UNITED STATES TARIFF COMMISSION

SUMMARIES OF TRADE AND TARIFF INFORMATION

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

Schedule 4
Chemicals and Related Products
(In 12 volumes)

Volume 12

Fatty Substances, Waxes, and Miscellaneous Chemical Products

TC Publication 239
Washington, D.C.
1968

SUMMARIES OF TRADE AND TARIFF INFORMATION
BY SCHEDULES

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

Schedule 4 Volumes

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

FOREWORD

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

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

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

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

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

SUMMARIES OF TRADE AND TARIFF INFORMATION

SCHEDULE 4

Volume 12

C O N T E N T S

Numerical List of TSUS Items in This Volume

INTRODUCTION

This volume, identified as volume 4:12, is the second in a series of 12 volumes on the chemicals and related products classified under schedule 4 of the Tariff Schedules of the United States (TSUS).

Volume 12 includes summaries on nearly all of the items listed under subparts 13A, B, and C of schedule 4. 1/ These consist of fatty substances, waxes, and a variety of other products which include casein, camphor, chars and carbons, pitch, certain botanical insecticides, certain carbohydrates, sheep dip, tall oil, wood tars and tar oils, cements, radioactive and non-radioactive isotopes, and miscellaneous medical supplies. The complete list of products in this interval of the TSUS is included in appendix A to this volume; those not discussed here, identified by shading are discussed in volumes 5, 6, 7, or 9. Volume 4:12 includes two TSUS items (465.25 and 465.30) encompassing sodium and potassium salts of fatty substances that are part of schedule 4, subpart 8A (Surface-Active Agents) but are included in this volume because of the close relationship they bear to the fatty substances of subpart 13A.

U.S. consumption of the materials covered by volume 4:12 is supplied almost entirely by domestic production and is only slightly less than U.S. production in value. (In 1966, the value of U.S. exports of these materials exceeded that of imports by about $20 million.) U.S. production, partially based on estimates, is valued at about $1-3/4 billion annually. About a third of the total value is accounted for by the fatty substances and nearly a half is estimated to be cleaning and polishing preparations; the remaining value is divided among about 20 of the commodity groups represented by individual summaries, chiefly petroleum waxes, dental and miscellaneous cements, medical and surgical supplies, tall oil, radioactive and other isotopes, and activated carbon. There is no U.S. production for some of the commodity groups, including several of the natural waxes.

In 1966, U.S. imports of the chemicals covered by this volume of summaries amounted to $62.0 million. Imports of casein, including casein mixtures in chief value thereof, accounted for $28.8 million. Waxes accounted for the second greatest value of imports--$12.5 million; botanical insecticides, chiefly pyrethrum, accounted for $8.1 million; fatty chemicals for $3.5 million; dextrines for $3.3 million; and usefully radioactive isotopes for $2.1 million.

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

The distribution in 1966 of volume 12 imports, by principal source, was as follows:

Country	Value ($1 million)	Principal products
New Zealand	8.1	Casein
Argentina	6.1	Casein
Canada	6.0	Casein; casein mixtures; isotopes
Australia	5.5	Casein
Brazil	5.1	Carnauba wax
West Germany	3.9	Mineral waxes; fatty chemicals
Netherlands	3.8	Dextrine; fatty chemicals
Kenya	3.4	Pyrethrum
United Kingdom	3.4	Pyrethrum; isotopes; various others
Communist countries	2.9	Casein; montan wax
Other Latin America	5.0	Candelilla wax; pyrethrum; beeswax; casein; cube root
Other Africa	4.2	Pyrethrum; mineral waxes; beeswax
Other countries	4.6	Casein; fatty chemicals; various others
All countries	62.0	

Export statistics for many of the commodities encompassed by this volume are not available; however, for the most part, these commodities are ones having small or negligible exports. In 1966, based on statistics available, the value of U.S. exports was in excess of $80 million. Exports of paraffin and other petroleum waxes accounted for $36 million, radioactive and other isotopes for more than $15 million, and fatty acids, for $9 million; exports of cleaning and polishing preparations, activated carbon, wood pitch, wood tar, and wood tar oil, tall oil, fatty alcohols, and fatty esters, together, accounted for almost another $20 million. Canada, France, the United Kingdom, West Germany, Mexico, and Japan were the destinations for about half of these exports.

The fatty substances discussed in the group of summaries covering TSUS items 490.05-491.00 are of animal (including marine animal) and vegetable origin--i.e., of natural origin, not synthetic. This group includes fats, oils and greases which have been halogenated, nitrated, or vulcanized and fatty substances, not sulfonated or sulfated, (although mixtures containing sulfonated or sulfated fatty substances are covered) but does not include individual fatty substances that are surface-active agents (except sodium and potassium salts) or that are elsewhere specifically provided for in the tariff schedule. The individual summaries included here cover: Certain chemically modified fats, oils, and greases; fatty acids; salts of fatty acids; fatty alcohols; fatty esters; and artificial mixtures of fatty substances, including surface-active agents.

These fatty chemicals are obtained from the fats, oils, and greases originating in animal and vegetable matter but do not include the fats, oils, and greases themselves unless they have been altered by some chemical process. (Fats, oils, and greases, as such, are discussed in separate summaries under schedule 1.). The principal raw materials used in the production of fatty chemicals are inedible animal tallow and grease, tall oil, and coconut, palm-kernel, soybean, and cottonseed oils.

Fatty chemicals are closely interrelated and, in general, one may be obtained from the other, although some processes are more economically feasible than others. Fatty acids can be derived from fats, oils, and greases, and salts of fatty acids can be obtained from the chemical action of an inorganic alkali and the fatty acid. In industrial practice, however, most salts (soaps)--particularly detergent soaps (sodium and potassium salts)--are produced from the reaction of the alkali with the fats, oils, and greases. In 1966, more than three-quarters of a billion pounds of (anhydrous) soaps were produced in the United States by this method. A small portion of the detergent soaps and 50 million, or more, pounds of other salts were produced from the more than a billion pounds of fatty acids produced domestically in 1966.

Fatty alcohols are produced from fats, oils, and greases, from fatty acids, and from fatty esters. In 1965, more than 200 million pounds of fatty alcohols, derived from natural sources were produced in the United States. A fatty ester is the product of a chemical reaction between a fatty acid and an alcohol. In 1966, more than 100 million pounds of fatty esters covered here (mostly plasticizers) were marketed by U.S. producers; an additional, larger amount was consumed in the internal operations of the producers.

The United States is on a net export basis in regard to fatty chemicals. In 1966, about 85 million pounds, valued at more than $10 million, were exported, mostly in the form of fatty acids. This amount does not include 25 million pounds of commercial soap products, consisting in substantial portion of salts of fatty acids.

U.S. imports, in 1966, amounted to more than 17 million pounds, valued at almost $4 million, mostly in the form of fatty acids and alcohols. Imports for 1965 supplied only a little more than 1 percent of U.S. consumption of fatty chemicals.

The fatty chemicals included in this group of summaries have a large number of uses, principally as chemical intermediates, plasticizers, lubricants, and additives for a variety of products. Fatty acids are the principal intermediates in the manufacture of other fatty chemicals as well as serving as emulsifying agents for producing synthetic rubber. Salts of fatty acids are the base of commercial and industrial soaps and also function as lubricants, water repellents, and paint ingredients. Fatty alcohols are intermediates in the production of surface-active agents, and are solvents, and additives for foods, pharmaceuticals, and lubricants. The fatty esters covered here are mainly plasticizers for synthetic resins but also serve as cosmetic and gasoline additives, and hydraulic fluids.

Fatty chemicals, mainly alcohols and acids, produced synthetically from petroleum, have gained in importance in recent years. Substantial quantities of synthetic fatty alcohols (in item 428.12), chiefly for use as synthetic detergents, have been produced and were probably responsible for a sharp decline in natural fatty alcohol production in 1965. Synthetic fatty acids have reportedly been produced abroad in recent years in substantial quantities. Imports of such, however have been negligible.

The chemically modified fats, oils, and greases and artificial mixtures included in this group of summaries are of little consequence either domestically or in international trade. The small quantity of chemically modified fats, oils, and greases produced in the United States provides special materials for a few minor industries. The artificial mixtures covered herein are not normally articles of commerce.

Commodity	TSUS item
Fats, oils, and greases, of animal or vegetable origin, halogenated, nitrated, or vulcanized	490.05

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

U.S. trade position

The chemically modified fats, oils, and greases covered by this summary are not important commodities of commerce. U.S. production is small (probably less than 1 million pounds in 1966), imports smaller, and exports probably negligible.

Description and uses

Vegetable oils are the principal fatty substances that are halogenated and vulcanized, and lard oil is the principal material nitrated. Halogenation, the chemical combining of the material with bromine, chlorine, fluorine, or iodine, takes place either by the chemical addition of one of the halogens to the unsaturated components of an oil or by the displacement of hydrogen by a halogen in the oil. Bromination appears to be the principal reaction used in the commercial preparation of halogenated vegetable oils. The vulcanization of oils is carried out by the action of sulfur in a manner similar to the vulcanization of rubber. Vulcanized oils have rubber-like properties but lack the tensile strength and abrasion resistance of natural or synthetic rubber.

Halogenated oils are used in the preparation of flavor emulsions for soft drinks, and nitrated oils are used to a limited extent as additives in drying oils for paints. Vulcanized oils are usually used for such products as gaskets, erasers, and electrical insulation where tensile strength and abrasion resistance are not primary requirements. They are also used as additives in extending certain synthetic rubbers.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972 1/
490.05	Fats, oils and greases of animal or vegetable origin, halogenated, nitrated or vulcanized----------	16% ad val.	16% ad val.

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

U.S. consumption, production, and exports

The U.S. annual consumption and production of the chemically modified fats, oils, and greases included in this summary are estimated to have amounted to no more than 1 million pounds annually during the period 1961-66 and may have been considerably less. During this period, although statistics are not available, the U.S. consumption and production of halogenated and nitrated oils are believed to have been small and to have decreased in volume between 1962 and 1966. The volume and trend of consumption and production of the vulcanized oils are not known; the volume of each may be smaller or somewhat greater than the consumption and production of the halogenated and nitrated oils but in any case are minute in comparison with the consumption and production of rubber, some of the properties of which vulcanized oils exhibit.

The halogenated oils are used only in minute amounts in the preparation of soft-drink emulsions. Nitrated oils are used in very small quantities in comparison with the consumption of unmodified oils in the production of paints since they are used only in a limited number of specialty paints. Most of the demand for halogenated and nitrated oils is met from domestic production.

1/ Effective date of the final stage of Kennedy Round trade agreement reductions; the rate for this particular item, however, was not reduced in the Kennedy Round.

In the United States, halogenated oils are produced by two small firms, one in New York, and one in California, and nitrated oils by one medium-sized firm in New Jersey. These companies manufacture a limited number of chemicals and derive a substantial part of their income from the sale of these oils. Firms producing vulcanized oils are not known but limited quantities may be produced by a few companies.

Exports are not separately classified in official statistics but are believed to be quite small.

U.S. imports

Halogenated, nitrated or vulcanized fats, oils, and greases were imported only during three years in the six-year period 1961-1966. Total imports for those years, according to official statistics of the Department of Commerce, were as follows:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)
1962----------	12	12
1963----------	35	34
1966----------	1	5

Imports in 1962-63 were almost entirely from Italy; those in 1966 from the United Kingdom.

Commodity	TSUS item
Fatty acids, not sulfonated or sulfated, and not elsewhere enumerated:	
Of animal origin:	
Oleic acid	490.10
Stearic acid	490.12
Other	490.14
Of vegetable origin:	
From linseed oil	490.20
From hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	490.22
From coconut, palm-kernel, or palm oil	490.24
Other	490.26

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

U.S. trade position

The United States produces a large part of the world supply of the fatty acids discussed in this summary. Of the total U.S. marketed production (valued at over $100 million annually in recent years), up to 8 percent has been exported; 1966 exports were about eight times the quantity of imports.

Description and uses

Fatty acids of animal and vegetable origin comprise an important class of organic chemicals used both in the manufacture of industrial and consumer products and in the production of chemical intermediates. They are obtained from many kinds of animal fats and vegetable oils, and range in nature from substances which are liquid and oily to those which are solid and waxy. Fatty acids that are sulfonated or sulfated (items 465.35-.40) are included in another summary.

Fatty acids are differentiated by chain length (i.e., number of carbon atoms in the molecule) as well as by chemical saturation. The chain length of fatty acids derived from animal and vegetable sources ranges from 6 to 24 carbon atoms (C-6 to C-24); those in the range of 12 to 18 carbon atoms are of the greatest commercial importance.

The products covered here are originally obtained in the form of mixtures of several fatty acids, the exact content depending upon the source and manner of processing. They may be used as mixtures or they may be separated into their component acids.

The principal animal fats from which fatty acids are derived are inedible tallow (a solid) and grease (a semisolid). The principal vegetable oils used are tall oil, obtained as a byproduct in the manufacture of paper by the sulfate (kraft) process, and coconut, soybean, cottonseed, corn, castor, linseed, and palm oils. Oils from marine animals such as the whale, sardine, cod, and other fish are a less important source. Fatty acids are obtained directly from fats and oils by hydrolysis ("splitting"); from the acidulation of vegetable oil soapstocks (foots); and, from the fractional distillation of tall oil. Animal fats are the principal sources for oleic, stearic, and palmitic acids. Coconut oil and palm-kernel oils are the chief sources of lauric, myristic, capric, and caprylic acids. Fatty acids from soybean, cottonseed, and tall oils are rich in linoleic acid, and linseed oil fatty acid has a high content of linolenic acid.

In some processes, materials (such as tallow) that are mixtures of animal acids are separated, by physical means or (more recently) by solvents, into their solid or saturated component, mainly stearic and palmitic acids, and their liquid or unsaturated component, mainly oleic acid (red oil). In another process, without being separated, the unsaturated component (principally oleic acid) of tallow fatty acid is hydrogenated to produce a saturated fatty acid with a high stearic acid content. A relatively complete separation of mixed fatty acids into their component acids is achieved by fractional distillation. By this process stearic and palmitic acids are obtained from saturated tallow acid (as produced by hydrogenation), and coconut oil fatty acid may be separated into its caprylic, capric, lauric, myristic, palmitic, and oleic acid components. The composition by chemical type is given in table 1 to this summary for several commercial types of fatty acids.

