent versus 135 percent for the United States. The Swiss SOD firms in 1978 and in 1979 had expenditures for R. & D. exceeding those for other major world SOD producers in those two years.

World SOD producers, particularly those located in Western Europe, were generally disappointed with their sales in 1980. Some described the situation as "disastrous" and were not too optimistic about the prospects for 1981. <u>1</u>/ Such negative statements have been attributed to increasing costs, particularly for raw materials and labor; increasing import competition from the United States, Eastern Europe, and the Far East; slow growth rates; and overcapacity. European SOD producers do, however, benefit from several positive factors. These factors include an extensive worldwide marketing network; generally favorable labor-management relations; and a commitment to maintain a strong position in the world SOD markets.

Production .-- World production of SOD's in 1979 is estimated to have been more than 1.7 billion pounds with Western European SOD producers accounting for approximately 40 percent of the total. 2/ Since the growth of the SOD industry is dependent largely on the growth of the synthetic fibers industry, the future growth of SOD's in Europe will probably approximate the growth of synthetic fibers which, according to industry estimates, will be 2-3 percent through the mid-1980's. 3/ These estimates, however, are subject to many factors which will affect the SOD industries in Western Europe over the next several years. For example, in West Germany, the largest SOD-producing country, rising costs of raw materials and labor have severely affected the profits of the three major SOD producers. In 1980, SOD firms were not able to pass on the rising prices for naphtha and for other raw materials because of intense competition and decreased demand. This situation reduced profits for West German chemical firms by almost 17 percent. Prospects for a slowdown in rising SOD prices in the near future seem dim as contract prices for naphtha in the first quarter of 1981 were almost 25 percent ahead of the last quarter in 1980. 4/ Labor costs are also rising; in 1978, the average West German labor cost per chemical worker was \$6.76 per hour compared to \$8.21 per hour in 1980. 5/ In the same period, the average U.S. cost per chemical worker per hour increased from \$7.01 in 1978 to \$8.50 in 1980. Labor costs have continued to increase yearly in both countries as well as in many other SOD-producing nations.

1/ "World Chemical Outlook," <u>Chemical and Engineering News</u>, Dec. 22, 1980, p. 36.

2/ "Outlook Clouds for Color Chemicals Business," . . ., p. 16.

3/ Based on information developed during fieldwork.

 $\overline{4}$ / "West Germany's Chemical Growth Falters," <u>Chemical and Engineering News</u>, Feb. 2, 1981, p. 10.

5/ Wirstschaft und Statistik, . . ., p. 123.

Japan, the largest producer of SOD's in the Far East, produced an estimated 92 million pounds of SOD's in 1980. Future production increases could depend on raw material and labor costs, and consumer demand. Japan has thus far been able to limit the impact of rising oil prices with fiscal and monetary restraints. These restraints, however, have resulted in a decline in production which could continue through 1981 (table 7). Recently, several major Japanese SOD producers obtained permission from Japan's Fair Trade Commission to form a "rationalization" cartel to deal with the oversupply of certain SOD products which resulted in sales below production costs. 1/ This rationalization cartel is expected to reduce the foreign competition and financial losses of these SOD producers by limiting their production of certain SOD's and by coordinating their R. & D. and product distribution.

Foreign trade.--International trade in SOD's by both the European Economic Community and Japan declined in 1980-81 because of increasing raw materials costs and reduced consumer demand. Since the major European SODproducing countries (West Germany, Switzerland, and the United Kingdom) are generally one another's largest SOD export markets, the current economic slowdown of the textile industry has reduced the volume of trade by these countries. For example, West German SOD exports to the United Kingdom declined from 12 million pounds in 1979 to 8 million pounds in 1980, or by 32 percent; they declined in Italy from 22 million pounds in 1979 to 15 million pounds in 1980, or by 31 percent; and they declined in France from 13 million pounds in 1979 to 11 million pounds in 1980, or by 18 percent (table 6).

The Swiss SOD producers experienced this same situation though to a lesser degree. The SOD producers in the United Kingdom were more seriously affected than the other countries by declining exports because of rising inflation and competition from the Swiss and West German producers.

The European SOD producers, in an effort to combat the effects of inflation, are expected to make reductions in the workforce and capacity levels; initiate more efficient use of fuel and raw materials; increase R. & D.; and develop new markets. These steps, coupled with their Governments' efforts to reduce inflation, could result in increased trade by 1982. Likely new major markets for the European SOD producers could be certain countries in Africa, South America, the Middle East, and the Far East.

In 1980, exports of SOD's from Japan were estimated to be 19 million pounds (table 7), less than half the total of the previous year. Although through a combination of Government cooperation and improved production practices, Japanese SOD producers have been able to minimize the effects of the worldwide decline in their textile industry, Japanese SOD exports are likely to continue to encounter increased competition in their primary market, Southeast Asia, from such countries as India, South Korea, Taiwan, and the United States because of lower labor costs in these countries or changes in the value of their currency. However, Japanese producers are planning to develop new markets and to locate new plants in the United States. A subsidiary firm is planned in New York State to be used as a base for further

1/ "Second Dye Cartel May Be Applied For," Japan Chemical Week, June 12, 1980, p. 5.

expansion and infiltration of the U.S. and European markets. 1/ Other possible markets for Japanese exports of SOD's could be the Middle East, Africa, and Eastern Europe.

A major competitive problem for Japan is pressure for higher wages from its workers. Japanese workers will continue to be the highest paid in the Far East. Further increases in wages could result in increased prices for SOD exports.

<u>Prices.--Increased manufacturing costs could increase the price of SOD's</u> in the future. In an effort to recoup some of these increased manufacturing costs, some major SOD producers recently decided to increase dyestuff prices. In 1979, in the United Kingdom, the major SOD producer attempted to increase prices by 20 percent, citing higher inflation rates and increased costs of raw materials as the major reasons affecting their decision. <u>2</u>/ These price increases met consumer resistance because of decreased demand coupled with increased competition from other SOD producers.

Attempts by other major European SOD-producing countries to increase prices in the future will probably meet with similar consumer resistance, and thus possibly continue the trend of deteriorating earnings in this industry. Price increases for SOD products during 1981-85 could largely depend on the pace of the economic recovery of the textile industry in Western Europe and the United States.

Other factors.--Many major European chemical companies are continuing to make limited capital investments in spite of poor earnings. Most of the investments by the SOD producers have been attributed to replacement of equipment and modernization of plants, especially in the pollution control area. Only limited expansion is planned by the European SOD producers because of overcapacity and low demand in 1980.

In the past few years, the Swiss made several major capital investments in the chemical industry when interest rates were low. The growth in investment has recently declined because of the increasing value of the Swiss franc which retards exports. However, the more recent variations in the value of the Swiss franc will probably lead to capital spending in the chemical industry in 1982.

Chemical investments in the United Kingdom are expected to decline by 1981. It is estimated that chemical expenditures could be L1.29 billion (\$2.66 billion) in 1981 as compared to L1.34 billion (\$3.12 billion) in 1980. Any expenditures in the SOD industry could be small and limited to the replacement of equipment and to the addition of pollution controls in existing plants.

1/ "Orient to Produce Pigments in U.S.," Japan Chemical Week, Aug. 21, 1980, p. 6.