Fatty acids are consumed in the manufacture of many industrial, household, and toilet articles. The acids are usually converted to salts (items 465.25-.30; 490.30-.50), esters (items 490.90-.94), or other derivatives prior to introduction into a manufacturing process, although in some instances they are introduced directly. Extensive use is made of vegetable (including tall oil) fatty acids in the production of alkyd and epoxy resins for protective coatings. The acids are esterified in the process. Saponification of fatty acids is employed to produce metallic soap and some toilet soap (see Description and Uses section of summary covering items 465.25-.30 and 490.30-.50). Stearic acid salts, in the form of metallic soaps, have wide industrial use as lubricants, water repellents, and other agents. Fatty acids, mainly of animal origin, serve as emulsifying agents in the polymeriza-

tion of synthetic rubber and as compounding ingredients in rubber formulation. The cosmetic industry uses stearic and oleic acids as basic formulating ingredients, fatty acid soaps as anionic emulsifiers, and fatty esters as nonionic emulsifiers and emollients. Certain esters of fatty acids form a significant class of industrial plasticizers, and other esters and derivatives of fatty acids form a large class of surface-active agents other than soaps.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Fatty acids, not sulfonated or sulfated, and not specially provided for:		
	Of animal origin:		
490.10	Oleic acid----------	3¢ per lb. + 10% ad val.	1.5¢ per lb. + 5% ad val.
490.12	Stearic acid----------	3¢ per lb. + 12.5% ad val.	1.5¢ per lb. + 6% ad val.
490.14	Other----------	1.5¢ per lb. + 10% ad val.	0.7¢ per lb. + 5% ad val.
	Of vegetable origin:		
490.20	From linseed oil--------	4.5¢ per lb. + 10% ad val.	2.2¢ per lb. + 5% ad val.
490.22	From hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil----------	2.25¢ per lb. + 10% ad val.	1.1¢ per lb. + 5% ad val.
490.24	From coconut, palm-kernel, or palm oil-------	10% ad val.	5% ad val.
490.26	Other----------	10% ad val.	5% ad val.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, except for item 490.24, are the rates applicable on August 31, 1963, the effective date of the TSUS. The 10 percent rate

for item 490.24 was provided for by Public Law 89-388, effective April 13, 1966. Previously under the TSUS the rate was 3 cents per pound plus 10 percent ad valorem (the specific rate of 3 cents per pound having been derived from former import tax provisions); the specific rate, however, had been suspended continuously under the TSUS since August 31, 1963 (TSUS deleted item 907.85).

U.S. consumption

The consumption of fatty acids increased steadily from 700 million pounds in 1961 to 1.1 billion in 1966 (table 2). The increase is partly accounted for by the greater demand for basic consumer goods such as soaps and detergents, textiles, and lubricants, in which they are used, and partly by new uses, particularly in cosmetics, plastics, and chemical intermediates. Eighty-five to 90 percent of the supply of fatty acids is marketed; the balance is used "captively" by producers for inclusion in their own products.

Fatty acids compete with one another for many purposes, although each type has its preferred uses. Fatty acids from tall oil in some instances have replaced fatty acids derived from agricultural products, particularly soybeans. Fatty acids of animal or vegetable origin confront potential competition from synthetic fatty acids (in item 425.98) of which there is growing use.

Prices of the principal fatty acids in recent years have ranged between 5 and 30 cents per pound. Saturated vegetable fatty acids--capric, caprylic, lauric, and myristic--have commanded the highest prices, ranging from 25 to 30 cents per pound in tank-car lots. Stearic and oleic acid prices have been listed at between 18 and 26 cents per pound in bags. Coconut oil fatty acid has been priced at 20 to 23 cents per pound, and soybean, cottonseed, and corn oil fatty acids, at 16 to 20 cents per pound. Tallow fatty acids have been listed at prices of about 16 to 21 cents per pound, or slightly higher, if hydrogenated. Tall oil fatty acids have generally been priced less than 10 cents per pound. Prices have changed frequently, depending on the price of the raw material and other factors.

U.S. production and exports

About 25 U.S. companies, located mainly in the eastern third of the country produce fatty acids. Seven of these produce tall oil fatty acids as a byproduct of paper-making operations. The rest are divisions of meat packers, renderers, and dairies, or producers of soap, detergents, paint, and a variety of acids, oils, and other chemicals. Some consume large quantities of fatty acids in the manufacture of finished products. For none of the producers is the sale of fatty acids the major source of income.

U.S. producers operate subsidiaries and joint ventures with foreign companies in Western Europe, Japan, Canada, and Latin America.

Batch-processing methods previously used have been extensively replaced since World War II by continuous processing equipment. Continuous hydrolysis, solvent separation, and fractional distillation have been widely used in recent years.

U.S. production, as reported by the U.S. Bureau of the Census, increased from 706 million pounds in 1961, to 1.13 billion pounds in 1966 (table 2). The Bureau of the Census provides the following breakdown of the total production of fatty acids for 1963, the most recent year for which the Census of Manufactures was published:

Fatty acids: U.S. production, by kind, 1963

	1,000 pounds
Stearic acid, total	260,169
Stearic acid, single, double, or triple pressed (40-50% stearic)	63,601
Stearic acid, other (over 50% stearic; over 60% palmitic; and hydrogenated)	196,568
Oleic acid, including white oleic and red oil	105,072
Other, total	482,982
Tall oil	274,012
Other saturated	104,965
Other unsaturated	104,005
Total, fatty acids	848,223

A similar breakdown of the annual production of fatty acids for the years 1961-66 is also shown (table 3), based on statistics published by the Fatty Acid Producers Council of the Soap and Detergent Association (SDA). These statistics, compiled on a somewhat more limited basis (excluding in-process intermediates) than Government statistics, show total production for 1966 at 865 million pounds, or about 75 percent of the Census figure. In 1966, based on SDA statistics, tall oil fatty acids accounted for 39 percent of total production; stearic acid for 31 percent; oleic acid for 14 percent; other unsaturated acids for 9 percent; and, other saturated acids for 7 percent. Although most of the categories of fatty acid production showed a substantial increase between 1961 and 1966, tall oil acid showed the greatest increase (about 70 percent).

During the period 1961-66, fatty acid exports, although never exceeding 8 percent of the annual quantity of domestic production, appeared to rise at a slightly faster pace than sales to the domestic

market. Tall oil fatty acids accounted for by far the bulk of the exports and stearic acid for a substantial part of the remainder (table 4). Most exports of tall oil fatty acids were destined for the countries of Western Europe, and most of those of other fatty acids were destined for countries of the Western Hemisphere and Japan. An apparent large increase in exports for 1965 and 1966 may be partly due to the reporting of exports in a more inclusive classification.

U.S. imports

During the period, 1961-66, imports of fatty acids averaged 10 to 11 million pounds annually (table 2). Imports since 1961 have been equivalent to less than 2 percent of the U.S. consumption of fatty acids; however, during the 1964-66 period, for which detailed statistics are available, imports of fatty acids derived from coconut oil and palm-kernel oil, were equivalent to from 5 to 10 percent of U.S. consumption of these acids. An analysis of imports for the years 1964-66 shows that about 90 percent of the imports were of vegetable origin and that 50 to 75 percent were derived from coconut, palm-kernel, or palm oil. Of these sources, by far the principal one was coconut oil, from which most of the fatty acids were derived in the form of commercially pure chemically defined acids, predominantly lauric acid and myristic acid. West Germany, Denmark, and Japan were the principal supplying countries (table 5).

Foreign production and trade

The production of fatty acids of animal or vegetable origin is substantial in Western Europe, Japan, and Canada. Of the European countries, the EEC countries are somewhat larger producers than the European Free Trade Association countries. The production of fatty acids from tall oil is considerably less important in Europe than in the United States; that of stearic acid in Western Europe is probably somewhat less than in the United States; and that of oleic acid is more nearly on a par with production in the United States. The production of other fatty acids in Europe, including those from coconut, palm-kernel, or palm oil, is known to be substantial.

Table 1.--Commercial fatty acids (selected): Composition by chemical type

(Percent)

Commercial type	Saturated						Unsaturated				Other
	Caprylic	Capric	Lauric	Myristic	Palmitic	Stearic	Palmitoleic	Oleic	Linoleic	Linolenic	
Stearic acid, double-pressed				2	51	40		6			1
Stearic acid, triple-pressed				2	47	48		2			1
Stearic acid, distilled (80%)				2	14	82		1			1
Stearic acid, distilled (90%)					9	90					1
Palmitic acid, commercially pure				2	91	6					1
Lauric acid, commercially pure		2	96	2							
Oleic acid (Red oil)				3	5	2	6	73	8	1	2
Oleic acid, white				3	3	1	6	77	7	1	2
Tallow acid, distilled				3	28	15		46	5	1	2
Tallow acid, hydrogenated				3	29	63		3			2
Coconut oil fatty acid, distilled	6	7	49	18	9	2		7	2		
Cottonseed oil fatty acid, distilled				1	24	3		31	40	1	
Soya bean oil fatty acid, distilled				1	15	6		23	50	5	
Linseed oil fatty acid, distilled					10	4		15	20	51	
Tall oil fatty acid, low rosin					1			50	47	1	1

Source: Compiled from technical and trade literature.

Table 2.--Fatty acids (not sulfonated or sulfated): U.S. production, imports for consumption, exports of domestic merchandise, year-end stocks, apparent consumption, and ratio of imports to consumption, 1961-66

(Quantity in million of pounds)

Year	Production	Imports	Exports	Year-end stocks 1/	Apparent consumption	Ratio (percent) of imports to consumption
1961	706.0	2/10.4	41.4	71.0	700.0	1.5
1962	784.6	2/10.6	41.9	83.2	741.1	1.4
1963	835.6	2/10.5	46.1	112.4	770.8	1.4
1964	936.0	11.0	57.5	81.4	920.5	1.2
1965	1,041.4	10.0	79.3	86.2	966.0	1.0
1966	1,133.9	9.6	78.1	92.3	1,059.3	.9

1/ Includes only stocks located at producer plants and warehouses.
2/ Imports for 1961-63 estimated by the Tariff Commission on the basis of a partial analysis.

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

Table 3.--Fatty acids (not sulfonated or sulfated): U.S. production, 1961-66

Type	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Fatty acids, total--	572,200	641,900	679,800	755,300	791,800	865,232
Stearic acid 1/-------	179,700	199,500	219,300	243,400	249,100	270,691
Oleic acid----------	85,600	93,200	104,200	108,900	113,300	120,900
Other fatty acids, total----------	306,900	349,200	356,300	403,000	429,400	473,650
Tall oil----------	195,600	228,000	238,700	266,100	298,200	337,240
Other saturated 2/--	56,500	60,300	51,900	54,500	52,400	61,221
Other unsaturated 3/	54,800	60,900	65,700	82,400	78,800	75,189
	Value (1,000 dollars) 4/					
Fatty acids, total--	76,480	92,531	94,188	112,575	124,011	130,951
Stearic acid 1/-------	32,346	35,910	37,281	46,246	52,311	54,138
Oleic acid----------	12,840	14,912	17,714	20,691	22,660	22,971
Other fatty acids, total----------	31,294	41,709	39,193	45,638	49,040	53,842
Tall oil----------	11,736	20,520	19,096	21,288	23,856	26,979
Other saturated 2/--	12,430	12,663	10,899	11,990	12,576	14,081
Other unsaturated 3/	7,128	8,526	9,198	12,360	12,608	12,782

1/ Includes all grades of stearic acid, hydrogenated animal and vegetable fatty acids, and palmitic acid.

2/ Includes hydrogenated fish and marine mammal fatty acids, coconut-type fatty acids (including palm-kernel and babassu), hydrogenated coconut acid, and fractionated fatty acids such as caprylic, capric, myristic, and lauric.

3/ Includes all unsaturated fatty acids of animal or vegetable origin, except oleic and tall oil fatty acids.

4/ Value of production calculated from quoted market prices.

Source: Compiled from statistics of the Soap and Detergent Association.

Note.--The statistics in this table are from a different source than those shown in table 1 and do not include in-process intermediates.

Table 4.--Fatty acids (not sulfonated or sulfated): U.S. exports of domestic merchandise, 1961-66

Item	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Fatty acids, total---	41,400	41,900	46,100	57,500	79,300	78,100
Stearic acid----------	8,100	8,100	6,300	7,300	1/	1/
Oleic acid----------	1,400	1,000	1,200	1,800	1/	1/
Other fatty acids, total----------	31,900	32,800	38,600	48,400	79,300	78,100
Tall oil----------	29,800	31,000	37,100	43,700	51,500	56,100
Other----------	2,100	1,800	1,500	4,700	27,800	22,000
	Value (1,000 dollars)					
Fatty acids, total 2/	3,174	4,042	4,113	5,380	9,067	9,039
Stearic acid----------	844	816	695	813	1/	1/
Oleic acid----------	248	166	225	297	1/	1/
Other fatty acids, total 3/----------	2,082	3,060	3,193	4,270	9,067	9,039
Tall oil 3/----------	1,788	2,790	2,968	3,518	4,155	4,893
Other 3/----------	294	270	225	752	4,912	4,146

1/ Included in "Other."
2/ Partly estimated for 1961-64.
3/ Estimated for 1961-64.

Source: For stearic acid and oleic acid in 1961-64 and for all 1965 and 1966 statistics, the U.S. Department of Commerce; for other fatty acids, the Soap and Detergent Association.

Table 5.--Fatty acids (not sulfonated or sulfated): U.S. imports for consumption, by kind, 1964-66

Type	1964		1965		1966	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars	1,000 pounds	1,000 dollars
Fatty acids, total	11,019	2,022	10,020	1,898	9,613	1,895
Oleic acid	25	8	81	26	-	-
Stearic acid	8	1	42	10	44	6
Other fatty acids, total	10,986	2,013	9,897	1,862	9,569	1,889
Of animal origin	876	144	862	113	1,046	184
Of vegetable origin	10,110	1,869	9,035	1,749	8,523	1,705
From linseed oil	3	1	2	1	1/	2/
From hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	240	42	2	2/	584	174
From coconut, palm-kernel, or palm oil	8,234	1,504	6,506	1,334	4,665	940
From other vegetable sources	1,633	322	2,525	414	3,274	591

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

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

Commodity	TSUS item
Salts of fatty acids, not sulfonated or sulfated:	
Of animal or vegetable origin:	
Sodium and potassium salts:	
From coconut, palm-kernel, or palm oil	465.25
Other	465.30
Of animal origin:	
Lithium stearate	490.30
Other	490.32
Of vegetable origin:	
From linseed oil:	
Cobalt linoleate	490.40
Lead linoleate	490.42
Other	490.44
From hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	490.46
From coconut, palm-kernel, or palm oil	490.48
Other	490.50

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

U.S. trade position

The United States produces a large part of the world supply of fatty acid salts and consumes almost all of its own output, largely in the manufacture of household and industrial soap products. The production of fatty acid salts in 1966 is believed to have amounted to nearly 1 billion pounds. Exports of the salts, as such, are believed to be small since most of the salts are exported in the form of soap products. Imports, which were less than 300,000 pounds, and valued at less than $100,000 in 1966, form a negligible part of domestic consumption.

Description and uses

Salts of fatty acids comprise a class of chemicals termed "soaps." Sodium and potassium salts are water-soluble soaps that form the main constituent of most commercial soap products (items 466.05-.25) used in household and industry as detergents. A second group of salts are popularly known as the metallic soaps; these are practically insoluble in water but are soluble in organic solvents.

Salts of this group include those of aluminum, barium, cadmium, calcium, cobalt, copper, lead, lithium, magnesium, manganese, and zinc. The so-called metallic soaps are of great industrial importance as lubricants, water repellents, and agents of other types. Salts derived from sulfonated or sulfated oils (items 465.35-.40) are included in the summary covering surface-active agents.

Fatty acid salts are usually obtained either (1) by the action of an alkali directly on fats or oils (items 176.01-177.72) 1/ 2/; (2) from the reaction of an alkali with fatty acids (items 490.10-.26); or (3) by the action of a metal salt on an alkali soap solution. Sodium and potassium salts are prepared by one of the first two methods, principally the first, which is the most important industrial soap-making process. The metallic soaps are usually obtained by the third, or "precipitation" method which requires the prior preparation of an alkali soap solution. Metallic soaps are also prepared to some extent by the action of metallic oxides, or hydroxides, or by weakly acidic salts, on fatty acids.

The characteristics of fatty acid salts (soaps) vary considerably, depending on the nature of the fatty substance from which they are derived as well as on the metal source. As fats, oils, and fatty acids from which the salts are derived differ widely in their chemical structures and characteristics, so do fatty acid salts. Oleic, stearic, palmitic, myristic, and lauric acid salts, usually as mixtures, are preferred for the preparation of cleansing soaps. Accordingly, salts from tallow and grease, high in oleates, palmitates, and stearates have been the principal ingredients of cleansing soap in the United States for many years. Coconut acid salts, high in laurates and myristates, are used extensively, usually mixed with other salts, in higher quality and special-purpose cleansing soaps. Sodium and potassium soaps prepared from individual fatty acids, however, comprise a very small portion of cleansing soaps produced domestically. On the other hand, of the metallic soaps produced in the United States, the most important are those prepared from individual fatty acids. Stearates predominate; oleates, linoleates, and palmitates are considerably less important. Of metallic soaps derived from mixed acids, tallates are the most important; coconut acid salts, less important.

1/ Salts of fatty substances (fats, oils, fatty acids, etc.) are referred to as the salts of fatty acids, even though they may be obtained directly from fats and oils without isolation of the fatty acids during the process.

2/ TSUS item 176.01 (babassu oil) was renumbered 176.00, effective January 1, 1968.

Sodium and potassium salts of fatty acids, the principal ingredients in commercial soap products, are not usually removed from process as pure salts but have added to them other ingredients which perform functions supplementary to the basic detergent action of the salts. The other ingredients include water softeners, antioxidants, perfumes, and abrasive, bleaching, and coloring agents. The salts also contain varying amounts of moisture depending on the projected use of the product and the method of processing. The commercial soap products are marketed mainly as toilet soaps in bars, and as laundry and household soaps in quick-dissolving forms (i.e., as powders, chips, flakes, etc.).

Metallic soaps frequently serve more than one industrial use. Aluminum, barium, calcium, lead, magnesium, and zinc stearates serve as lubricants for molding operations, for wire-drawing, and as anticaking agents for powders, while zinc, calcium, and aluminum stearates are used as water repellents for textiles, paper, and cement. Aluminum and lithium stearates are important ingredients of lubricating greases; lead stearate is used for controlling the burning rate in ammunition powders; and cobalt and manganese stearates are used as catalysts for oxidizing petroleum fractions. Cadmium and barium laurates, oleates, and stearates are used as stabilizers for polyvinyl chloride resins. Aluminum and zinc palmitate and calcium linoleate are used as paint ingredients; cobalt, manganese, and lead tallates are paint driers. Copper linoleate is used in antifouling paints for marine use.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Salts of fatty substances, not sulfonated or sulfated:		
	Of animal or vegetable origin:		
	Sodium and potassium salts:		
465.25	From coconut, palm-kernel, or palm oil	10% ad val.	5% ad val.
465.30	Other	1.5¢ per lb. + 10% ad val.	0.7¢ per lb. + 5% ad val.
	Of animal origin:		
490.30	Lithium stearates	1.5¢ per lb. + 10% ad val.	0.7¢ per lb. + 5% ad val.
490.32	Other	1.5¢ per lb. + 10% ad val.	0.7¢ per lb. + 5% ad val.
	Of vegetable origin:		
	From linseed oil:		
490.40	Cobalt linoleate	7.25¢ per lb.	3.6¢ per lb.
490.42	Lead linoleate	2.25¢ per lb. + 15% ad val.	1¢ per lb. + 7.5% ad val.
490.44	Other	2.25¢ per lb. + 10% ad val.	1.1¢ per lb. + 5% ad val.
490.46	From hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	2.25¢ per lb. + 10% ad val.	1¢ per lb. + 5% ad val.
490.48	From coconut, palm-kernel, or palm oil	10% ad val.	5% ad val.
490.50	Other	10% ad val.	5% ad val.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to

January 1, 1968, except for items 465.25 and 490.48, are the rates applicable on August 31, 1963, the effective date of the TSUS. The 10 percent rate for items 465.25 and 490.48 was provided for by Public Law 89-388, effective April 13, 1966. Previously under the TSUS, the rate was 3 cents per pound plus 10 percent ad valorem (the specific rate of 3 cents per pound having been derived from former import tax provisions); the specific rate, however, had been suspended continuously under the TSUS since August 31, 1963 (TSUS deleted items 907.72 and 907.86).

U.S. consumption, production, and exports

During the period 1961-66, annual consumption of salts of fatty acids is believed to have declined 3 or 4 percent. The rate of decline for the sodium and potassium salts would be somewhat greater than this since the metallic fatty acid salts appear to have almost doubled in consumption during this period. The value of annual consumption can roughly be equated to annual production for these years since both imports and exports have been very small in respect to U.S. production.

The annual production of salts of fatty acids in 1966 is believed to have aggregated close to 1 billion pounds. This figure is estimated, largely on the basis of annual sales data released by the industry on finished soap products, and on the quantities of fats, oils, and greases utilized in soap as published by the U.S. Department of Agriculture. Annual sales statistics for commercial cleansing soap are given in the summary on soap and soap powders (items 466.05-.25). The annual consumption of fats, oils, and greases in cleansing soaps are given below.

(Millions of pounds)

Year	Total fats, oils, and greases	Inedible tallow and greases	Coconut oil	Others
1961	911	721	140	50
1962	859	683	141	35
1963	861	684	150	27
1964	875	691	158	26
1965	819	650	145	24
1966	839	667	150	22

The decrease in the amount of fats consumed in cleansing soaps generally reflects the gradual displacement of soap in the detergent market by synthetic detergents.

During 1961-65, the annual production of metallic soaps accounted for from 3 to 6 percent of the total production of fatty acid salts. Unlike the trend of the soluble salts (sodium and potassium), however, the production of metallic soaps rose from 35 million pounds in 1961 to 53 million pounds in 1965 (table 1). Salts of stearic acid comprised about 80 percent of the metallic soaps.

Salts of fatty acids are produced in the United States by more than 50 companies located throughout the Eastern and Midwestern States. Most of the companies are small or medium in size; however, the bulk of production is consumed captively by a few large companies in the manufacture of detergent-type soaps. The large companies also operate overseas plants or are affiliated with foreign concerns. The marketed production of fatty acid salts, as such, represents only a minor source of income for most producers, although for some the salts are important chemical intermediates used in the manufacture of other products.

Statistics on U.S. exports of salts of fatty acids are not recorded separately; however, the quantity of exports is probably no greater than that of imports.

U.S. imports

Imports of salts of fatty acids during the period 1961-66 were equivalent to less than 1 percent of domestic production. During this period, imports of salts of fatty acids were greatest in 1962, when almost 1 million pounds were imported. Imports declined in each year thereafter and were less than 300,000 pounds in 1966.

Statistical breakdown by class of imports for salts of fatty acids became available when the TSUS went into effect on August 31, 1963. For the years 1964-66, imports of sodium and potassium salts derived from coconut, palm-kernel, or palm oil accounted for 81, 69, and 64 percent respectively, of the quantity of annual imports of salts of fatty acids. During these years there were also some imports of lithium stearate and other salts of animal origin, and salts derived from linseed oil, from hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil, and from other vegetable oils. There were no imports in any of these years of cobalt or lead linoleate, nor of salts, other than sodium or potassium salts, of fatty acids derived from coconut, palm-kernel, or palm oil.

In 1966, Japan was by far the principal supplier of imported salts of fatty acids; however, in preceding years, Canada, Belgium, and West Germany generally had been more important sources than Japan (table 2).

Table 1.--Salts of fatty acids (not sulfonated or sulfated): U.S. production of metallic soaps 1/, by kind, 1961-65

Type	1961	1962	1963	1964	1965
	Quantity (1,000 pounds)				
Grand total	35,363	39,118	39,829	42,330	52,930
Linoleic acid salts	492	437	409	542	459
Oleic acid salts	329	213	329	339	282
Palmitic acid salts	2/	327	274	245	758
Stearic acid salts, total	27,299	30,573	30,885	31,884	41,962
Aluminum stearates	5,298	5,066	4,971	5,014	5,101
Calcium stearate	8,433	10,083	10,836	11,046	17,842
Zinc stearate	7,705	8,538	8,567	9,982	12,020
Other	5,863	6,886	6,511	5,842	6,999
Tall oil salts, total	6,454	7,371	7,583	9,007	8,679
Cobalt tallate	2,012	2,106	2,154	2,391	2,400
Lead tallate	2,831	3,395	3,554	4,262	3,847
Other	1,611	1,870	1,875	2,354	2,432
Other	789	197	349	313	790
	Value (1,000 dollars) 3/				
Grand total	13,816	14,370	14,070	15,502	17,850
Linoleic acid salts	157	144	139	190	147
Oleic acid salts	234	166	263	292	203
Palmitic acid salts	2/	2/	2/	2/	2/
Stearic acid salts, total	10,364	11,312	10,810	11,478	13,847
Aluminum stearates	2,013	1,925	1,889	1,855	1,836
Calcium stearate	2,699	2,924	3,034	3,093	4,639
Zinc stearate	2,928	3,330	3,255	3,993	4,447
Other	2,724	3,133	2,632	2,537	2,925
Tall oil salts, total	2,259	2,432	2,502	3,062	3,038
Cobalt tallate	1,026	1,011	1,099	1,267	1,272
Lead tallate	793	883	888	1,066	962
Other	440	538	515	729	804
Other	802	316	356	480	615

1/ The production of metallic soaps is only a small portion of the total production of fatty acid salts. Statistics on the production of salts of fatty acids consumed in commercial soap products is not available.

2/ Included in other.

3/ Value of production calculated based on unit value of sales.

Source: U.S. Tariff Commission, Synthetic Organic Chemicals, U.S. Production and Sales.

November 1967
4:12

Table 2.--Salts of fatty acids (not sulfonated or sulfated): U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Japan	-	67	60	69	79	188
West Germany	47	109	16	122	90	26
United Kingdom	2	98	45	57	69	30
Canada	2	430	165	108	-	8
Belgium	1/ 574	168	203	35	-	-
Italy	-	79	102	34	2	-
All other	9	15	21	8	2/ 87	43
Total	634	966	612	433	327	295
	Value (1,000 dollars)					
Japan	-	23	22	19	25	56
West Germany	11	50	6	26	14	13
United Kingdom	3/	39	14	20	10	10
Canada	1	104	31	24	-	3
Belgium	38	58	70	11	-	-
Italy	-	32	37	11	3/	-
All other	2	6	3	3	2/ 25	13
Total	52	312	183	114	74	95

1/ Amount believed to be in error.
2/ Includes 77,000 pounds, valued at $23,000, from Norway.
3/ Less than $500.

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

Commodity	TSUS item
Fatty alcohols, not sulfonated or sulfated, and not elsewhere enumerated:	
Of animal or vegetable origin:	
Oleyl	490.65
From coconut, palm-kernel, or palm oil	490.73
Other	490.75

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

U.S. trade position

Almost all U.S. production of fatty alcohols derived from natural sources is consumed domestically, to a large extent in the internal operations of the producers. In recent years, less than 5 percent of the estimated annual domestic consumption of over 200 million pounds has been supplied by imports; U.S. exports are believed to have been slightly larger than imports and to have consisted partly of intracompany transfers between producers in the United States and Canada.

Description and uses

The fatty alcohols discussed in this summary are natural alcohols obtained from animal fats or vegetable oils, or derived from other fatty substances obtained from these fats and oils. They are mainly those alcohols having straight, chain-like molecular structures that contain even numbers of carbon atoms ranging from 6 to 26 (C-6 to C-26). They vary from clear, oily liquids to white, waxy solids. Fatty alcohols produced by synthetic means are included in such TSUS items as 427.84, 427.98, and 428.12; fatty alcohols that are sulfonated or sulfated are included in items 465.45 and 465.50 (see separate summaries).

Fatty substances, other than fats and oils, from which fatty alcohols may be derived, include mainly fatty acids (items 490.10-.26) and esters of fatty acids (items 490.90-.94), both of which are converted from fats and oils, although present, to a small extent, in a free state in some of these fats and oils.

The two principal processes used to obtain fatty alcohols are high-pressure hydrogenolysis, in which the alcohols are produced in the saturated form, and sodium reduction, in which the alcohols may

be produced in both the saturated and unsaturated forms.

The saturated fatty alcohols of greatest importance commercially are decyl (C-10), lauryl (C-12), myristyl (C-14), cetyl (C-16), and stearyl (C-18). Oleyl alcohol is the only unsaturated alcohol of any commercial consequence. Decyl, lauryl, and myristyl alcohols are obtained chiefly from coconut oil; stearyl, mainly from tallow; and cetyl and oleyl, almost entirely from spermaceti and sperm oil. Smaller amounts of fatty alcohols (including some higher alcohols above the C-18 chain length) are derived from vegetable sources such as cottonseed, soybean, and linseed oils, and animal sources such as wool fat and fish oils.

Fatty alcohols, as first produced, are usually in the form of mixtures. Varying degrees of separation of the component alcohols are obtained by fractional distillation whereby the content of the alcohol mixture is altered as required and individual alcohols of 95 percent, or more, purity may be obtained.

Fatty alcohols serve a variety of purposes, mostly as intermediate chemicals. They are the starting materials for a wide range of surface-active materials (e.g., detergents), plasticizers for polyvinyl chloride, lubricant additives, food and pharmaceutical ingredients, and solvents for fats, waxes, gums, and resins. Cetyl and stearyl alcohols are used extensively as emulsifiers and emollients for cosmetics; lower fatty alcohols are used as rubber compounding and polymerizing agents.

The most important end-uses for fatty alcohols are as detergents. Detergent-range alcohols (C-12 and above) are converted to alkyl sulfonates and sulfates and are incorporated in numerous formulated detergent products. Fatty-alcohol derivatives have become increasingly important for this use because of their capacity for ready decomposition ("biodegradability") in sewage systems.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Fatty alcohols of animal or vegetable origin, not sulfonated or sulfated, and not elsewhere enumerated:		
490.65	Oleyl----------	2.5¢ per lb. + 12.5% ad val.	1.2¢ per lb. + 6% ad val.
490.73	From coconut, palm-kernel, or palm oil-	10.5% ad val.	5% ad val.
490.75	Other----------	10.5% ad val.	5% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, except for item 490.73, are the rates applicable on August 31, 1963, the effective date of the TSUS. The 10.5 percent rate for item 490.73 was provided for by Public Law 89-388, effective April 13, 1966. Previously under the TSUS, the rate was 3 cents per pound plus 10.5 percent ad valorem (the specific rate of 3 cents per pound having been derived from former import tax provisions); the specific rate, however, had been suspended continuously under the TSUS since August 31, 1963 (TSUS deleted item 907.87).

U.S. consumption, production, and exports

The annual domestic consumption and production of fatty alcohols during the period 1961-65 amounted to at least 200 million pounds. Production increased between 1961 and 1964 but decreased substantially in 1965. About three-quarters of the fatty alcohols produced are used in the internal operations of the producer, either as intermediate chemicals or for inclusion in formulated products.