2/ Chemical Marketing Reporter, Dec. 31, 1979, pp. 3 and 15.

In Japan, the 77 major petrochemical firms, which include the SOD producers, reportedly will increase capital spending by 18 percent to \$890 million in 1981. 1/

Emphasis on R. & D. should also continue to remain a top priority with many major world SOD producers, especially in West Germany. Since the 1970's, the R. & D. budgets for the major West German chemical firms as well as the major SOD producers have averaged approximately 3.5 to 4.5 percent of total sales. In comparison, the major U.S. chemical firms have steadily decreased their R. & D. budgets to approximately 2.5 percent of total sales.

A major West German chemical firm's R. & D. budget was \$640 million in 1980 which was greater than the combined R. & D. budgets for three of the four largest U.S. chemical firms that year. This large R. & D. budget combined with a staff of 13,500 scientists and laboratory technicians 2/ could assure this West German firm of a dominant role in world chemical and SOD industries in the 1980's. Two other major West German SOD producers are in a similar situation. The 3 producers allocated approximately \$2.0 billion of their 1980 budget for R. & D. investments for chemicals, including SOD's. In comparison, the 10 largest U.S. chemical companies allocated a total of \$1.7 billion to R. & D. in 1980.

A commitment to increased R. & D. by most major European and Japanese SOD producers, combined with increased capital investments, are principal factors which they believe will help them to continue world leadership in SOD's.

U.S. Synthetic Organic Dye Industry

During 1975-79, although the U.S. SOD industry demonstrated strengths in some aspects of world competitiveness, it was not as competitive in the world market as were its major world competitors. For example, during this period the domestic industry showed strong competitive points such as the highest output per worker and the lowest import-to-consumption ratio in the world. However, the United States is less competitive in many other factors of competition. In 1979, in comparison to its competitors, the U.S. SOD industry had the lowest annual R. & D. budget in relation to sales, and its exports were among the lowest whether measured as a percent of world trade or in comparison to imports. Also, during this period, U.S. productivity remained static with an average annual growth rate of only 1.1 percent. The future prospects of the domestic SOD industry, however, appear more favorable.

1/ "Foreign Forecast 1981: Recovery Eludes Most Chemical Makers," <u>Chemical Week</u>, January 28, 1981, p. 51.
2/ "How the German Dominate the World Chemical Industry," . . ., p. 157.

In projecting the future trends for the domestic SOD industry, it must be noted that several major domestic producers are now subsidiaries of foreign firms. Consequently, the decisions of the parent firms, located primarily in West Germany, Switzerland, and the United Kingdom, will have a great effect on the future of the domestic SOD industry.

Production

Rising costs of raw materials resulting from the deregulation of oil in 1981 and the future deregulation of natural gas, combined with increased wages and transportation costs, could cause increased competition from imported SOD products. Production of SOD's by foreign-owned subsidiaries in the United States could continue to increase through 1985 owing to increasing plant capacities compared with those of U.S.-owned firms. In 1979, foreign subsidiaries produced approximately 35 percent of total domestic SOD production by quantity. <u>1</u>/ This percentage could increase to over 40 percent in 1981 as a foreign-owned plant in South Carolina becomes fully operational and a major U.S.-owned SOD producer phases out its production facilities. <u>2</u>/

Domestic production of certain classes of dyes could decline in the 1980's because of increasing safety and environmental regulations and the increasing use of synthetic fibers in the textile industry. On the other hand, domestic production of disperse dyes, a class of dyes used to color synthetic fibers, could increase from 47 million pounds in 1980 by approximately 5 to 7 percent per year through 1985 because of an anticipated 7 percent annual growth rate for the polyester fibers and the planned plant expansion of a domestic producer of disperse dyes. <u>3</u>/ U.S. SOD firms intend to develop new uses for existing products and concentrate on manufacturing specialty dyes which could attract a larger share of the domestic SOD market.

Foreign trade

In 1980, exports of chemicals from the United States were \$20 billion while chemical imports were \$8.8 billion. This trade surplus of \$11.2 billion was the eighth consecutive year the U.S. chemical industry has recorded a strong positive balance of trade. 4/ Unfortunately, the U.S. SOD industry has not contributed to this positive balance of trade and the outlook for any change in the near future is dim.

The present U.S. SOD industry is composed of foreign subsidiary firms and U.S.-owned firms. All these firms depend, to some extent, on imported SOD's to supplement their line of products. It is estimated that most, if not all, SOD imports from West Germany, Switzerland, and the United Kingdom are from

- 1/ Commission estimate.
- 2/ Obtained from industry source.

 $\overline{3}$ / "Major Expansion by Dyestuff Supplier," <u>American Dyestuff Reporter</u>, April 1980, p. 39.

4/"World Chemical Outlook," . . ., p. 33.

parent firms to subsidiaries. In 1980, this segment of SOD imports amounted to approximately \$112 million or 74 percent of total SOD imports and is not expected to change significantly in the near future. The value of SOD imports could climb by approximately 8 to 10 percent per year from 1981 to 1985 resulting from increased costs of raw materials, labor, and transportation from overseas.

The changes in the rate of exchange for world currencies could also affect the cost of imported SOD's into the United States in the 1980's. The probable increase in SOD imports resulting from the elimination of the ASP method of Customs valuation has not yet materialized. In fact, import figures from July 1, 1980 through December 1980, showed a large drop in U.S. SOD imports compared to the first 6 months of 1980 as shown in the following tabulation:

	Quantity	Value				
1980	(1,000 pounds)	(1,000 dollars)				
JanJune	21,185	108,209				
July-Dec	8,286	77,024				

It must be noted, however, that the sharp drop in consumer demand in the last 6 months of 1980 must be considered a major factor for declining U.S. imports.

The value of U.S. SOD exports in 1979 amounted to \$96 million, an increase of 20 percent from \$80 million in 1978, as compared with the value of U.S. exports of all chemicals which increased by 170 percent from \$6.3 million in 1978 to \$17 billion in 1979. 1/ The large increase in SOD exports, however, did not continue in 1980 and the present worldwide economic slowdown could result in limited export growth rates of 1 to 3 percent per year for SOD's in the near future.

Some domestic producers, however, which have registered production gains through increasing SOD exports in the last few years, believe the future for the domestic SOD industry could be improved if domestic firms seek new export markets as aggressively as their foreign competitors. Realizing this fact, one domestic producer has increased its SOD exports by 10 to 15 percent annually since 1977. Export sales of SOD's in 1979 represented 10 percent of this firm's total sales, or approximately \$6.3 million. 2/

Because of the relatively low oil and natural gas prices in the United States through 1980, the domestic producers have enjoyed a cost advantage over most of their foreign competitors. This advantage encouraged some domestic firms to seek new markets in areas such as Scandinavia, the Middle East, South America, and the Far East for their SOD products. U.S. exports of SOD's to these areas could increase domestic production in the coming years.

1/ "World Chemical Outlook," . . ., p. 28.
2/ Daily News, February 25, 1980, p. 13.

The primary markets for U.S. SOD exports in the future will continue to be countries producing large amounts of textile products such as South Korea, Taiwan, and Singapore; countries headquartering the parent firms of certain subsidiaries located in the United States such as the United Kingdom; and countries with a large consumer demand and no domestic SOD producers such as Canada. Any change in the amount of SOD exports to these countries, particularly the European countries, could depend, in part, on future fluctuations in the value of U.S. currency in the world market and the resulting effect on SOD export prices.