At least 75 percent of the natural fatty alcohols produced during the years 1961-65 was in the form of mixed alcohols with molecular chain lengths ranging between 6 and 18 carbon atoms (i.e.,

from hexyl (C-6) to stearyl (C-18), or oleyl (C-18) alcohols. The remainder of the fatty alcohol production consisted of chemically defined (relatively pure) alcohols of the decyl (C-10), lauryl (C-12), cetyl (C-16), stearyl, and oleyl types. Statistical data on the chemically defined alcohols are not available for all types and for all years; however, stearyl alcohol production in 1961 amounted to about 13 million pounds and was probably greater during the period 1962-64; lauryl alcohol production in 1963-64 was 17 to 18 million pounds annually; and cetyl alcohol production during the years 1962-65 was between 1 and 3 million pounds annually.

Between 1961 and 1964, about 75 percent of the fatty alcohols produced in the range C-10 and above was derived from animal or vegetable sources; the rest was produced by synthesis. In 1965, the share of fatty alcohols produced from natural sources was considerably less. Most of the alcohols with chain lengths of less than 10 carbon atoms were produced by synthetic means. The natural fatty alcohols were produced mainly from imported coconut oil and domestic tallow. Oleyl alcohol, made from sperm oil of either domestic or foreign origin, accounted for only a small part of the U.S. production.

Natural fatty alcohols are produced in the United States by two large- and two medium-sized companies; the production of fatty alcohols is not a major source of income to any of these firms. Plants are located in the North Central States and on the east coast.

U.S. exports of natural fatty alcohols in recent years are believed to have been small, since a large portion of the domestic production is utilized in the internal operations of producers. Exports are estimated, however, to have been slightly larger than imports; a substantial portion of these fatty alcohol exports are believed to have gone to Canada and to have included intracompany transfers.

U.S. imports

Official statistics on imports of fatty alcohols are not available for the years prior to 1964. Total imports declined from 6.7 million pounds, valued at $1.6 million, in 1964, to 4.2 million pounds, valued at $1.1 million, in 1966, as shown in the following table:

TSUS class	1964 1,000 pounds	1964 1,000 dollars	1965 1,000 pounds	1965 1,000 dollars	1966 1,000 pounds	1966 1,000 dollars
Fatty alcohols:						
Oleyl (490.65)---	768	259	611	272	1,159	458
From coconut, palm-kernel, or palm oil (490.73)-------	4,546	969	2,747	531	1,882	383
Other (490.75)---	1,338	366	1,798	418	1,173	267
Total-------	6,652	1,594	5,156	1,221	4,214	1,108

Imports of fatty alcohols derived from coconut, palm-kernel, or palm oils, the largest class of imports on a volume basis during the years 1964-66, declined from 4.5 million pounds (68 percent of total imports) in 1964 to 1.9 million pounds (45 percent of total imports) in 1966. During the period, West Germany was the principal supplier of fatty alcohol imports, but its share of total imports declined from more than 50 percent in 1964 to less than 40 percent in 1965 and 1966. These imports from West Germany were principally fatty alcohols derived from coconut, palm-kernel, or palm oils. Japan, which was the second most important supplier of U.S. imports of fatty alcohols from 1964 to 1966, supplied between 25 and 36 percent of the imports during these years. The United Kingdom and the Netherlands supplied most of the balance of fatty alcohol imports during the period (see accompanying table).

U.S. imports of fatty alcohols derived from coconut, palm-kernel, or palm oils (item 490.73) have consisted mostly of lauryl alcohol and smaller amounts of stearyl, cetyl, and myristyl alcohols. Imports of fatty alcohols other than oleyl and coconut-type alcohols are derived from sperm oil, wool wax, cottonseed oil, and other animal and vegetable sources; the largest portion of these imports has consisted of cetyl alcohol and the rest, mostly of stearyl alcohol or cetyl-stearyl alcohol mixtures.

Foreign production and trade

The greatest concentration of fatty alcohol production outside the United States is in Great Britain and the EEC countries; of the latter, West Germany is probably the largest producer and exporter of natural fatty alcohols. Japan is also a substantial producer and exporter. In recent years, these countries, as well as some in Eastern Europe, have increased production capacity for the synthetic fatty alcohols as well as for the natural.

Fatty alcohols (not sulfonated or sulfated): U.S. imports for consumption, by principal sources, 1964-66

Country	1964	1965	1966
	Quantity (1,000 pounds)		
West Germany	3,474	1,969	1,634
Japan	1,707	1,870	1,148
United Kingdom	536	427	553
Netherlands	546	714	778
Denmark	301	154	49
All other	88	22	52
Total	6,652	5,156	4,214
	Value (1,000 dollars)		
West Germany	822	535	472
Japan	323	300	194
United Kingdom	204	184	241
Netherlands	170	155	170
Denmark	62	33	12
All other	13	14	19
Total	1,594	1,221	1,108

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

Commodity	TSUS item
Fatty esters, not sulfonated or sulfated, and not elsewhere enumerated:	
Of animal origin	490.90
Of vegetable origin:	
From coconut, palm-kernel, or palm oil	490.92
Other	490.94

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

U.S. trade position

The United States consumes 95 percent or more of its marketed production of fatty esters not elsewhere enumerated (over 100 million pounds in 1966). Exports are believed in recent years to have been somewhat greater than imports; the value of the latter in 1966 was about $300,000.

Description and uses

A fatty ester included in this summary may be the product of a chemical reaction between a fatty acid or fatty ester (usually a fat) and a monohydric alcohol, between two esters (one a fatty ester), or between a fatty alcohol and an acid. Most are probably produced using the monohydric alcohol. (Simple fatty esters rarely occur naturally in commercial quantities, an exception being some found in sperm oil.)

The fatty esters included in this summary are of animal or vegetable origin and are derived directly or indirectly from fats and oils, principally tallow and soybean (soya), tall, coconut, and castor oils. (Fats and oils of themselves are complex fatty esters but are not included in this summary; see schedule 1, subparts 14B and C.) Those fatty esters that are marketed are used mainly as plasticizers. Fatty esters that are surface-active agents or esters of polyhydric alcohols are included in the summary on nonbenzenoid textile assistants and surface-active agents (items 465.05-.95, and 493.50); fatty esters that are synthetic resin polymers are included in the summary on synthetic resins (items 445.05 and 445.50). In general, the fatty esters used as plasticizers are clear, colorless or pale yellow, oily liquids, sometimes with a mild fatty odor. Epoxy fatty esters obtained usually by the epoxidation of vegetable oils, mainly soya and tall oils, are the principal type of plasticizers

covered here. Non-plasticizer fatty esters are used captively in large amounts as intermediates in the production of other fatty chemicals.

Plasticizers, including those of the fatty ester type, are used to give flexibility, particularly at low temperatures, and impart workability during processing to synthetic resins, rubber, cellulose derivatives, and other complex substances. Plasticizers often perform additional functions such as providing heat and light stability, lubricity, water repellency, gloss, and abrasion resistance to the product. The action of a plasticizer differs for each substance with which it is combined and, therefore, the selection of a plasticizer that has a high degree of compatibility is essential. Combinations of plasticizers, including non-fatty-ester types, are used to achieve optimum effects.

Fatty ester plasticizers number in the hundreds and include esters of the saturated fatty acid type (generally caprylates through stearates), esters of the unsaturated fatty acid type (mainly oleates and ricinoleates), and esters of the mixed acid type derived from soya, tall, castor, and linseed oils. Since the mid 1950's, epoxidized fatty esters have grown in importance and have been responsible for the increase in importance of fatty ester plasticizers. The growth of the epoxidized fatty ester has been due mainly to its dual function as plasticizer and stabilizer for vinyl chloride polymers.

Fatty ester plasticizers, in general, are used to plasticize polyvinyl chloride and its copolymer resins, cellulosic resins, nitrocellulose, acrylics, and synthetic rubbers, mainly neoprene, nitrile, and polysulfide rubbers. Fatty esters such as isopropyl myristate and isopropyl palmitate serve as emollients for cosmetics; others act as nonionic emulsifiers for cosmetics. Certain fatty esters serve, among other uses, as lubricants, hydraulic fluids, and gasoline additives.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Fatty esters, not sulfonated or sulfated, and not elsewhere enumerated:		
490.90	Of animal origin-----	0.75¢ per lb. + 10.5% ad val.	0.3¢ per lb. + 5% ad val.
	Of vegetable origin:		
490.92	From coconut, palm-kernel, or palm oil----------	10.5% ad val.	5% ad val.
490.94	Other----------	10.5% ad val.	5% ad val.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, except for item 490.92, are the rates applicable on August 31, 1963, the effective date of the TSUS. The 10.5 percent rate for item 490.92 was provided for by Public Law 89-388, effective April 13, 1966. Previously under the TSUS, the rate was 1.5 cents per pound plus 10.5 percent ad valorem (the specific rate of 1.5 cents per pound having been derived from former import tax provisions); the specific rate, however, had been suspended continuously under the TSUS since August 31, 1963 (TSUS deleted item 907.88).

U.S. consumption, production, and exports

The consumption of the fatty esters dealt with in this summary is believed to be approximately equivalent to domestic production. U.S. production of those fatty esters used as plasticizers increased from 72 million pounds, valued at $22 million, in 1962, to 111 million pounds, valued at $30 million, in 1966 (table 1). The production of these fatty esters, however, has represented in recent years less than half of the U.S. production of fatty esters covered by this summary. Most of the fatty esters produced for uses other than as plasticizers are intermediate products and are consumed by the producer in the manufacture of other fatty chemicals.

Of the fatty esters produced for use as plasticizers in 1966, epoxidized fatty esters accounted for 78 percent, amounting to 87 million pounds, valued at $23 million. Epoxidized soya oils, the principal kind of epoxy esters produced, accounted for 59 million pounds, valued at $16 million; octyl epoxy tallates accounted for another 12 million pounds, valued at $3 million. The annual quantity of esters derived from eleic acid and stearic acid during the years 1964-66 amounted to somewhat more than 7 million pounds each. The annual values were between $1 million and $2 million.

Other production of plasticizers covered by this summary for the years 1962-66 consisted mainly of esters of ricinoleic, palmitic, myristic, and lauric acids derived chiefly from coconut oil. Production other than for plasticizers included simple esters of fatty acids of similar origin (i.e., principally coconut oil) mixed esters of coconut oil and of tallow, and esters of lauryl, myristyl, cetyl, and stearyl alcohols.

The fatty esters discussed herein are produced domestically by about 40 companies located chiefly in the North Central States and on the east coast, largely in the vicinity of New York City. The producers include large, medium, and small firms and consist mainly of chemical companies, but include oil processors, soap makers, meat packers, renderers, and others. Many of these companies produce fatty acids as well as the esters, and for most of the companies, particularly the smaller ones, the manufacture of fatty esters is an important source of income.

Official statistics on U.S. exports of fatty esters are not available. Based on trade information, however, annual exports are estimated to have been equivalent to about 5 percent of production in recent years. The principal destinations for fatty ester exports probably have been Canada, Western Europe, and Latin America.

U.S. imports

Import statistics for 1964-66, the first full years for which data were available, are shown in table 2. In 1964, imports of fatty esters amounted to 4.2 million pounds, valued at $1.0 million; these decreased in 1965 to 1.9 million pounds, valued at $657,000, and, in 1966, to 671,000 pounds, valued at $311,000. Of the fatty esters imported in 1964, 80 percent were derived from coconut oil or palm-kernel oil, mostly the latter. This type of ester accounted for only about 50 percent of the imports in 1965, and for less than 20 percent (only 121,000 pounds) in 1966. In 1964 and 1965, more than half of the volume of imports was from the Netherlands. Switzerland was the principal supplier in 1966 and the second most important supplier in 1965, although both the quantity and value of imports

received from Switzerland in 1965 were more than twice as large as those received in 1966. The United Kingdom was also a consistent source of fatty esters during these years. Imports for the years 1961-63, based on a partial analysis, are estimated to have been substantially lower than the imports for 1964--probably less than half as large. Imports have been small compared with domestic production (about 5 percent in 1964, less in 1965 and 1966) and are believed to have been comparable to exports in volume. Imports have included a wide range of fatty-ester types, mainly because of the specialized requirements for plasticizers.

Table 1.--Fatty esters, for use as plasticizers, not elsewhere enumerated: U.S. production, by kind, 1962-66

Type	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)				
Epoxidized esters:					
All types	53,998	58,752	58,020	75,905	86,635
Epoxidized soya oils	37,725	39,965	38,455	49,484	59,178
Octyl epoxy tallates	14,611	15,915	9,852	10,642	11,511
Other	1,662	2,872	9,713	15,779	15,946
Oleic acid esters	4,455	6,557	7,680	7,204	7,645
Stearic acid esters	4,240	6,300	1/ 7,399	1/ 7,696	1/ 7,237
All other	9,303	7,045	8,105	6,985	9,670
Total	71,996	78,654	81,204	97,790	111,187
	Value (1,000 dollars) 2/				
Epoxidized esters:					
All types	17,279	17,038	13,925	19,735	23,391
Epoxidized soya oils	12,072	11,590	9,229	13,361	15,978
Octyl epoxy tallates	4,529	4,456	2,562	2,661	2,993
Other	678	992	2,134	3,713	4,420
Oleic acid esters	1,316	1,713	1,956	1,496	1,593
Stearic acid esters	1,075	1,459	1/ 1,850	1/ 1,847	1/ 1,809
All other	2,779	2,295	2,796	2,533	3,603
Total	22,449	22,505	20,527	25,611	30,396

1/ Includes some esters of polyhydric alcohols.
2/ Value of production based on unit value of sales.

Source: U.S. Tariff Commission, Synthetic Organic Chemicals, U.S. Production and Sales.

Table 2.--Fatty esters not elsewhere enumerated: U.S. imports for consumption, by principal sources and TSUS class, 1964-66

Country	Value 1,000 dollars	Quantity (1,000 pounds) TSUS class 490.90 1/	490.92 2/	490.94 3/	Total
		1964			
Netherlands	723	487	2,208	2	2,697
Congo (Leopoldville)	108	-	881	-	881
United Kingdom	81	95	79	-	174
Switzerland	43	71	4/	-	71
Japan	32	47	56	5	108
West Germany	21	-	63	5	68
All other	40	63	108	1	172
Total	1,046	763	3,395	13	4,171
		1965			
Netherlands	304	167	1,007	-	1,174
Switzerland	269	468	-	-	468
United Kingdom	39	53	-	23	76
All other	45	103	2	35	140
Total	657	791	1,009	58	1,858
		1966			
Switzerland	128	221	-	4/	221
United Kingdom	57	38	-	43	81
Netherlands	28	102	-	1	103
West Germany	19	-	60	13	73
Japan	48	3	6	60	69
All other	31	69	55	1	125
Total	311	433	121	117	671

1/ Of animal origin.
2/ From coconut, palm-kernel, or palm oil.
3/ Of other vegetable origin.
4/ Less than 500 pounds.

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

Commodity	TSUS item
Artificial mixtures of fatty substances, not elsewhere enumerated	491.00

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

U.S. trade position

The materials covered by this summary are of small importance in domestic and international trade. Imports (mostly intracompany transfers) have not exceeded $100,000 annually.

Description and uses

Artificial (as distinguished from naturally occurring) mixtures of fatty substances are rarely articles of commerce. Such mixtures are most likely to be intermediate stages in a company's formulation of its own products. When such mixtures are traded they may represent byproducts of processing operations; or they may be shipments by a firm's subsidiaries across national boundaries. Examples of substances covered by this summary are mixtures of fatty acids in the form of acidulated refining residues for soapstock, or in the form of skimmings incurred in the process of recovering and purifying glycerine from the soap-making process.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
491.00	Artificial mixtures of two or more of the fatty substances provided for in parts 8A and 13A of the TSUS, not specially provided for----------	10.5% ad val., but not less than the highest rate applicable to any component.	5% ad val., but not less than the highest rate applicable to any component.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and exports

The quantities of domestic consumption and marketed production of miscellaneous artificial fatty mixtures are not known, but are believed to be extremely small compared with the consumption and production of other fatty substances. These mixtures are not separately classified in U.S. export statistics. Exports, however, are probably negligible.