Prices

The present deregulation of oil and the coming deregulation of natural gas in 1985, coupled with increases in salaries and transportation costs, could increase the prices of SOD's in the 1980's. SOD producers are unsure whether these price increases can be absorbed in the face of reduced consumer demand. It is doubtful that the unit value in 1981 will increase at anywhere near the same rate as it did in 1978 over 1977 when it went from \$2.71 per pound to \$3.15 per pound (table 1). It is likely that over the next few years the unit value of SOD's will be limited to increases of approximately 5 percent per year.

Other factors

In addition to inflation, consumer demand, and changes in tariff rates, the domestic SOD industry could continue to be affected by increased costs from environmental and other Government regulations as well as overcapacity in both the domestic industry and the world SOD industry. The need for pollution abatement programs as required by law could continue to affect the domestic SOD producers in the late 1980's, although most major domestic SOD producers have already made significant capital expenditures in this area. 1/

Government regulations resulting from the potential toxicity and carcinogenicity of SOD's will require additional testing of new SOD's before these products enter the marketplace in the coming years. The resulting increased cost for development and marketing of new SOD's may contribute to the continuing decline of SOD R. & D. in the United States in the 1980's.

Excess capacity for U.S. SOD production eased in 1980 when a major domestic producer sold its technology, patents, trademarks, equipment, and commercial information (but not the plant sites and buildings) to other SOD producers. 2/ However, the decrease in the growth of consumer demand has again led to excess capacity pressures in the domestic SOD industry as some producers had expanded their capacity to fill part of the gap resulting from the major firm's withdrawal. This excess capacity with only a slow increase in consumer demand could reduce profits over the next few years as producers attempt to maintain their current position in the domestic and world markets.

U.S. SOD producers appear to be committed to maintaining a viable SOD industry in the United States in the coming years. Investment in alreadyinstalled pollution control systems will continue to affect the prices of SOD's, but for a limited number of years. Corresponding expenditures by several foreign SOD firms in the future as their countries implement environmental regulations similar to those already in place in the United States, could place the U.S. industry in a more competitive world position.

Several U.S. firms recently completed plant expansions which should enable them to meet the demand for specialty dyes. Other manufacturing efficiency programs to be realized by some firms include equipment improvement, quality assurances, the establishment of new process development programs, and computer systems designed to enhance production scheduling. 1/ These programs are geared toward a policy of extending export markets in an effort to regain markets lost to foreign competitors.

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Statistical Tables

Table 1.--Synthetic organic dyes: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1975-1980

Year	Production	Expor	ts :	Imports	:::::::::::::::::::::::::::::::::::::::	Apparent consumption	:Ratio : cent) : impor :consur	(per-) of cts to nption
				Quantity				
	:	:	:		:		:	
1975	: 206,000	: 37,1	12 :	18,282	:	187,170	:	9.77
1976	: 256,000	: 45,9	30 :	28,103	:	238,173	1.	11.80
1977	: 264,000	: 47,3	62 :	29,258	:	245,896	1	11.90
1978	: 251,000	: 43,0	07 :	29,800	:	237,793	:	12.53
1979	: 266,000	: 45,4	: 00	30,962	:	251,562	:	12.31
1980	: 1/ 260,000	: 39,9	08:	29,471	:	1/ 249,563	:	11.81
				Value				
	:	:	:		:		;	
1975	: 469,680	: 60,9	43 :	58,141	:	466,878	:	12.45
1976	: 634,880	: 76,6	29 :	96,245	:	654,496	1	14.71
1977	: 715,440	: 76,8	17 :	108,550	:	747,173	:	14.53
1978	: 790,650	: 80,3	81 :	158,138	:	868,407	:	18,21
1979	: 877,800	: 95,9	78 :	175,273	:	957,095	:	18.31
1980	: 1/ 910,000	: 97,2	76 :	185,233	:	1/ 997,957	:	18.56
	:		Uı	nit value	2			
	:	:	:		:	and the second second second second	:	
1975	: 2.28	: 1.	64 :	3.18	:	-	:	-
1976	: 2.48	: 1.	67 :	3.42	:	-	:	-
1977	: 2.71	: 1.	62 :	3.71	;		:	-
1978	: 3.15	: 1.	87 :	5.31	:		:	-
1979	: 3.30	: 2.	11 :	5.66	:	1911 - Herei H Herei Herei Here Herei Herei	:	-
1980	: 3.50	: 2.	44 :	6.29	:	·	:	-
2 X X	:	:	:		:		:	

(Quantity in thousands of pounds; value in thousands of dollars; unit value per pound)

1/ Estimated.

Source: U.S. production, compiled from <u>Synthetic Organic Chemicals</u>, <u>United States Production and Sales</u>; exports and imports, compiled from official statistics of the U.S. Department of Commerce.

Markets	1975	:	1976	1977	:	1978	:	1979	:	1980
		0	Quan	tity (1,0	000	pounds)				
:		:	:	and the second secon	:		:		:	
West Germany:	8,673	:	11,616 :	11,850) :	11,985	:	11,966	:	12,169
Switzerland:	2,757	:	5,082 :	5,712	:	5,078	:	4,081	:	4,515
Japan:	1,399	:	2,726 :	2,902	:	3,469	:	4,826	:	4,181
United Kingdom:	3,403	:	4,853 :	4,594	:	3,931	:	4,809	:	3,310
All other:	2,050	:	3,826 :	4,200) :	5,337	:	5,280	:	5,296
Tota1:	18,282	:	28,103 :	29,258	:	29,800	:	30,962	:	29,471
		# 3	v	alue (1,0	00	dollars)				
		:	:		:		:		:	
West Germany:	27,310	:	43,361 :	47,362	:	67,585	:	72,983	:	74,669
Switzerland:	13,075	:	25,197 :	27,422	:	37,558	:	33,969	:	37,531
Japan:	4,104	:	6,264 :	6,968	:	13,586	:	21,967	:	30,652
United Kingdom:	7,701	:	11,575 :	13,380	:	17,684	:	22,259	:	15,996
All other:	5,951	:	9,848 :	13,418	:	21,725	:	24,095	:	26,385
Tota1:	58,141	:	96,245 :	108,550	:	158,138	:	175,273	:	185,233
		ka I	Un	it value	(pe	er pound)			5	,
:		:	:		:		:		:	
West Germany:	3.15	:	3.73 :	4.00	:	5.64	:	6.10	:	6.14
Switzerland:	4.74	:	4.96 :	4.80	:	7.40	:	8.32	:	8.31
Japan:	2.93	:	2.30 :	2.40	:	3.92	:	4.55	:	7.33
United Kingdom:	2.26	:	2.39 :	2.91	:	4.50	:	4.63	:	4.83
All other:	2.90	:	2.57 :	3.19	:	4.07	:	4.56	:	4.98
Average:	3.18	:	3.42 :	3.71	:	5.31	:	5.66	:	6.29
:		:	:		:		:		:	

Table 2.--Synthetic organic dyes: U.S. imports for consumption, by principal markets, 1975-80

Market	1975	:	1976	:	1977	:	1978	:	1979	:	1980
	Quantity (1,000 pounds)										
		:		:		:		:		:	
Canada:	10,478	:	11,695	:	10,740	:	11,974	:	12,544	:	12,282
Hong Kong:	1,455	:	2,190	:	1,751	:	1,999	:	2,162	;	1,540
Brazil:	1,312	:	616	:	675	:	557	:	551	:	947
Taiwan:	548	:	948	:	948	:	1,641	:	1,760	:	2,015
United Kingdom:	2,437	:	4,039	:	4,306	:	3,611	:	3,284	:	1,795
All other:	20,882	:	26,442	:	28,942	:	23,285	:	25,099	:	21, 329
Tota1:	37,112	:	45,930	:	47,362	:	43,067	:	45,400	:	39,908
			Va	alu	e (1,000	do	llars)		· · · ·		1
St. A.A. S. M.A.F		:		:		:		:		:	
Canada:	13,896	:	16,540	:	16,025	:	20,114	:	22,473	:	22,518
Hong Kong:	2,716	:	4,019	:	4,441	:	4,193	:	4,088	:	5,536
Brazil:	2,043	:	1,330	:	1,605	:	2,431	:	2,865	:	5,363
Toiwan:	1,276	:	1,879	:	1,882	:	3,133	:	3,696	:	5,289
United Kingdom:	4,816	:	6,389	:	6,420	:	5,977	:	7,060	:	4,982
All other:	36,196	:	46,472	:	46,444	:	44,533	:	55,796	:	53,588
Tota1:	60,943	:	76,629	:	76,817	:	80,381	:	95,978	:	97,276
			U	nit	value (per	pound)				
· · · · · · · · · · · · · · · · · · ·		:		:		:		:		:	
Canada:	1.33	:	1.41	:	1.49	:	1.68	:	1.79	:	1.83
Hong Kong:	1.87	:	1.84	:	2.54	:	2.10	:	1.89	:	3.60
Brazil:	1.56	:	2.16	:	2.38	:	4.36	:	5.20	:	5.66
Taiwan:	2.33	:	1.98	:	1.99	:	1.91	:	2.10	:	2.62
United Kingdom:	1.98	:	1.58	:	1.49	:	1.66	:	2.15	:	2.78
All other:	1.73	:	1.76	:	1.60	:	1.91	:	2.22	:	2.51
Average:	1.64	:	1.67	:	1.62	:	1.87	:	2.11	:	2.44
:		:		:		:		:		:	
Source: Compile	ed from o	ffi	cial sta	tis	tics of	the	U.S. De	pai	ctment of	Cc	mmerce.

Table 3.--Synthetic organic dyes: U.S. exports of domestic merchandise, by principal markets, 1975-80

Table 4.--Synthetic organic dyes: West German production, exports, imports, and apparent consumption, 1975-80

Year	Production	Production Exports Import		Imports		Apparent consumption	: : : :	Ratio (percent) of imports to consumption	
					Quantity <u>1</u> /				and a set of a set of the set of
		:		:		:		:	a na managana na kana kana kana kana kana kana
1975:	191,491	:	130,270	:	27,067	:	88,287	:	30.7
1976:	331,317	:	180,312	:	38,236	:	189,241	:	20.2
1977:	297,280	:	166,263	:	54,518	:	185,535	:	29.4
1978:	299,518	:	166,659	:	36,034	:	168,893	:	21.3
1979:	323,137	:	183,542	:	41,934	:	181,529	:	23.1
1980:	<u>2/ 300,000</u>	:	151,234	:	38,888	:	187,654	:	20.7
					Value				
		:	- en	:		:	4	:	
1975;	1,706,844	:	1,289,800	:	187,776	:	604,820	•	31.0
1976:	2,779,175	:	1,797,724	:	245,549	:	1,227,000	:	20.0
1977:	2,480,972	:	1,684,980	•	273,972	:	1,069,964	:	25.6
1978:	2,507,028	:	1,651,983	:	264,870	:	1,119,915	:	23.7
1979:	2,976,160	:	1,883,559	:	314,361	:	1,406,962	:	22.3
1980:	2/ 2,850,000	:	1,680,877	:	310,111	;	1,479,234	:	21.0
				Un	nit value				
		:		•	1	:		:	
1975:	8.91	:	9.90	:	6.94	:	-	:	·
1976:	8.39	:	9.97	:	6.42	:	-	:	-
1977:	8.35	:	10.13	:	5.03	:		:	-
1978:	8.37	:	9.91	:	7.35	:		:	_
1979:	9.21	:	10.26	:	7.50	:	, 1994 <u>–</u>	:	<u>-</u>
1980:	9.50	:	11.11	:	7.97	:	-	:	
				•					

(Quantity in thousands of pounds; value in thousands of DM; unit value per

pound)

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

2/ Estimated from information developed during fieldwork.

Source: West German production, compiled from <u>Produktion im Produzierenden</u> Gewerbe, 1977, West Germany, July 1978, and <u>Produktion im Produzierenden Gewerbe</u> nach Waren rund Warengruppen, 1979, West Germany, June 19, 1980; Exports and Imports, compiled from <u>Zusammenfassende Ubersichten fur den Aussenhandel</u>, 1975, 1976, 1977, 1978, 1979, and 1980.

Source	1975	:	1976	:	1977	:	1978	:	1979	:	1980 <u>1</u> /
:			Q	ua	ntity (1	,0	00 pounds	5)	2/		
2 · · · · ·		:		:		:		:		:	
United :		:		:		:				:	
Kingdom:	5,144	:	6,785	:	7,422	:	7,247	:	9,717	:	7,767
France:	4,589	:	8,508	:	15,281	:	5,503	:	5,324	:	5,216
Switzerland:	6,768	:	8,782	:	8,301	:	8,703	:	9,573	:	8,210
Italy:	3,069	:	3,222	:	11,840		2,859	:	2,931	:	3,089
All other:	7,497	:	10,940	:	11,675	:	11,713	:	14,386	:	14,606
Total:	27,067	:	38,237	:	54,519	:	36,025	:	41,931	:	38,888
:					Value	(1	,000 DM)				
		:		:		:		:		:	
United :		:		:		:	,	:		•	
Kingdom:	37,238	:	47,886	:	53,731	:	51,315	•	67,840	:	61,187
France:	28,484	:	41,584	:	49,560	:	44,605	:	46,249	:	46,679
Switzerland:	68,599	:	90,760	:	93,787	:	105,303	:	114,387	:	99,070
Italy:	13,846	:	13,697	:	18,779	:	11,510	:	12,182	:	16,351
All other:	39,609	:	51,622	:	58,115	:	52,137	:	73,703	:	86,824
Total:	187,776	:	245,549	:	273,972	:	264,870	:	314,361	:	310,111
1			τ	Jn	it value	(1	per pound	1)			
		:	And and the second second	:		:		:		:	
United :		:		:		:		:		:	
Kingdom:	7.24	:	7.06	:	7.24	:	7.08	:	6.98	:	7.88
France:	6.21	:	4.89	:	3.24	:	8.11	:	8.69	:	8.95
Switzerland:	10.14	:	10.33	:	11.30	:	12.10	:	11.95	:	12.07
Italy:	4.51	:	4.25	:	1.59	•	4.03	:	4.16	:	5.29
All other:	5.28	:	4.72	:	4.98	:	4.45	:	5.12	:	5.94
Average:	6.94	:	6.42	:	5.03	:	7.35	:	7.50	:	7.97
		:		:		:		:	1.1.1.1	:	
1/ Estimated	from Zusa	mm	enfassen	de	Ubersic	ht	en fur de	n	Aussenha	nd	el.