U.S. imports

Statistics on imports of artificial fatty mixtures are not available for the years prior to 1964. Imports since that date are given below:

Year	Quantity (1,000 pounds)	Value (1,000 dollars)	Principal source (value basis)
1964	1,023	32	Canada
1965	309	63	West Germany
1966	129	36	West Germany

Imports have been varied in nature and have included fatty acid and fatty alcohol mixtures. Most of the imports were intra-company transfers. The unit values of the imports ranged from about 1 cent per pound to almost $1 per pound.

Commodity	TSUS item
Barbasco and derris:	
Crude----------	493.02
Advanced----------	493.04

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

U.S. trade position

The United States is the largest world consumer of barbasco and derris; the consumption of all the crude form and a substantial part of the advanced form is supplied by imports. In 1966, imports of the crude and advanced forms together amounted to more than 4 million pounds, valued at $466,000.

Description and uses

Barbasco (cube root) and derris (tube or tuba root) come from the Lonchocarpus or Derris genera of the Leguminosae family of plants. These plants are cultivated at present in South America, primarily in Peru. The roots contain an insecticide, rotenone, which is relatively non-toxic to warm-blooded animals. The greater part of rotenone-bearing roots used at present are of the barbasco or cube type. These roots are marketed either in crude or ground form ("advanced in value"); the powder usually has a 5-percent rotenone content.

Rotenone-bearing barbasco and derris have their primary industrial uses in powders or emulsifiable extracts; rotenone is used in agriculture mainly to combat cattle grub. Smaller amounts are used for household and home garden insecticidal preparations. Rotenone is seldom marketed in pressured aerosols because of the clogging tendency of the granules. Sometimes it is combined in preparations with pyrethrum (see separate summary covering items 493.55-.56).

The importance of rotenone-bearing roots, both crude and advanced, has declined considerably since World War II, and they now comprise a relatively small item of commerce. Synthetic insecticides with similar properties have been largely substituted for them.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Barbasco and derris:		
493.02	Crude----------	Free	Free
493.04	Advanced----------	1% ad val.	Free

The duty-free status of crude barbasco and derris was provided for in the Tariff Act of 1930 as originally enacted and by the Tariff Schedules of the United States (TSUS), effective August 31, 1963; it has been bound for derris root since January 1948, and for barbasco root since October 1951 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption

U.S. consumption of barbasco and derris has been approximately equal to the combined volume of imports of crude and advanced forms, since domestic production is limited to the processing of the imported crude roots. After World War II, in 1947, there was an aggregate consumption of more than 12 million pounds of these materials, but by 1961 consumption had declined to less than 3 million pounds. In 1966, the consumption amounted to approximately 4 million pounds with an aggregate value of under $500,000 (see accompanying table).

U.S. production and trade

Four concerns in the metropolitan New York area process either the imported crude roots, or advanced (powdered) roots and incorporate these rotenone-containing materials in insecticidal formulations. These products comprise only a small part of the operations of these concerns. During most recent years, the major portion of the imports (in terms of quantity) has been in crude form.

The aggregate quantities of imports of crude and advanced forms of these rotenone-containing roots have diminished in recent years, unlike those of the other important botanical insecticide, pyrethrum. During the period 1961-66, Peru supplied the bulk of the imports in both crude and advanced form (see accompanying table).

Exports of these commodities, while not separately reported, are believed to be negligible or nil.

Foreign consumption, production, and trade

World consumption of rotenone-bearing materials, in terms of quantities used in or sold for agricultural purposes, is reported in a United Nations publication as 1,118 tons in 1964, about 74 percent of which was consumed in the United States, 19 percent by Canada, and 5 percent by Japan. Total world consumption in 1964 was about half that of 1963.

Peru supplied the bulk of this world consumption. In 1963, Peruvian exports of cube root in the crude and powdered (advanced) forms amounted to about 3,141,800 pounds and 1,514,900 pounds, respectively.

The production and exportation of this botanical insecticide, which is one of a number of forestry products (the most important of which is rubber) exported by Peru, is centered at Iquitos, on the Amazon River, east of the Andes. Only small amounts of barbasco (cube) are used within that country.

Barbasco and derris roots, crude and advanced: U.S. imports for consumption, by kind, and by principal source, 1961-66

Year	Crude			Advanced		
	Total	Peru	All other	Total	Peru	All other
	Quantity (1,000 pounds)					
1961	1,581	1,581	-	2,016	2,016	-
1962	1,937	1,847	90	1,783	1,782	1
1963	2,754	2,752	1/ 2	951	939	2/ 12
1964	1,019	1,019	-	645	645	-
1965	1,029	923	3/ 106	737	737	-
1966	3,014	3,014	-	1,031	1,031	-
	Value (1,000 dollars)					
1961	130	130	-	250	250	-
1962	193	181	12	228	223	5
1963	275	275	1/ 4/	111	109	2/ 2
1964	99	99	-	67	67	-
1965	100	91	3/ 9	83	83	-
1966	335	335	-	131	131	-

1/ Brazil.
2/ Japan.
3/ Ecuador.
4/ Less than $500.

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

Commodity	TSUS item
Cleaning and polishing preparations (in containers not over 10 pounds each)----------	493.10

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

U.S. trade position

U.S. consumption of the products considered in this summary, which exceeded $700 million in 1965, has been supplied in recent years almost entirely by domestic production. Exports have been greater than imports.

Description and uses

This provision applies to a wide variety of cleaners and polishes for use on products such as automobiles, floors, furniture, glass, metal, plastics, or shoes. These preparations in such forms as powder, liquid, paste, or solid, are used to clean and to produce or restore a glossy surface; at the same time, many tend to prolong the life of the material on which they are used. In addition to preparations formulated solely from non-benzenoid materials, this summary includes preparations containing benzenoid materials, which products, if not expressly provided for under headnote 1 to part 13 of schedule 4 of the TSUS, would be covered under part 1 of schedule 4.

Floor, furniture, or shoe polishes in liquid, cream, or paste form usually consist of lustrous waxes, with vehicles (water or organic solvents, or mixtures of both). The solvent evaporates, leaving a thin wax film which, when polished, produces the desired gloss and a protective coating.

In many formulations for glass, metal, or plastic surfaces, abrasives are the polishing ingredients. By their grinding action, they remove tarnish or imperfections and smooth the surface to high luster. A protective film can be obtained by silicones (automobile polishes) or oleic acid (many metal polishes) as a deterrent to oxidation.

Many floor polishes consist of waxes blended with a volatile organic solvent in a liquid or paste form, or as a water emulsion; others may contain no wax. They are used on wood floors, linoleum, and asphalt or rubber tile.

Popular furniture polishes include lemon-oil types, oil-in-water emulsions, liquid wax emulsions, silicone polishes and wax pastes.

Shoe polishes include wax-solvent pastes in cans and liquid ("no rubbing") shoe polishes applied with a dauber. Shoe polish creams in glass jars or collapsible tubes are ordinarily colored water-wax emulsions containing solvents. White shoe polishes are wax emulsions containing white pigments in liquid, cream, or paste forms.

Automobile polishes are produced in three different types: Wax paste, liquid wax emulsions, and silicone polishes.

Because of the variety of preparations covered by this provision, they would be classified under various tariff provisions, principally in Schedule 4 when imported in bulk or in immediate containers holding more than 10 pounds each.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.10	Cleaning and polishing preparations (in containers not over 10 pounds each)----------	6% ad val.	3% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and trade

Statistics on imports are not completely comparable with statistics on U.S. production and exports of these articles, because imports under this provision of the TSUS are limited to shipments in immediate containers of 10 pounds or less and because the U.S.

industry manufactures a somewhat wider range of products. U.S. consumption, valued at over $700 million in 1965, is, however, known to be supplied almost entirely by domestic production (table 1).

Cleaning and polishing preparations were manufactured in 1963 by 1,082 small, medium, and large establishments scattered throughout the United States. Only 174 of these establishments employed 20 or more persons. Total employment by the establishments decreased from 16,429 persons in 1958 to 16,276 in 1963. Domestic production (bulk and containers of all sizes) totaled $592 million in 1961 and $742 million in 1965.

U.S. exports of these articles, also not completely comparable with imports, totaled $6.8 million in 1961 and $7.6 million in 1966 (table 1).

U.S. imports classified under the tariff provision for cleaning and polishing preparations amounted to $1.1 million in both 1961 and 1962 and ranged between $909,000 and $647,000 from 1963 to 1966 (table 1). The smaller volume of imports after 1963 is at least partly due to the fact that beginning on August 31, 1963, this tariff provision was limited to preparations in immediate containers of 10 pounds or less. The principal sources of imports have been Canada, the United Kingdom, and West Germany (table 2).

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

(Value in thousands of dollars)

Year	Production	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
1961	592,308	1,133	6,804	586,637	0.2
1962	643,359	1,060	7,430	636,989	.2
1963	636,995	1/ 909	7,527	630,377	.1
1964	686,650	1/ 826	7,160	680,316	.1
1965	741,786	1/ 767	7,351	735,202	.1
1966	2/	1/ 647	7,628	2/	2/

1/ Imports, beginning August 31, 1963, limited to shipments in immediate containers holding not over 10 pounds.
2/ Not available.

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

Table 2.--Cleaning and polishing preparations: U.S. imports for consumption, by principal sources, 1961-66

(In thousands of dollars 1/)

Country	1961	1962	1963 2/	1964 2/	1965 2/	1966 2/
United Kingdom	469	444	311	272	485	466
Canada	442	470	409	396	145	30
West Germany	200	119	149	95	83	96
France	11	7	14	13	13	19
Ireland	-	-	-	16	27	16
All other	11	20	26	34	14	20
Total	1,133	1,060	909	826	767	647

1/ Data available on value only.
2/ Covers imports in immediate containers holding not over 10 pounds, beginning August 31, 1963.

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

Commodity	TSUS item
Casein and mixtures in chief value thereof:	
Casein	493.15
Casein mixtures	493.16

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

U.S. trade position

Casein is not produced in the United States. In 1966 all of the domestic consumption of casein and about 15 percent of the consumption of casein mixtures were supplied by imports, which had a total value of $29 million.

Description and uses

Casein is a yellowish, medium-hard, granular solid, classed chemically as a phosphoprotein. It comprises about 3 percent by weight of cow's milk, from which it is extracted commercially. Casein is insoluble in water.

Caseinates (chiefly sodium and calcium caseinates) and other edible casein derivatives of which casein is the component material of chief value are commercially the most important casein mixtures. The TSUS provision for casein mixtures also includes certain dry, physical mixtures in chief value of casein which are, however, of considerably less importance in commerce. Caseinates are soluble in water and are used in food products as protein additives and as stabilizing and binding agents for meat and bakery products.

Casein is manufactured commercially from skim milk, usually by precipitation or coagulation with an acid, but sometimes by precipitation with rennet (an extract from the stomachs of young animals). If stored in a cool dry place, casein will keep in good condition for several years.

Skim milk is also used in the manufacture of skim milk powder. Because of the higher dollar returns on skim milk when used to make skim milk powder, there is no U.S. production of casein. Similarly, production of casein has decreased in other countries, with subsequent increases in price.

Casein is used principally in the manufacture of paint and similar coatings (including paper coatings), in gypsum, caseinates and other edible mixtures, glue, and in miscellaneous applications. Soya proteins are used interchangeably with casein in certain uses depending on the price of each. Synthetic resins have virtually replaced rennet casein in plastic manufactures.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.15	Casein	Free	Free
493.16	Mixtures in chief value of casein	2.75¢ per lb.	1.3¢ per lb.

The duty-free status of casein, effective July 1, 1963, was provided for under paragraph 1828 of the previous tariff schedules by Public Law 87-606 and was continued under the Tariff Schedules of the United States (TSUS), effective August 31, 1963 (duties had previously been suspended since 1957); it was bound in the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT).

The rate of duty for casein mixtures, effective January 1, 1972, reflects the final stage of a reduction negotiated under the GATT in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

U.S. consumption of casein is supplied entirely by imports which were not separately classified before July 1, 1963. The consumption of casein during the period 1964-66 ranged between 87 million and 104 million pounds annually. In 1966, about 50 to 60 million pounds of casein were consumed in paper coatings and paint, between 15 to 20 million pounds each in the manufacture of gypsum and in the manufacture of caseinates and other edible casein mixtures, and about 5 million pounds each in casein glue and miscellaneous products. Consumption of edible caseinates increased from 1 million pounds in 1955 to an estimated 20 to 25 million pounds in 1966.

U.S. producers

There are no establishments manufacturing casein commercially in the United States. There are, however, four establishments commercially manufacturing casein mixtures; they are located in New York, New Jersey, Illinois, and Texas. The establishments are operated by both small and very large firms. The large firms manufacture cheese, dry skim milk, and other dairy products in the same establishments. The producing firms manufacture casein mixtures almost entirely for sale, retaining only small quantities for their own use. They use imported casein as a raw material. Some of the establishments also make products such as casein glue or other items from casein or from skim milk.

The domestic producing firms have no foreign affiliations. One importing firm has casein-producing plants or affiliates abroad. Within the past 10 years the last of the few establishments manufacturing casein ceased production and used the supply of skim milk available to them for making dried skim milk instead.

U.S. production

There is no domestic production of casein. U.S. production of casein mixtures, which was negligible in 1955, is estimated to have increased from 5 million pounds in 1961 to 15 to 20 million pounds in 1966.

The rapid decline in U.S. production of casein which began in 1952, has been attributed to the milk price-support program of the U.S. Department of Agriculture, under which the price of dry skim milk is supported. In that year, domestic producers curtailed their casein production because of higher skim milk prices (resulting from higher support prices on skim-milk powder) and low prices of imported casein. Although the price-support program has operated to increase the total production of whole milk, it has continued to reduce the relative profitability of converting skim milk to casein.

U.S. exports

U.S. exports of mixtures in chief value of casein totaled 174,000 pounds, valued at $150,000, in 1961, and 270,000 pounds, valued at $138,000, in 1964. Export statistics for these items were not reported separately in 1965 or 1966. The average unit values of casein mixture exports have ranged widely from year to year.

U.S. imports

U.S. imports of casein and mixtures in chief value of casein during the period 1961-66 ranged from 88 million pounds (in 1963) to 108 million (in 1966)(table 1). The average value of annual imports was $21 million. Imports of casein mixtures were not reported separately during the first three years of the above period; in recent years they have aggregated about 5 percent of the combined quantity of casein and casein mixture imports. In 1966, imports of casein were 104 million pounds, valued at $27 million, and of casein mixtures, 3.5 million pounds, valued at $1.6 million.

The average unit value of imported casein varied considerably during the period 1961-66. Between January and December of 1964 it increased from 20 to 37 cents per pound. After that high point the price gradually declined to between 27 and 31 cents per pound in late 1966. The unit values of imported casein mixtures during the 1961-66 period were generally about 10 to 18 cents per pound higher than those for casein imports.