Table 5.--Synthetic organic dyes: West German imports, by principal sources, 1975-80

<u>1</u>/ Estimated from <u>Zusammenfassende Ubersichten fur den Aussenhandel</u>, January-November 1980.

2/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from <u>Zusammenfassende Ubersichten fur den Aussenhandel</u>, West Germany, 1975, 1976, 1977, 1978, and 1979.

Markets	1975	:	1976	:	1977	:	1978	:	1979	:	1980 <u>1</u> /
)	Quan	tit	y (1,000	por	unds) <u>2</u> /				
:		:	-	:	1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 -	:		:		:	
United Kingdom:	6,737	:	11,139	:	11,029	:	11,556	:	12,441	:	8,485
France:	8,882	:	13,652	:	11,587	:	12,553	:	12,940	:	10,665
Italy:	10,215	:	20,322	:	15,447	:	16,611	:	21,829	:	15,164
United States:	6,943	:	11,691	:	12,025	:	12,314	:	12,844	:	11,370
Japan:	7,262	:	11,462	:	7,939	:	9,792	:	11,540	:	7,779
All other:	90,231	:	112,046	:	108,236	:	103,833	: .	111,948	:	97,771
Total:	130,270	:	180,312	:	166,263	:	166,659	:	183,542	:	151,234
				V	alue (1,0	000	DM)				
	,	:		:		:		:		:	
United Kingdom:	54,314	:	91,650	:	101,988	:	100,597	:	117,159	:	81,255
France:	75,086	:	111,101	:	96,548	:	102,489	:	112,795	:	102,634
Italy:	76,819	:	164,151	:	129,362	:	134,864	:	196,357	:	149,845
United States:	58,795	:	114,353	:	117,251	:	121,008	:	130,501	:	112,908
Japan:	66,919	:	122,312	:	92,176	:	121,393	:	130,970	:	83,545
All other:	957,867	:1	,196,157	:1	,147,655	:1	,071,632	:1	,195,778	:1	,150,690
Total:	1,289,800	:1	,799,724	:1	,684,980	:1	,651,983	:1	,883,559	:1	,680,877
:			Un	it	value (pe	er j	pound)		5		
:		:	the second s	:		:		;		:	
United Kingdom:	8.06	:	8.23	:	9.25	:	8.71	:	9.42	:	9.58
France:	8.45	•	8.14	:	8.33	:	8.16	:	8.72	:	9.62
Italy:	7.52	:	8.08	:	8.37	:	8.12	:	9.00	:	9.88
United States:	8.47	:	9.78	:	9.75	:	9.83	:	10.16	:	9.93
Japan:	9.21	:	10.67	:	11.61	•	12.40	:	11.35	:	10.74
All other:	10.62	:	10.68	:	10.60	:	10.32	:	10.68	:	11.77
Average:	9.90	:	9.98	:	10.13	:	9.91	:	10.26	:	11.11
		:	A	:		:		:		:	
1/ Estimated fr	om Zusamme	enf	assende l	Jbe	rsichten	fui	r den Aus	sei	nhandel,	We	st

Table 6.--Synthetic organic dyes: West German exports, by principal markets, 1975-80

1/ Estimated from Zusammenfassende Übersichten fur den Aussenhandel, Wes Germany, January-November 1980.

 $\underline{2}/$ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Zusammenfassende Ubersichten fur den Aussenhandel, West Germany, 1975, 1976, 1977, 1978, and 1979.

Table 7.--Synthetic organic dyes: Japanese production, exports, imports, and apparent consumption, 1975-80

(Quantity in thousands of pounds; value in thousands of yen; unit value

			4 H	per	pound)		1 F		the design of the second second
Year	Production	: : : : : : : : : : : : : : : : : : : :	Exports	: : : : : : : : : : : : : : : : : : : :	Imports	: : : : :	Apparent consumption	:::::::::::::::::::::::::::::::::::::::	Ratio (per- cent) of imports to apparent consumption
		1.	in a secolar in a	Qua	ntity <u>1</u> /				
		:		:		:		:	
1975:	87,859	:	26,356	:	15,043	:	76,546	:	19.7
1976:	: 113,859	:	32,536	:	23,968	:	105,291	:	22.8
1977:	119,046	:	35,387	:	18,542	:	102,201	:	18.1
1978:	: 119,645	:	39,928	:	20,970	:	100,687	:	20.8
1979:	131,987	:	40,374	:	31,644	:	123,257	:	25.6
1980:	2/ 92,300	:	3/ 18,948	:	3/ 16,163	:	89,515	:	18.1
					Value	0			
		:		:		:		:	
1975:	: 71,700,000	:	22,300,000	:	17,091,756	:	66,491,756	:	25.7
1976:	: 104,600,000	:	27,800,000	:	26,045,820	:	102,845,820	:	25.3
1977:	: 96,115,000	:	27,798,000	:	21,606,741	:	89,923,741	:	24.0
1978	: 93,215,000	:	26,465,000	:	20,880,567	:	87,630,567	:	23.8
1979	: 104,363,000	:	33,025,000	:	31,201,259	:	102,539,259	:	30.4
1980:	; 76,609,000	:3/	30,964,275	:3/	18,719,146	:	64,363,871	:	29.1
				U	nit value				
		:		:		:		:	-
1975	: 816	:	846	:	1,136	:		:	
1976	919	:	854	:	1,087	:		:	-
1977	: 807	:	786	:	1,165	:	- 12 j -	:	
1978	: 779	:	663	:	996	:	- 13 ° -	:	
1979	: 791	:	818	:	986	:	-	:	-
1980	: 830	:	1,634	:	1,158	:	이 같은 문	:	
and a second	:	:		:		:		:	

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

2/ "Dye Makers Tackling Seriously Swollen Inventory Adjustments," Japan Chemical Week, November 27, 1980, p. 6.

3/ Estimated from Japan Exports & Imports, Commodity by Country, Japan, January-November 1980.

Source: Production compiled from Japan Chemical Review, March 1978, p. 16; Japan Chemical Annual, 1979, p. 82; and Japan Chemical Annual 1980, p. 92; exports and imports compiled from Japan Exports & Imports, Commodity by Country, 1975, 1976, 1977, 1978, and 1979.