Argentina, New Zealand, Australia, Canada, Poland, and France have been the largest suppliers for U.S. imports of casein during recent years. Canada, West Germany, and the Netherlands have been the principal suppliers of casein mixtures (tables 1, 2, and 3).

The largest U.S. importer of casein is also the world's largest manufacturer of casein, producing abroad 30 percent or more of the world's casein which is distributed throughout the world. This importer was among the largest of the U.S. manufacturers of casein 16 years ago.

Foreign production and trade

The casein-manufacturing establishments in the countries supplying the largest quantities of U.S. imports produce three main types of casein. One type is a high-quality casein suitable for use in mixtures in chief value of casein, such as caseinates. A second premium-type casein is used in coating the best grades of paper. These premium grades come primarily from Australia and New Zealand. A third, standard type, which comprises most of the remainder of U.S. imports, is manufactured in Argentina, which produces nearly 40 percent of the world's casein supply.

New Zealand, the largest source of U.S. imports in 1966, exports practically all of its production of casein and casein mixtures. The majority of casein-producing establishments in New Zealand are also equipped to manufacture cheese or dry skim milk powder. Recently, the production of dry skim milk powder has curtailed the production, and raised the price, of New Zealand casein.

Argentina, the second largest source of U.S. imports in 1966, leads all other countries in the volume of casein produced. Its production, which fluctuates between 40 and 70 million pounds annually, is almost all exported. For many years before 1966, Argentina was consistently the largest source of U.S. imports.

Australia, the third largest source of U.S. imports of casein and casein mixtures, consumes much of the casein it produces and exports the rest. Considerable quantities of cheese and dry skim milk powder are produced in Australia, but production of casein has increased in recent years, reaching 35 million pounds in 1965. Australia exports at least half of its total production to the United States.

Casein and casein mixture production in recent years has been characteristic of temperate-zone countries which maintain dairy herds well in excess of the domestic demand for dairy products without adequate export markets for milk, butter, and cheese. Even from these countries, the quantity produced, and therefore the price, of casein products tends to fluctuate with the apparent attractiveness of producing skim milk powder or other products in preference to casein. This accounts for the temporary sharp price increase which took place in the latter part of 1964. Prices began a gradual decline in the latter part of 1965.

Table 1.--Casein and mixtures in chief value thereof: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
New Zealand	18,273	11,703	12,530	24,566	24,982	26,860
Argentina	38,810	37,814	34,330	41,978	26,781	25,484
Australia	12,048	15,996	14,982	14,612	17,524	20,016
Canada	9,745	11,459	13,886	9,956	12,971	13,489
Poland	12,493	8,281	935	716	1,751	10,849
France	6,393	3,274	3,038	9,922	2,887	6,379
All other	4,065	7,049	8,177	6,702	4,892	4,829
Total	101,827	95,576	87,878	108,452	91,788	107,906
	Value (1,000 dollars)					
New Zealand	3,726	2,434	2,193	4,444	6,614	8,119
Argentina	6,100	6,229	5,634	7,589	8,126	6,085
Australia	2,213	2,721	2,447	2,436	4,114	5,523
Canada	1,316	2,450	3,116	2,694	4,927	4,175
Poland	2,058	1,383	159	135	579	2,416
France	1,027	495	494	1,570	810	1,170
All other	1,623	1,572	1,751	1,445	1,451	1,298
Total	18,063	17,284	15,794	20,313	26,621	28,786

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

Table 2.--Casein: U.S. imports for consumption, by principal sources, 1963-66

Country	1963 1/	1964	1965	1966
	Quantity (1,000 pounds)			
New Zealand	7,342	24,566	24,982	26,799
Argentina	16,018	41,978	26,781	25,484
Australia	6,233	14,491	17,455	19,878
Canada	5,142	5,201	9,118	10,925
Poland	716	716	1,751	10,849
France	3,038	9,922	2,887	6,335
All other	3,018	4,844	3,979	4,060
Total	41,507	101,718	86,953	104,330
	Value (1,000 dollars)			
New Zealand	1,284	4,444	6,614	8,094
Argentina	2,647	7,589	8,126	6,085
Australia	1,021	2,407	4,095	5,474
Canada	1,024	1,225	3,270	2,930
Poland	120	135	579	2,416
France	494	1,570	810	1,156
All other	584	931	1,110	1,010
Total	7,174	18,301	24,604	27,165

1/ July-December only.

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

Table 3.--Mixtures in chief value of casein: U.S. imports for consumption, by principal sources, 1963-66

Country	1963 1/	1964	1965	1966
	Quantity (1,000 pounds)			
Canada	2,487	4,754	3,853	2,563
West Germany	393	505	180	385
Netherlands	956	1,339	720	304
Australia	94	121	69	138
New Zealand	-	-	-	61
Denmark	-	-	-	60
All other	123	15	13	65
Total	4,053	6,734	4,835	3,576
	Value (1,000 dollars)			
Canada	697	1,469	1,657	1,245
West Germany	108	136	55	135
Netherlands	249	376	283	125
Australia	16	29	19	49
New Zealand	-	-	-	25
Denmark	-	-	-	23
All other	20	2	3	19
Total	1,090	2,012	2,017	1,621

1/ July-December only.

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

Commodity	TSUS item
Camphor:	
Natural:	
Crude	493.20
Advanced	493.21
Synthetic	493.22

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

U.S. trade position

In 1963, domestic production of synthetic camphor ceased and the United States has since been completely dependent on imports for its consumption of both natural and synthetic camphor. Imports in 1966 (which had an aggregate value of about $900,000) were almost 80 percent of synthetic camphor; practically all the balance consisted of advanced natural camphor.

Description and uses

Camphor is an oxygen-containing derivative of alpha-pinene, the most widely distributed terpene found in nature. Camphor is a colorless or white crystalline solid which vaporizes slowly at room temperature and melts at temperatures of 174° to 179° Centigrade. It is fairly insoluble in water, but is very soluble in organic solvents. The physical properties of natural and synthetic camphor are almost identical.

Natural camphor is derived from the wood of the camphor tree (Cinnamomum camphora) which is grown primarily in China, Taiwan, and Japan. When the camphor tree is about 45 to 50 years old, it is cut into small pieces which are subjected to steam distillation. The product thus obtained is crude camphor. The bulk of the crude camphor is then distilled or sublimed to obtain refined or advanced natural camphor. Synthetic camphor is produced from pinene, a product obtained from the fractional distillation of turpentine.

Refined natural camphor and synthetic camphor are marketed in the United States in two grades--United States Pharmacopoeia (U.S.P.) and technical. To be classified as U.S.P. grade, the camphor must satisfy rigid specifications with respect to solubility, melting range, and nonvolatile residue. Camphor which does not meet the U.S.P. specifications is classified as technical grade.

Until about 1955, the chief use of camphor was as a plasticizer for cellulose-nitrate plastics. Because of the substitution in recent years of newer types of synthetic plastics for celluloid and other cellulose-nitrate plastics, little camphor is now used as a plasticizer. Camphor is presently used principally in the manufacture of explosives, pyrotechnics, lacquers, insecticides, and as an ingredient in embalming and pharmaceutical preparations.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Camphor:		
	Natural:		
493.20	Crude	0.5¢ per lb.	0.2¢ per lb. 1/
493.21	Advanced	3¢ per lb.	1.5¢ per lb. 1/
493.22	Synthetic	5¢ per lb.	2.5¢ per lb.

1/ The rates of duty for 1970, 1971, and 1972 are contingent--see footnote 1 to Staged Rates and Historical Notes to part 13 of schedule 4 of the Tariff Schedules of the United States Annotated (1968), as shown in appendix A to this volume.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

The annual consumption of camphor reached a peak of about 9 million pounds in 1948; annual consumption declined in subsequent years and in the 1961-66 period ranged from 1.6 million to 2.1 million pounds, with an average annual value of $800,000 (table 1). The decline in consumption resulted primarily from the displacement of cellulose-nitrate plastics (which utilized camphor as a plasticizer) by newer types of synthetic plastics. In the period 1964-66, U.S.

consumption of camphor was supplied wholly by imports.

In recent years, crude natural camphor has accounted for less than 1 percent, and advanced natural, for roughly 25 percent of the camphor consumed in the United States. Synthetic camphor has accounted for the remainder of the consumption.

U.S. producers

Natural camphor has never been produced in the United States because attempts to grow camphor trees in this country have not been economically successful, and, at present, little or no synthetic camphor is produced in the United States. Until 1959, synthetic camphor was produced by two large companies which also produced a variety of other chemicals and related products. The larger producer manufactured camphor principally for use in its own cellulose-nitrate plastics operations until those operations were to a large extent displaced by the production of newer types of synthetic plastics. The U.S. producers were not able to compete with imports in the noncaptive segment of the market so that in 1959 the larger producer, and in 1963 the second producer, discontinued their synthetic camphor operations. The former U.S. producers are not affiliated with producers of camphor located abroad.

U.S. production and exports

It is estimated that the annual U.S. production of synthetic camphor amounted to about 800,000 pounds in 1958 and 1959, but only to about 100,000 pounds from 1960 through 1963 (table 1). Approximately 40 percent of the synthetic camphor that was produced in the United States during the period 1958-63 was U.S.P. grade, and the remainder, technical grade.

Very little camphor has been exported from the United States since World War II. The small amounts exported have been in the form of medicinal preparations.

U.S. imports

Prior to World War II, imports filled most of the U.S. demand for camphor, but at the start of the war all imports ceased and they did not become substantial again until after 1959. Imports increased sharply from less than 0.5 million pounds, valued at about $200,000, in 1959, to an annual average of 1.6 million pounds, valued at about $660,000, during the period 1961-63. In 1964, after the sole remaining U.S. producer of synthetic camphor discontinued operations,

imports increased to 2.1 million pounds, valued at about $1 million. In both 1965 and 1966 imports amounted to 1.9 million pounds, valued at about $900,000, annually (table 1).

In spite of the lower tariff on crude natural camphor, imports have been primarily of natural advanced camphor and synthetic camphor. All the imported natural advanced camphor, but only part of the imported synthetic camphor, has been U.S.P. grade.

In recent years the average foreign value of the imports of advanced natural camphor has ranged from 50 cents to 65 cents per pound, whereas the average foreign value of the imports of synthetic camphor has been about 40 cents per pound. The higher unit value for the advanced natural camphor reflects the higher grade of most of the imports of natural camphor compared with the imports of the synthetic product.

Imports of natural camphor come from the Orient and those of synthetic camphor, from Western Europe. The principal supplying countries are Taiwan, Japan, West Germany, and the United Kingdom (table 2).

Foreign production and trade

The annual world output of natural camphor has varied greatly in recent years, with no apparent trend. The world-wide production of synthetic camphor, however, has increased fairly steadily during the past 8 years and a continued gradual increase in the future is anticipated. Foreign producers are primarily privately owned multi-product firms.

Separate import and export statistics for those countries from which the United States imports synthetic camphor (West Germany, the United Kingdom, and France) are not available. France, which formerly supplied the United States, imports about 5-1/2 times as much as it exports. A new plant for the production of synthetic camphor is presently being completed in India. This plant will utilize the system of manufacturing that was developed by one of the former U.S. producers of synthetic camphor and will reportedly have the capacity to produce approximately three million pounds of synthetic camphor per year. None of the existing foreign producers, however, is affiliated or associated with either of the U.S. corporations that formerly produced camphor.

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

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

Year	Production 1/	Imports				Apparent consumption	Ratio (percent) of imports to consumption
		Total	Crude natural	Advanced natural	Synthetic		
	Quantity						
1961	100	1,711	11	380	1,320	1,800	95
1962	100	1,700	-	224	1,476	1,800	95
1963	100	1,479	2/ 25	435	1,019	1,600	95
1964	-	2,108	-	730	1,378	2,100	100
1965	-	1,895	14	3/ 457	1,424	1,900	100
1966	-	1,933	-	419	1,514	1,900	100
	Value						
1961	50	681	4	169	508	731	4/
1962	50	677	-	117	560	727	4/
1963	50	625	2/ 8	235	382	675	4/
1964	-	995	-	475	520	995	4/
1965	-	888	5	3/ 294	589	888	4/
1966	-	896	-	256	640	896	4/

1/ Estimated. Comprised of synthetic only; no domestic natural camphor was produced.

2/ One shipment of 15,000 pounds, valued at $39,000, which is believed to be other merchandise, has been excluded.

3/ One shipment of 5,000 pounds, valued at $48,000, which is believed to be other merchandise, has been excluded.

4/ Not meaningful.

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

Note.--Statistics on exports are not available, but exports are believed to be insignificant.

Table 2.--Camphor: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
United Kingdom	899	833	1/ 365	557	775	720
West Germany	420	521	516	782	655	794
Taiwan	85	124	400	569	364	300
Japan	298	91	26	161	93	119
France	-	122	166	39	8	-
All other	9	9	6	-	1/	-
Total	1,711	1,700	1,479	2,108	1,895	1,933
	Value (1,000 dollars)					
United Kingdom	337	327	1/ 145	225	338	321
West Germany	170	185	183	281	253	320
Taiwan	35	63	211	358	233	183
Japan	135	49	18	117	61	72
France	-	47	64	14	3	-
All other	4	6	4	-	1/	-
Total	681	677	625	995	888	896

1/ One shipment shown in the official statistics is excluded here because it is believed to be other merchandise.

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

Commodity	TSUS item
Bone char	493.25

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

U.S. trade position

U.S. imports of bone char amounted to 2.7 million pounds in 1966 with an aggregate value of $250,000. It is estimated that imports supplied about 20 percent of U.S. consumption in that year. Both consumption and production have been declining in recent years.

Description and uses

Bone char is produced commercially by burning (carbonizing) animal (usually cattle) bones, in the absence of air, in closed retorts. Combustible gas, ammonia, bone oil, and tar are recovered as byproducts. After carbonization the char is cooled, crushed, and screened.

Bone char is composed mainly of tricalcium phosphate and calcium carbonate and includes about 8-10 percent carbon, 1 percent nitrogen, and traces of calcium oxide, calcium sulfate, and iron oxide. The char has the same cellular structure possessed by the original bones. Most of the carbon, which is derived from the organic matter, is finely dispersed in a thin coating on the highly porous structure of calcium phosphate and carbonate. It is generally agreed that in sugar refining, which is the principal use of bone char, the carbon coating decolorizes the sugar and the tricalcium phosphate carrier removes the ash.

Periodic regeneration of spent bone char is accomplished by washing the char with hot water, drying, and reburning it in the absence of air at a carefully controlled temperature.

Bone char differs from bone black (item 473.02, a pigment-grade product) which is discussed in a separate summary. Both are produced from animal bones and are closely related products. Activated carbon (in item 493.26), another related product used for more purposes than bone char, is also discussed in a separate summary. Activated carbon has replaced much of the bone char formerly used in sugar manufacture.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.25	Bone char----------	20% ad val.	10% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and trade

The continued substitution of activated carbon for bone char in sugar refining has caused a steady decline in the production and consumption of bone char in the United States. Consumption in 1966 is estimated to have had an aggregate value of about $1.25 million, compared with perhaps double that annual value a decade ago. This estimate is based on the last official production figures, which indicated a domestic output valued at $2.2 million (19.4 million pounds) in 1954. The current rate of production is believed to be about $1 million annually.

Exports of bone char are believed to be negligible or nil. Prior to the embargo of U.S. exports to Cuba, substantial exports of bone char for sugar refining were made to that country.

U.S. imports of bone char increased from 1.9 million pounds, valued at $173,000, in 1961, to 2.2 million pounds, valued at $186,000, in 1964; then decreased to 1.6 million pounds, valued at $135,000, in 1965. Imports in 1966 increased to 2.7 million pounds, valued at $257,000. About half of the quantity imported during the period 1961-66 came from the United Kingdom (see accompanying table).

Foreign production and trade

The Netherlands, France, the United Kingdom, Portugal, and Egypt have been the larger foreign producers of bone char. Egypt is believed to be the largest of the above-named producers.

Bone char: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
United Kingdom	1,458	1,239	1,303	974	731	1,360
Portugal	201	408	289	320	320	750
Netherlands	191	308	429	670	217	224
France	-	-	10	43	110	98
Egypt	73	63	81	200	158	90
All other	15	52	12	11	15	153
Total	1,938	2,070	2,124	2,218	1,551	2,675
	Value (1,000 dollars)					
United Kingdom	138	115	120	90	67	144
Portugal	16	27	23	21	23	54
Netherlands	15	24	33	57	24	34
France	-	-	1	4	11	12
Egypt	3	4	5	13	9	5
All other	1	2	1	1	1	8
Total	173	172	183	186	135	257

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

Note.--Statistics on domestic production and exports are not available, but production is believed to be several times as large as imports and exports are believed to be very small, if any.

Commodity	TSUS items
Activated and other absorbing chars and carbons-------	493.26

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

U.S. trade position

Imports in recent years have supplied less than 2 percent of the absorbing chars and carbon consumed in the United States. In 1966, imports amounted to 2.8 million pounds, valued at $414,000; the value of exports was 9 times that of imports.

Description and uses

This summary covers all decolorizing and absorbing carbons, whether or not they have been "activated." In practice, however, virtually all of the commercial products of this type are activated carbons. Activated carbons are amorphous forms of carbon which have been specially treated to produce a highly developed internal pore structure, which, in turn, gives them a very large surface area. This structure imparts to the carbon the ability to absorb gases, and vapors from gases, or to absorb dissolved or dispersed substances from liquids. (Non-activated absorbing carbons have a less developed internal pore structure than the activated carbons and have a smaller absorbing capacity.)

Decolorizing carbons, commonly called liquid phase carbons, are generally light, fluffy, black powders; gas phase, or vapor-absorbent carbons are hard, dense, black granules.

Many carbonaceous materials of animal, vegetable, or mineral origin can be converted into absorbing chars or carbons. Domestic producers use wood charcoal, coal, petroleum, coke, lignite, coconut shells, and a residue recovered in wood-pulp manufacture. Producers in the Netherlands (the largest source of U.S. imports in many years) use peat.

Absorbing chars and carbons are used for refining sugar, purifying water, recovering dry-cleaning solvents, absorbing gas, purifying and deodorizing air, refining fats and oils, in the manufacture of plasticizers, alcoholic beverages, and automobile tires, in electroplating processes, and in cigarette filters.

Most chars and carbons are prepared for particular end-uses. For example, a carbon used for municipal water treatment would be quite unsuitable for removing color from cane sugar.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.26	Activated and absorbing chars and carbons------	15% ad val.	7.5% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

U.S. annual consumption of absorbing chars and carbons increased from 104.7 million pounds, valued at $13.6 million, in 1961, to 154.7 million pounds, valued at $19.4 million, in 1965 (table 1). Imports supplied less than 2 percent of this consumption.

About 45 million pounds per year of absorbing chars and carbons are currently used in the refining of corn, cane, and beet sugar. In water purification, about 35 million pounds are used, and in dry cleaning, an estimated 13 million pounds. Air and gas purification and solvent recovery consume about 12 million pounds. About 12 million pounds are added to the carbon black components of white sidewall tires, and about 3 million pounds go into cigarette filters. Numerous other applications require smaller amounts of carbons.

U.S. producers

Absorbing or activated chars and carbons are manufactured in the United States in eight establishments operated by seven firms. The

establishments are located in Virginia, Pennsylvania, Kentucky, Ohio, Michigan, Texas, and Florida. The combined output of two of the firms is estimated to account for about 75 percent of domestic production.

Except for one firm which is large and produces only activated chars and carbons (and related products), all of the producing firms are large chemical companies, producing a variety of chemical products.

U.S. production and exports

U.S. production of absorbing chars and carbons increased from 114.1 million pounds, valued at $15.3 million, in 1961, to 169.2 million pounds, valued at $22.5 million, in 1965 (table 1). Virtually all of the production in the United States is for sale or export. The sales price of U.S. production ranges from under 10 cents to over $1.50 a pound for grades of varying quality, with the water purification grade representing one of the least expensive types.

Exports, which increased from 10.9 million pounds, valued at $2.0 million, in 1961, to more than 16.0 million pounds annually at values above $3 million annually during 1963-66, appear to have constituted over 10 percent of U.S. production in quantitative terms, or about 15 percent in value terms, in recent years (table 1). These figures are somewhat overstated due to the inclusion of bone char in official export statistics. Canada, Mexico, and Japan have been the principal markets for U.S. exports in recent years.

U.S. imports

U.S. imports of decolorizing and gas-absorbing chars and carbons increased from 1.4 million pounds, valued at $312,000, in 1961, to 2.8 million pounds, valued at $414,000, in 1966 (table 1). The average value of imports decreased sharply in 1966, presumably indicating increased imports of lower-value grades. The three principal sources of imports, in order of importance, have been the Netherlands (during most of the recent years), the United Kingdom, and West Germany (table 2).

Foreign production and trade

There are believed to be three firms manufacturing activated carbon in the United Kingdom. In the Netherlands, two firms make activated carbon; one of these has a subsidiary in the United States. There are 10 firms making activated carbon in West Germany.

Table 1.--Decolorizing and gas or vapor absorbing chars and carbons: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1961-66

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

Year	Production	Imports	Exports 1/	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1961	114,116	1,404	10,857	104,663	1.3
1962	126,036	1,337	13,449	113,924	1.2
1963	137,004	1,665	16,835	121,834	1.4
1964	159,256	2,202	18,756	142,702	1.5
1965	169,216	1,907	17,266	153,857	1.2
1966	2/	2,841	16,312	2/	2/
	Value				
1961	15,346	312	2,014	13,644	
1962	17,684	352	2,772	15,264	
1963	19,803	360	3,019	17,144	
1964	21,486	399	3,694	18,191	
1965	22,487	385	3,520	19,352	
1966	2/	414	3,682	2/	

1/ Includes bone char.
2/ Not available.

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

Table 2.--Decolorizing and gas or vapor absorbing chars and carbons: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Netherlands	783	613	721	385	1,046	1,515
United Kingdom	541	408	848	1,504	636	932
West Germany	71	139	93	137	213	197
Mexico	-	-	-	-	11	11
Canada	-	4	-	123	-	173
All other	9	173	3	53	1	13
Total	1,404	1,337	1,665	2,202	1,907	2,841
	Value (1,000 dollars)					
Netherlands	165	115	153	92	177	219
United Kingdom	108	89	172	225	140	106
West Germany	33	46	33	47	65	81
Mexico	-	-	-	-	2	2
Canada	-	1	-	21	-	1
All other	6	101	2	14	1	5
Total	312	352	360	399	385	414

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

Commodity	TSUS item
Dextrine and soluble or chemically treated starches	493.30

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

U.S. trade position

U.S. consumption of dextrines has been declining because of the increasing use of synthetic resins. In 1963, about 20 percent of domestic consumption was supplied by imports; domestic production was valued at about $10 million. Exports have been minor. Imports, which averaged $2.3 million annually between 1961 and 1965, increased to $3.3 million in 1966.

Description and uses

Dextrines are products made by heating dry starch with or without the addition of acid. Their chemical composition is similar to that of starch (items 132.35-.55), although the molecule is smaller. Commercial dextrines are divided into three classes: (1) White dextrine; (2) canary or yellow dextrines; and (3) British gum or burnt starch. "Chemically treated starches" (sometimes called chlorinated or oxidized starches) are prepared by treatment of starches with an alkali hypochlorite instead of an acid or heat. The term "soluble starch" is used to designate a starch that has been only partially dextrinized, although both dextrines and chemically treated starches are water-soluble.

In addition to differences in color between types of dextrine, there are differences in other physical properties. A canary dextrine has a more stable viscosity at high concentrations of solids than a white dextrine. The whites are characterized not only by their light color but also by undesirable agglomerating tendencies. The British gums form gummy, filmy colloids of relatively stable body at comparatively low-solids concentrations and are the strongest of the dextrine adhesives. They are, however, difficult to produce.

Dextrines and chemically treated starches are used in the sizing and coating of paper and textile fabrics, in textile printing and finishing, and in preparing water-based adhesives for boxboard. Chemically treated (oxidized) starches are used in the manufacture of surface-sizing for paper. The lighter varieties (acid modified)

of British gums and certain white dextrines as well as oxidized starches are excellent in the machine-coating of paper.

In manufacturing products made from paper, dextrines and oxidized starches also find large and varied uses. In all paper-gluing operations (except the manufacture of corrugated board), the adhesive requirements are met principally by formulations based on soluble starches, oxidized starches, or dextrines (see summary on vegetable glue, items 455.30-.32). However, synthetic resins have been making increasing inroads into these fields.

In the following sections, dextrines and other soluble or chemically treated starches are referred to in the aggregate as "dextrines."

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.30	Dextrine and soluble or chemically treated starches	1.125¢ per lb. 1/	1.125¢ per lb.

1/ Temporarily increased to 3 cents per pound, pursuant to Presidential Proclamation No. 3564, effective January 7, 1964 (see item 945.49 in the Tariff Schedules of the United States Annotated (1968) or in appendix A to this volume).

The column 1 TSUS rate of duty (1.125¢ per lb.) reflects a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT), effective June 1951. The temporary rate (3¢ per lb.) was one of the increases in U.S. rates of duty negotiated under article XXVIII of the GATT to restore a balance of concessions between the United States and the European Economic Community (EEC) following the increased restrictions imposed by the EEC in 1962 on imports of poultry. The rate for this tariff item was not reduced under the GATT in the Kennedy Round; the rate established in 1951 is the column 1 rate of the TSUS subject to the temporary increase noted above.

U.S. consumption

The apparent U.S. consumption of dextrine declined from 188 million pounds, valued at $15 million, in 1958, to 138 million pounds, valued at $12 million, in 1963, and was probably still less in 1966 (table 1).

This decrease in consumption has been largely due to the replacement of dextrines by synthetic resins in adhesives.

It is estimated that about 25 percent of domestic consumption is supplied by imports.

U.S. producers and production

Dextrines are produced in the United States by one large firm that accounts for the greater part of the total output and by some 20 other companies that also formulate adhesives and sizing products.

Production decreased from 173 million pounds, valued at $14 million, in 1958, to 119 million pounds, valued at $10 million, in 1963 (table 1). Production is believed to have declined further since 1963.

Except for about 8 million pounds made from tapioca and a smaller amount made from potato starch, dextrines produced in the United States are made from corn starch.

U.S. exports and imports

U.S. exports of dextrine and soluble or chemically treated starches increased from 4.0 million pounds, valued at $508,000, in 1958, to 5.4 million pounds, valued at $624,000, in 1964 (table 1). Data on exports are not available for 1965 or 1966. Canada has predominated as the largest market for U.S. exports, but Belgium, Peru, and Venezuela have also been substantial purchasers.

In recent years, imports have supplied an increasing portion of domestic consumption as domestic production has declined. U.S. imports of dextrines increased from 20 million pounds, valued at $1.8 million, in 1958, to 34 million pounds, valued at $3.3 million, in 1966 (table 1). The Netherlands supplied 94 percent or more of the total in each year during the period 1958-65, and 85 percent in 1966. The bulk of that country's dextrine exported to the United States was made from potato starch. Belgium, France, Canada, and the United Kingdom were the principal additional suppliers (table 2).

Foreign production and trade

The Netherlands has been the world's largest producer and exporter of potato starch and its dextrines. The bulk of the potato starch and dextrine has been produced by 14 plants owned by farmer cooperatives; the remainder has come from five plants owned by three private concerns. There are two large manufacturers of cornstarch and dextrine in that country, one a subsidiary of the largest U.S. producer.

Belgium has been an exporter of cornstarch dextrine to the United States for many years. Three concerns manufacture this product in Belgium, one of them a subsidiary of the largest U.S. concern. Belgium is not an exporter of potato-starch dextrine.

Table 1.--Dextrine and soluble or chemically treated starches: U.S. production, imports for consumption, exports of domestic merchandise, and apparent consumption, 1958 and 1961-66

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

Year	Production	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1958	172,806	19,613	4,011	188,408	10.4
1961	1/	25,439	3,990	1/	1/
1962	1/	23,846	5,768	1/	1/
1963	118,891	24,585	5,241	138,235	17.8
1964	1/	23,632	5,444	1/	1/
1965	1/	25,463	2/	1/	1/
1966	1/	33,557	2/	1/	1/
	Value				
1958	13,770	1,826	508	15,088	3/
1961	1/	2,392	409	1/	3/
1962	1/	2,282	580	1/	3/
1963	9,887	2,340	565	11,662	3/
1964	1/	2,177	624	1/	3/
1965	1/	2,462	2/	1/	3/
1966	1/	3,311	2/	1/	3/

1/ Not available.
2/ Exports not separately classified after 1964.
3/ Not meaningful.

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

Table 2.--Dextrine and soluble or chemically treated starches: U.S. imports for consumption, by principal sources, 1958 and 1961-66

Country	1958	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)						
Netherlands	19,051	22,816	23,082	24,116	22,471	24,291	28,549
France	-	2	-	2	2	520	2,394
United Kingdom	383	435	123	133	710	144	1,448
Belgium	-	1,970	503	30	40	404	875
Canada	-	154	71	81	111	46	30
All other	179	62	67	223	298	58	261
Total	19,613	25,439	23,846	24,585	23,632	25,463	33,557
	Value (1,000 dollars)						
Netherlands	1,773	2,238	2,209	2,281	2,075	2,313	2,682
France	-	1/	-	1/	1/	66	282
United Kingdom	37	47	13	12	51	13	175
Belgium	-	96	26	5	4	51	108
Canada	-	6	23	29	45	15	36
All other	16	5	11	13	2	4	28
Total	1,826	2,392	2,282	2,340	2,177	2,462	3,311

1/ Less than $500.

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

Commodity	TSUS item
Mineral salts	493.40

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

U.S. trade position

U.S. production of the type of mineral salts considered here is presumed to be minor, although larger than imports, which have not exceeded $2,000 annually in recent years.

Comment

The mineral salts dealt with in this summary are those produced by the mineral-water industry by the evaporation of spring waters obtained from a designated mineral spring. The salts so obtained are used medicinally and as bath salts. Mineral waters from such springs are covered in the summary dealing with item 166.10.

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.40	Mineral salts	Free	Free

The duty-free status was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and was bound in the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT).

Statistics on U.S. consumption, production, and exports are not available, although U.S. production of these salts is believed to be substantially larger than imports.

U.S. imports of mineral salts during the period 1961-66 have never exceeded $2,000 in value annually, as shown in the following table, compiled from U.S. Department of Commerce figures:

Year	Quantity (pounds)	Value
1961---------	6,216	$1,800
1962---------	2,536	1,800
1963---------	1,268	900
1964---------	3,086	900
1965---------	3,934	1,532
1966---------	1,996	1,602

Italy was the sole supplier of these imports between 1961 and 1965. Czechoslovakia was the second supplier in 1966.