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Source	1975	1976	:	1977	:	1978	•••••	1979	:	1980 <u>1</u> /
:		Qua	nt	ity (1,000	p	ounds) <u>2</u> /				
:		:	:	7	:		:		:	
West Germany:	6,577	: 10,617	:	7,089	:	8,889	:	11,893	:	5,894
Switzerland:	3,607	: 5,802	:	3,593	:	4,853	•	5,984	:	4,453
United :		:	:		:		:		:	
Kingdom:	1,624	: 2,966	:	2,191	:	2,227	:	3,933	:	2,144
United :		:	:		:		:		:	
States:	534	: 1,135	:	1,323	:	1,549	:	1,669	:	1,013
All other:	2,701	: 3,448	:	4,346	:	3,452	:	8,165	:	2,659
Total;	15,043	: 23,968	:	18,542	:	20,970	:	31,644	:	16,163
			1	Value (1,00	00	yen)				
-					-					
Heat Commons	7 120 126	. 12 666 440	:	9 655 606	•	7 / 22 120	•	12 609 715	:	7 256 625
West Germany:	5 005 240	. 6 10/ 0/5	:	6,000,000	:	9 / 95 057	•	9 /01 296	:	5 6/5 702
Switzerland:	5,005,240	. 0,194,045	:	4,910,975	•	0,403,937	•	0,491,200	•	5,045,702
Vinadom :	1 262 665	. 3 08/ 203		2 302 657	•	2 066 006	•	3 551 205	•	2 270 835
Kingdom:	1,303,005	. 5,004,205	:	2,502,057	:	2,000,990	•	5,551,295	•	2,219,033
Statog	370 216	· 080 105	:	806 887	:	857 636	:	1 247 440	:	735 228
All athor	2 222 /00	. 2 111 029	:	690,007	•	2 0/7 959		1,247,449	:	2 704 746
Total	17 001 756	• 26 045 820		21 606 7/1	÷.	2,047,050	•	31 201 250	÷	18 719 146
10La1	17,091,790	.20,040,020		21,000,741	-	20,000,007	•	51,201,255	•	10,719,140
:			Uı	nit value	(p	er pound)				
2		•								
Nost Cormany:	1 084	• 1 193	:	1 221	:	835	:	1 152	:	1 248
Switzerland	1 388	• 1 068	:	1 369		1 749	:	1 419		1 268
United :	1,500	: 1,000		1,505	•	1,745	:	1,717	•	1,200
Kingdom	840	• 1 040		1 051		928		903		1 063
United :	040	: 1,040		1,051		,20		200	•	1,000
States:	694	: 871	:	678		554		747	•	723
All other:	1,193	: 903	:	1,112	:	593	:	516	:	1.017
Average:	1,136	: 1.087	:	1,165	:	996	:	986	:	1,158
incluge i	-,-50	:	:	2,200	:		:	200	:	1,150
1/ Fatimated	from Japan	Exporte & T	mn	orts Comm	h	ity by Cour	t	ry, Japan,	Ta	inuary-

Table 8.--Synthetic organic dyes: Japanese imports, by principal sources, 1975-80

1/ Estimated from Japan Exports & Imports, Commodity by Country, Japan, January-November 1980.

 $\underline{2}$ / Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Japan Exports & Imports, Commodity by Country, Japan, 1975, 1976, 1977, 1978, and 1979.

Source	1975	1976	:	1977	:	1978	::	1979	:	1980 <u>1</u> /
	:	Q	uanti	ty (1,0	00	pounds) <u>2</u>	1			
	:	:	:		:		:		:	
Taiwan	: 2,987	: 4,066	:	5,477	:	5,607	:	4,841	:	6,069
Indonesia	: 1,880	: 1,384	1.00	1,790	:	1,991	:	2,085	:	3,246
Republic of	:	:	: "		:		:		:	
Korea	: 3,127	: 3,499	:	3,771	:	4,481	:	4,182	:	3.674
Hong Kong	: 3,578	: 3,041	:	2,917	:	3,682	:	5,610	:	3,354
All other	: 14,784	: 20,546	:	21,432	:	24,167	:	23,656	:	2,650
Total	: 26,356	: 32,536	:	35,387	:	39,928	:	40,374	:	18,948
			V	alue (1,	000) yen)				
	:	:	:		:		:		:	
Taiwan	: 2,294,482	: 3,750,442	: 4.	036.568	: :	3.566.589	:	3.667.822	:	4.371.250
Indonesia	: 1,983,581	: 1,428,573	: 1.	661.198	: 1	1.341.741	:	1,786,294	:	2.861.353
Republic of	:	:	:		:	, , ,	:		:	
Korea	: 3,584,556	: 4,760,350	: 4.8	800,039	: 8	3,424,423	:	4,603,857	:	5,041,112
Hong Kong	: 2,850,316	: 3,187,806	: 2.0	518,565	: 2	2,249,989	:	2,707,052	:	2.644.289
All other	:11,587,065	:14,672,829	:14.0	581,630	:10	,882,258	: 2	20,259,975	:	16,046,271
Total	:22,300,000	:27,800,000	:27,	798,000	:26	5,465,000	:	33,025,000	:	30,964,275
	:	× × ×	Unit	value (per	pound)	7		-	
	:	:	:		:		:		:	
Taiwan	. 768	: 922		737		636		758	:	720
Indonesia	: 1.055	: 1.032	:	928	:	674		857	:	882
Republic of	:	:			:		:		:	
Korea	: 1.146	: 1.360	÷	1.273	:	1,880	:	1,101	;	1.372
Hong Kong	: 797	: 1.048	÷	898		611	:	483	:	788
All other	: 784	: 714		685	:	450	:	856	:	6,159
Average	: 846	: 854	:	786	:	663	:	818	:	1,634
0.1	:	:	:		:		:		:	
1/ Estimated	from Japan	Exports & In	nports	, Commo	dit	y by Coun	tr	y, Japan,	Ja	nuary-

Table 9 .-- Synthetic organic dyes: Japanese exports, by principal markets, 1975-80

November 1980. 2/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per

2/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Japan Exports & Imports, Commodity by Country, Japan, 1975, 1976, 1977, 1978, and 1979.

Table 10.--Synthetic organic dyes: British production, exports, imports, and apparent consumption, 1975-80

Year	Production	Exports	:::::::::::::::::::::::::::::::::::::::	Imports	: : :	Apparent consumption	:	Ratio (percent) of imports to consumption		
a sa warrar (h	Constantion of the second second			Quantity	1/					
	:		:		:		:			
1975	: 95,040 :	76,234	:	23,001	:	41,807	:		55.0	
1976	: 114,400 :	89,503	:	32,974	:	57,871	:		57.0	
1977	: 118,140 :	94,017	:	36,260) :	60,383	:		60.1	
1978	: 106,260 :	59,512	:	35,868	3:	82,616	•		43.4	
1979	: 116,600 :	73,931	:	38,511	:	81,180	:		47.4	
1980	$: \underline{2}/110,000$:	69,240	:	27,691	:	68,451	:		40.5	
		· A Sec		Value						
	: :	5 - M	:	1	:		;			
1975	: 88,007 :	95,509	:	56,348	:	48,846	:		115.4	
1976	: 109,745 :	133,807	:	62,381	:	38,315	:		162.8	
1977	$: \underline{3}/130,250:$	155,944	:	72,625	:	46,931	:		154.7	
1978	: 136,675 :	102,049	:	75,655	:	110,281	:		68.6	
1979	: 156,124 :	126,059	:	79,705	:	109,770	:		72.6	
1980	:162,000 :	130,470	:	58,051	:	89,581	:	÷	64.8	
	:			Unit value						
	: :		:		:		:			
1975	: 0.93 :	1.25	:	2.45	:	-			-	
1976	: .96 :	1.50	:	1.89	:	-	:		 – 	
1977	: 1.10 :	1.66	:	2.00	:		:			
1978	: 1.29 :	1.71	:	2.11	:	-	:			
1979	: 1.34 :	1.71	:	2.07	:		:		-	
1980	: 1.47 :	1.88	:	2.10	:	2 . .	:		-	

(Quantity in thousands of pounds; value in thousands of pound sterling unit value per pound)

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

2/ Estimated from data developed during fieldwork.

 $\overline{3}$ / Production values are estimates derived from the wholesale price of dyes and pigments for 1975-79, and from an approximate production value for 1977 obtained from Chemical Week, February 8, 1978, p. 27.

Source: Compiled from <u>Annual Abstract of Statistics</u>, 1981 Edition, Central Statistical office United Kingdom; exports and imports, compiled from <u>Overseas</u> <u>Trade Statistics of the United Kingdom</u>, United Kingdom, 1975-80.

Source	1975	:	1976	:	1977	:	1978	:	1979	:		1980
		**	Qua	ant	tity (1,0	000) pounds)	<u>1</u> /			
	4	:	X	:		:		:		:		
France:	1,800	:	2,548	:	2,743	:	4,363	:	3,852	:		3,720
West Germany:	7,720	:	12,016	:	11,721	:	13,204	:	16,139	:		10,402
Switzerland:	5,361	:	8,928	:	9,046	:	7,456	:	6,857	:		5,078
United States:	3,509	:	3,951	:	4,785	:	4,391	:	3,709	:		1,870
All other:	4,611	:	5,531	:	7,965	:	6,424	:	7,954	:		6,621
Total:	23,001	:	32,974	:	36,260	:	35,838	:	38,511	:		27,691
		1	Valu	ıe	(1,000]	oou	nd ster	Liı	ng)			
· · · · · ·	e	:		:		:		:		:		
France:	1,865	:	3,553	:	4,470	:	6,416	:	5,157	:		4,707
West Germany:	18,918	:	21,380	:	26,152	:	30,289	:	36,039	:	1	23,562
Switzerland:	16,312	:	27,001	:	25,979	:	25,774	:	22,941	:		16,532
United States:	2,961	:	3,914	:	5,030	:	4,635	:	4,982	:		3,360
All other:	16,292	:	6,533	:	10,994	:	8,541	:	10,586	:		9,890
Total:	56,348	:	62,381	:	72,625	:	75,655	:	79,705	:		58,051
			ι	Jni	lt value	(p	er pound	1)				
the second se		:		:		:		:		:		
France:	1.04	:	1.40	:	1.63	:	1.47	:	1.34	:		1.27
West Germany:	2.45	:	1.78	:	2.24	:	2.30	:	2.24	:		2.27
Switzerland:	3.05	:	3.03	:	2.88	:	3.46	:	3.35	:		3.26
United States:	.85	:	.99	:	1.06	:	1.06	:	1.35	:		1.80
All other:	3.54	:	1.19	:	1.38	:	1.33	:	1.34	:		1.50
Average	2.45	:	1.90	:	2.01	:	2.12	:	2.07	:		2.10
:		:		:	a contraction of the second	:		:		:		

Table 11.--Synthetic organic dyes: British imports, by principal sources, 1975-80

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Overseas Trade Statistics of the United Kingdom, United Kingdom, December 1975, 1976, 1977, 1978, 1979, and 1980.
				-				-		-	
Source :	1975	:	1976	:	1977	:	1978	:	1979	:	1980
			Q	ua	ntity (1	.,(000 pound	ls)		
1		:		:		:		:		:	
France:	3,540	:	5,480	:	5,960	:	3,903	:	4,226	:	4,288
Netherlands:	4,673	:	4,745	:	5,240	:	3,401	:	4,041	:	3,212
West Germany:	5,465	:	6,923	:	6,613	:	4,578	:	5,810	:	6,494
Italy:	3,417	:	5,993	:	4,431	:	2,473	:	4,011	:	3,263
Switzerland:	6,453	:	8,457	:	11,396	:	10,118	:	13,979	:	11,510
All other:	52,688	:	57,904	:	60,377	:	35,039	:	41,864	:	40,394
Tota1:	76,234	:	89,503	:	94,017	:	59,512	:	73,931	:	69,161
			Val	ue	(1,000	ро	und ster	11	lng)		
	. / .	:		:		:		:		:	
France:	4,115	:	6,550	:	7,841	:	4,774	:	6,073	:	6,778
Netherlands:	4,544	:	5,743	:	7,934	:	4,456	:	5,975	:	4,207
West Germany:	6,739	:	9,756	:	11,169	:	7,854	:	11,293	:	12,447
Italy:	3,776	:	7,974	:	7,162	:	3,892	:	6,268	:	5,373
Switzerland:	11,418	:	15,424	:	19,704	:	15,015	:	20,846	:	23,259
All other:	64,917	:	88,360	:	102,134	:	66,058	:	75,604	:	78,406
Total:	95,509	:	133,807	:	155,944	:	102,049	:	126,059	:	130,470
			Un	it	value	(pe	er pound))			, e .
1		:		:		:		:		:	
France:	1.17	:	1.20	:	1.32	:	1.23	:	1.44	:	1.58
Netherlands:	. 98	:	1.21	:	1.52	:	1.31	:	1.48	:	1.31
West Germany:	1.24	:	1.41	:	1.69	:	1.72	:	1,95	:	1.92
Italv:	1,11	:	1.33	:	1.62	:	1.58		1.57		1.65
Switzerland:	1.77	:	1.83	:	1.73		1.49		1.50		2.02
All other:	1.24	:	1,53	:	1.70	:	1.89	:	1.81		1.95
Average:	1.26	:	1,50	:	1.66	:	1.72	;	1.71	:	1,89
Average		:		:		:		:		:	

Table 12.--Synthetic organic dyes: British exports, by principal markets, 1975-80

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Overseas Trade Statistics of the United Kingdom, United Kingdom, December 1975, 1976, 1977, 1978, 1979, and 1980.

Note .-- Figures may not add to totals due to rounding.

Year	Production	Exp	orts <u>1</u> /	: : :	Imports	::	Apparent consumption	:	of imp appa const	(perc ports arent impti	to to
:				Quanti	ty <u>2</u> /						
	-	:		:		:		:	and the second second second		
1975:	66,000	:	51,276	:	20,401	:	35,125	:		5	8.0
1976:	79,000	F	60,510	:	24,994	:	43,484	:		5	7.4
1977:	78,500	:	59,843	:	28,230	:	46,887	:		6	0.2
1978:	3/ 81,000	:	64,941	:	31,462	:	47,521	:		6	6.2
1979:	3/ 90,000	:	71,992	:	39,963	:	57,971	:		6	8.9
1980:	3/ 82,000	:	65,522	:	41,334	:	57,812	:		7	1.5
					Value	1			1	N 8	
	4 2	:		:	Section Contraction Contraction	:		:		112 - 18. ALL	
1975:	4/	:	762,987	:	195,977	:	4/	:			
1976:	4/	1. A.	870,134	:	222,212	:	4/	:			
1977:	4/	:	875,503	:	261,337	: 1	4/	:			
1978:	4/	:	819,555	:	241,941	:	4/	:			
1979:	4/	:	867,504	:	327, 392	:	4/	:			
1980:	4/	:	824,922	:	375,309	:	4/	:			
			τ	Jnit va	alue				-		
:		:		:		:		:			
1975:		:	14.88	:	9.61	:	-	:			-
1976:		:	14.38	:	8.69	: .	-	:			-
1977:		:	14.63	:	9.26	:	-	:			-
1978:		:	12.62	:	7.69	:	-	:			-
1979:		:	12.05	:	8.19	:	-	:			-
1980:		•	12.59	:	9.08	:	-	:			-

apparent consumption 1975-80

(Quantity in thousands of pounds; value in thousands of Swiss Francs, unit value per pound)

Table 13.--Synthetic organic dyes: Swiss production, exports, imports, and

1/ Estimated from Jahresstatistik des Aussenhandels der Schweiz, Erster Band, 1975, 1976, 1977, 1978, 1979, and 1980. These estimates omit exports of nondomestic merchandise. For comparison see table 15.

2/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

3/ Estimates based on 125 percent of exports as cited in Economic Survey of Switzerland 1980, Union Bank of Switzerland, Zurich, Switzerland, January 1981, p. 53.

4/ Not available.

Source: Production, based on data obtained from the U.N.'s <u>Yearbook of</u> <u>Industrial Statistics</u>, General Industrial Statistics, 1978, V.I., N.Y. 1980, p. 522; also see "Color Removal by Adsorption," <u>American Dyestuff Reporter</u>, March 1980, p. 38; Imports, compiled from <u>Jahresstatistik des Aussenhandels der</u> Schweiz, Erster Band, 1975, 1976, 1977, 1978, 1979, and 1980.

Source	1975	:	1976	:	1977	:	1978	:	1979	:	1980
	Quantity (1,000 pounds) $1/$										
	8	:	1.2.1	:		:	10 ¹² C 2	:		:	
West Germany:	6,606	:	8,929	:	8,888	:	11,275	:	13,620	:	14,203
France:	4,092	:	6,069	:	6,915	:	6,667	:	9,658	:	10,452
United :		:		:		:		•		:	
Kingdom:	6,230	:	7,080	:	9,058	:	10,347	:	11,792	:	11,383
Spain:	817	:	703	:	818	:	799	:	1,190	:	1,108
All other:	2,655	:	2,213	:	2,551	:	2,373	:	3,703	:	4,186
Total:	20,400	:	24,994	:	28,230	:	31,461	:	39,963	:	41,332
	, , , , , , , , , , , , , , , , , , ,			Va.	lue (1,00	00	S. Franc	s)	-	
	24 - S	:		:		:		:	naniany and analysis an	:	
West Germany:	63,273	:	85,556	:	90,714	:	99,454	:	123,718	:	132,340
France:	31,855	:	52,311	:	67,483	:	59,623	:	87,984	:	100,199
United :		:		:		:		:		:	
Kingdom:	69,881	•	65,459	:	81,107	:	63,499	:	84,602	•	99,276
Spain:	6,724	:	4,828	:	6,057	:	5,134	:	8,371	:	8,693
All other:	24,244	:	14,058	:	15,976	:	14,231	:	22,717	:	34,801
Total:	195,977	:	222,212	:	261,337	:	241,941	:	327, 392	:	375,309
	Unit value (per pound)									i.	
		:		:		:		:		:	
West Germany:	9.58	:	9.58	:	10.21	:	8.82	:	9.08	:	9.32
France:	7.78	:	8.62	:	9.76	:	8.94	:	9.11	:	9.59
United :		:		:		:		:		:	
Kingdom:	11.22	:	9.25	:	8.95	:	6.14	:	7.17	:	8.72
Spain:	8.23	:	6.87	:	7.40	:	6.43	:	7.03	:	7.85
All other:	9.13	:	6.35	:	6.26	:	6.00	:	6.13	:	8.31
Average:	9.61	:	8.89	:	9.26	:	7.69	:	8.19	:	9.08
		:	an a	:	. ¹ e	:		:		:	

Table 14.--Synthetic organic dyes: Swiss imports, by principal sources, 1975-80

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from <u>Jahresstatistik des Aussenhandels der Schweiz</u>, Erster Band, 1975, 1976, 1977, 1978, 1979, and 1980.

Market	1975	:	1976	:	1977	:	1978	:	1979	:	1980	
				Qu	antity (1	1,	000 pounds	s)	<u>1</u> /			
		:		:		:		:		:	1999 B	
West Germany:	9,671	:	14,161	:	12,402	:	12,934	:	13,948	:	11,983	
France:	3,897	:	6,061	:	4,577	:	6,099	:	6,968	:	6,805	
United Kingdom:	4,745	:	6,750	:	6,371	:	6,618	:	5,676	:	4,550	
Japan:	4,995	:	7,063	:	4,839	:	6,947	:	8,608	:	6,078	
United States:	4,928	:	7,148	:	7,616	:	6,597	•	5,699	:	6,021	
All other:	45,034	:	57,219	:	53,603	:	57,317	:	63,995	:	60,197	
Total:	73,270	:	98,402	:	89,408	:	96,512	:	104,894	:	95,634	
	Value (1,000 S. Francs)											
그 친구 맛을 받는 두		:		:	1	:		:	1	:		
West Germany:	100,431	:	134,545	:	128,096	:	119,868	:	137,861	:	121,936	
France:	81,154	:	126,147	:	127,265	:	99,496	:	110,475	:	124,511	
United Kingdom:	66,339	:	95,657	:	81,145	:	78,313	:	67,005	:	55,269	
Japan:	63,907	:	95,293	:	73,189	•	90,912	:	108,989	:	68,862	
United States:	58,833	:	98,449	:	103,141	:	84,273	:	69,451	:	71,107	
All other:	719,616	:	864,808	:	795,343	:	744,904	:	770,624	:	362,032	
Tota1:1	,090,280	:1	,414,899	:1	,308,179	:	1,217,766	:]	,264,405	:	1,203,717	
		1. 		Un	it value	()	per pound))				
이번 이 것 이 전 전 🗗		:		:		:		:		:		
West Germany:	10.38	:	9.50	:	10.33	:	9.27	•	9.88	•	10.18	
France:	20.82	:	20.81	:	27.81	:	16.31	:	15.85	:	18.30	
United Kingdom:	13.98	:	14.17	:	12.74	:	11.83	:	11.80	•	12.15	
Japan:	12.79	:	13.49	:	15.12	:	13.09	:	12.66	:	11.33	
United States:	11.94	:	13.77	:	13.54	:	12.77	:	12.19	:	11.81	
All other:	15.98	:	15.11	:	14.84	:	12.96	:	12.04	:	12.66	
Average:	14.88	:	14.38	:	14.63	:	12.62	:	12.05	:	12.59	
<u> </u>		:		:		:		:		:		

Table 15.--Synthetic organic dyes: Swiss exports, by principal markets, 1975-80

1/ Original data obtained in metric tons and converted at a rate of 2,200 pounds per metric ton.

Source: Compiled from Jahresstatistik des Aussenhandels der Schweiz, Erster Band, 1975, 1976, 1977, 1978, 1979, and 1980. These estimates include exports of non-domestic merchandise. For consumption see table 13.

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ADDRESS CORRECTION REQUESTED

Postage And Fees Paid U.S. International Trade Commission



ADDRESS CHANGE Remove from List Change as Shown Please detach address

label and mail to address shown above.

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