Commodity	TSUS item
Burgundy pitch	493.45
Marine glue pitch	493.46
Wood pitch	493.47
Wood tar oil and wood tar	494.40

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

U.S. trade position

U.S. production supplies virtually all of the domestic consumption of the tar, tar oil, and pitches covered by this summary as well as large quantities for exportation. Exports, which probably account for 60 percent of U.S. production, amounted to 62 million pounds, valued at $3.4 million, in 1964.

Description and uses

This summary covers tar oil, and pitch obtained from wood (principally by the distillation of pine wood and stumps), and marine glue pitch obtained from asphalt. Tars, tar oils, and pitches obtained from petroleum or coal are covered by separate summaries dealing with items 401.18, 401.60, 401.62, and 401.70.

Wood tar is the initial product obtained by the distillation of wood, and is a very viscous liquid or semi-solid, dark brown to black, with a strong odor. Wood tar oils and wood pitch are the separated components of the tar which are obtained by subjecting it to further fractional distillation. Wood tar is also a raw material for other chemicals and is used in medicines, roofing compositions, paints, varnishes, plastics, tar soaps, linoleum, asphaltic compositions, and preservatives.

Wood tar oil is an almost colorless liquid, when freshly distilled, that turns a dark red-brown with age. It is used to waterproof and insectproof paper, heat-quench iron and steel castings, and reclaim rubber; in ore flotation; and in paints, stains, and creosote; and as a source of guaiacol. Wood pitch is a resinous material used in rubber, and as a waterproofing and insulating material.

Burgundy pitch (unlike "wood" pitch, which is obtained by distilling pine wood) is produced by refining the exudate collected from either Norway spruce or European silver fir trees. It is a hard

yellow-brown plastic aromatic solid that is soluble in hot alcohol and is used abroad in the preparation of counter-irritants and stimulant plasters. As these items are apparently no longer used in the United States, there has been no U.S. production or importation of Burgundy pitch for many years.

Marine glue pitch (unlike the other items included in this summary) is a specialty product obtained from asphalt. It was once used to a large extent to waterproof the deck seams of large vessels, but has been replaced almost wholly in this use by synthetic resins. As a result, it appears to be no longer produced domestically and imports are insignificant.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.45	Burgundy pitch	Free	Free
493.46	Marine glue pitch	16% ad val.	8% ad val.
493.47	Wood pitch	0.5¢ per lb.	0.25¢ per lb. 1/
494.40	Wood tar oil and wood tar	0.5¢ per lb.	0.5¢ per lb.

1/ The rates of duty for 1970, 1971, and 1972 are contingent--see footnote 1 to Staged Rates and Historical Notes to part 13 of schedule 4 of the Tariff Schedules of the United States Annotated (1968), as shown in appendix A to this volume.

The duty-free status of burgundy pitch was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and is not bound as a trade agreement concession.

The rates effective January 1, 1972, for the dutiable items reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968 are the rates applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and trade

The annual U.S. consumption of wood tar, tar oils, and pitch is estimated to have been at about 40 million pounds in recent years, but declining. The apparent consumption of marine glue pitch (all imported) is declining and aggregated only 7,000 pounds in 1966.

About 20 plants in the United States, located primarily in the Southeastern States, produce wood tar, tar oil, and pitch. Most of these are highly integrated producers of naval stores and other distilled wood products and charcoal. No data are available on the production of wood tar, tar oil, and pitch, but sales of these products by the concerns are believed to have amounted to about 90 million pounds annually (valued at $5 million) in recent years and have shown a downward trend.

A substantial part of U.S. production of tar, tar oil, and pitch enters the export market, although the total has fluctuated in recent years. Exports dropped from 69 million pounds, with an aggregate value of $4.3 million in 1960 to 52 million pounds, with a value of $3.1 million in 1961; then increased to 62 million pounds, with a value of $3.4 million in 1964 (table 1). Exports for 1965 and 1966 were not classified on a basis comparable to those for previous years. During the period 1960-64, West Germany, Canada, and the United Kingdom provided the largest export markets (table 1), although more than 50 countries received these exports.

Notwithstanding the use of modern wood distillation furnaces in Europe, foreign production has not been competitively priced with that of the highly integrated and efficient U.S. manufacturers. Although the annual volume of wood pitch, wood tar, and wood tar oil imported between 1961 and 1966 has varied widely between 18,000 and 223,000 pounds, its aggregate annual value was never in excess of $5,000. Imports were principally from the United Kingdom and Canada (table 2).

Annual imports of marine glue pitch (almost entirely from the United Kingdom) have averaged less than $1,000 annually in recent years. There were no imports in 1965; 1966 imports of 7,000 pounds were valued at $1,400 (table 3).

Table 1.--Wood pitch, tar and tar oil: 1/ U.S. exports of domestic merchandise, 1960-64 2/

Country	1960	1961	1962	1963	1964
	Quantity (1,000 pounds)				
West Germany	13,175	6,892	11,339	8,501	12,090
Canada	9,615	12,338	11,213	11,957	12,472
United Kingdom	15,026	6,925	9,098	6,942	9,938
France	1,439	1,555	1,976	2,224	2,942
India	2,153	2,151	2,729	3,484	2,899
Mexico	981	1,067	1,128	1,007	2,029
Japan	3,358	1,161	1,065	2,521	2,538
Italy	3,838	3,623	2,689	2,171	1,984
Sweden	3,260	2,363	2,350	2,268	2,380
Australia	415	983	1,172	1,230	1,550
Netherlands	4,453	1,916	2,041	1,526	1,740
All other	11,716	11,024	10,127	9,113	9,679
Total	69,429	51,998	56,927	52,944	62,241
	Value (1,000 dollars)				
West Germany	818	420	613	446	616
Canada	538	686	617	626	595
United Kingdom	917	391	496	379	528
France	84	91	115	128	170
India	149	145	187	243	157
Mexico	75	69	74	71	157
Japan	209	69	59	130	140
Italy	236	223	157	125	131
Sweden	196	137	126	119	124
Australia	27	61	72	80	97
Netherlands	320	121	116	86	91
All other	753	711	619	539	617
Total	4,322	3,124	3,251	2,972	3,423

1/ Other products covered by this summary--burgundy pitch and marine glue pitch--have not been produced in the United States in recent years.

2/ Export statistics for 1965 and 1966 are not separately classified.

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

Table 2.--Wood pitch, wood tar, and wood tar oil: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964 1/	1965 1/	1966
	Quantity (pounds)					
United Kingdom	4,480	11,450	39,088	17,920	22,400	2/28,280
Sweden	22,046	-	-	-	-	3/ 9,248
Canada	-	23,000	-	-	189,000	-
Norway	4,409	4,409	-	-	-	-
West Germany	-	794	-	-	-	-
All other	-	-	-	-	11,200	-
Total	30,935	39,653	39,088	17,920	222,600	37,528
	Value					
United Kingdom	$854	$1,246	$4,304	$1,185	$1,392	2/$1,736
Sweden	881	-	-	-	-	3/ 579
Canada	-	1,208	-	-	2,434	-
Norway	560	461	-	-	-	-
West Germany	-	273	-	-	-	-
All other	-	-	-	-	621	-
Total	2,295	3,188	4,304	1,185	4,447	2,315

1/ Imports in 1964-65 consisted entirely of wood pitch.
2/ Consists entirely of wood pitch.
3/ Consists entirely of wood tar oil and wood tar.

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

Table 3.--Marine glue pitch: U.S. imports for consumption, by sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (pounds)					
United Kingdom	15,600	12,600	7,840	6,720	-	7,000
France	-	-	2,116	-	-	-
Total	15,600	12,600	9,956	6,720	-	7,000
	Value					
United Kingdom	$945	$923	$630	$1,180	-	$1,417
France	-	-	125	-	-	-
Total	945	923	755	1,180	-	1,417

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

Commodity	TSUS item
Pyrethrum:	
Crude	493.55
Advanced	493.56

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

U.S. trade position

The United States consumes more than half the world's output of pyrethrum in various forms. All U.S. requirements of pyrethrum are imported, either in crude or advanced form. Imports had an aggregate value of $7.6 million in 1966. Exports, consisting of processed pyrethrum, are only a minor fraction of imports in value.

Description and uses

Pyrethrum or insect flowers are the dried daisy-like flower heads of the chrysanthemum species, C. cinerariaefolium, C. coccineum, or C. marschallii. Pyrethrum is well suited to cultivation at high elevations along the equator and is the product of only certain countries of Africa and South America. Pyrethrum is the world's principal botanical insecticide; its insecticidal constituents, pyrethrin I and II and cinerin I and II, poison insects rapidly on contact, but are relatively nontoxic to humans and other animals.

Pyrethrum enters into trade either in its crude form, or advanced as an extract or powder. The extract is generally marketed as an intermediate 25 percent partially dewaxed product, or in a refined "20 percent pale" form, the latter being preferred for end products. Consumers generally use pyrethrum in the form of sprays or powders containing pyrethrum extract, or as aerosols (in pressurized containers), the latter requiring a highly refined grade of pyrethrum, free of wax and precipitates. Aerosols reportedly account for the major present form of use.

Low-toxicity insecticides are in demand not only for household purposes but also for such commercial uses as grain storage. Because of its relatively high cost, pyrethrum is usually mixed with other insecticides or with a synergist. Synthetic insecticides such as allethrin compete with pyrethrum because of their lower cost, even though some of them are not as effective. Nontoxic synthetics, however, have become increasingly effective, and therefore increasingly

competitive with pyrethrum in recent years.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Pyrethrum:		
493.55	Crude----------	Free	Free
493.56	Advanced----------	2.5% ad val.	Free

The duty-free status of crude pyrethrum was provided for under paragraph 1602 in the Tariff Act of 1930 as originally enacted and in Tariff Schedules of the United States (TSUS), effective August 31, 1963, and has been bound since January 1948 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

The duty-free status of the advanced product reflects the final stage of a reduction negotiated under the GATT in the Kennedy Round. The first stage of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt from which is reproduced as appendix A to this volume.

U.S. consumption

Since pyrethrum flowers are not grown in the United States, pyrethrum consumption can be estimated by subtracting exports from imports. Apparent consumption, calculated on this basis, increased from an aggregate value of $6.2 million in 1961 to $7.2 million in 1966 (assuming that exports during the latter year were not in excess of 5 percent of imports).

U.S. producers, production, and exports

Five U.S. firms process imported pyrethrum among other products. Two of them (at Linden, N.J., and at Houston, Tex.,) import crude flowers and process them through various stages. Three others, at Baltimore, Md., Newark, N.J., and Minneapolis, Minn., import the extract which they refine for incorporation in their own products or those of other firms. Large exterminating firms sometimes purchase refined extract and formulate their own insecticides.

One of the processing firms maintains a wholly owned subsidiary in Ecuador (which accounted in 1964 for about 27 percent of that country's production of pyrethrum flowers) and thus ensures its supply of raw material.

The value of the products in which the pyrethrum is incorporated is presumably many times the value of the pyrethrum imported. Statistics on the value added by manufacture are not available; however, the fact that imports are increasingly in the form of extract (see U.S. imports) indicates that U.S. establishments are concentrating more on the later stages of processing.

Exports of pyrethrum have all been in advanced form and have consisted mostly of imported extract which has been refined and upgraded by the U.S. processors.

Exports increased from 41,000 pounds, valued at $169,000, in 1961 to 63,000 pounds, valued at $271,000, in 1964. Venezuela, Canada, Switzerland, and South Africa were the principal markets. Separate statistics on U.S. exports in 1965 and 1966 are not available.

U.S. imports

In 1961, the combined value of U.S. imports of crude and advanced pyrethrum totaled $6.4 million. This included unusually large imports of crude (totaling $1.6 million, or about 25 percent of all pyrethrum imports) attributable largely to a special arrangement whereby a Baltimore plant processed a quantity of pyrethrum from Kenya which could not be handled that year by that country's facilities. Total pyrethrum imports in 1962 were valued at $4.8 million, 16 percent of which were in crude form. By 1966, imports had climbed to $7.6 million, but less than 5 percent of this quantity represented crude (table 1). Most U.S. imports have come from Africa (principally Kenya) but Ecuador has also become a significant supplier in recent years (table 2).

World production and trade

World production of pyrethrum flowers totals about 10,000 short tons annually; the world demand for pyrethrum extract in terms of the "20 percent pale" type is estimated at 1.5 million pounds annually. By far the largest amount of this is used in aerosols. The United States supplies 60 percent, Europe 30 percent, and the rest of the world, 10 percent, of the demand. Kenya, Tanzania, and Ecuador are the largest producers of flowers and extract. Bad weather and political disturbances have recently hampered production in Kenya. While production in Ecuador had increased during 1961-65, encouraged

by increased investment of funds, including both United Kingdom and U.S. capital, and exemption from export tax, adverse weather caused a decline in output in 1966.

Smaller quantities of flowers and extracts are produced in Rwanda and in Kivu Province (Congo), where political unrest has also been a problem. In late 1965 a pyrethrum processing plant was reopened in the Congo which substantially increased the capacity of that country for producing extract. Also, in 1965, a British chemical concern invested in a project for cultivation and extraction of pyrethrum in Mount Hagen, New Guinea.

Table 1.--Pyrethrum or insect flowers, crude and advanced: U.S. imports for consumption, by kind, and exports of domestic merchandise, 1961-66

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

Year	Imports		Exports 1/
	Crude	Advanced 1/	
	Quantity		
1961	4,116	514	41
1962	2,061	445	46
1963	1,646	527	50
1964	1,355	590	63
1965	551	663	2/
1966	924	846	2/
	Value		
1961	1,606	4,777	169
1962	772	4,006	171
1963	407	4,707	138
1964	326	4,910	271
1965	154	5,838	2/
1966	296	7,292	2/

1/ Includes only the extract (advanced form).
2/ Not separately classified.

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

Table 2.--Pyrethrum, crude and advanced: U.S. imports for consumption, by principal sources, 1963-66

Country	1963		1964		1965		1966	
	Crude	Advanced	Crude	Advanced	Crude	Advanced	Crude	Advanced
	Quantity (1,000 pounds)							
British East Africa 1/	1,333	387						
Kenya 1/			700	274	-	207	326	338
Tanganyika 1/ 2/			-	92				
Tanzania 2/					-	201	158	188
Ecuador	197	90	324	126	66	180	27	132
Burundi-Rwanda	-	-	264	-	407	-	413	-
Peru	83	27	10	81	-	50	-	120
Congo	-	8	57	1	56	19	-	1
All other	33	15	-	16	22	6	-	67
Total	1,646	527	1,355	590	551	663	924	846
	Value (1,000 dollars)							
British East Africa 1/	345	3,715						
Kenya 1/			216	2,652	-	1,996	98	3,303
Tanganyika 1/ 2/			-	879				
Tanzania 2/					-	1,938	60	1,837
Ecuador	41	758	8	1,182	4	1,707	7	1,371
Burundi-Rwanda	-	-	82	-	127	-	131	-
Peru	21	11	2	34	-	20	-	44
Congo	-	75	18	9	18	124	-	13
All other	3/	148	-	154	5	53	-	724
Total	407	4,707	326	4,910	154	5,838	296	7,292

1/ For 1963, imports reported from British East Africa include those from Kenya and Tanganyika.

2/ For 1965, imports formerly reported as from Tanganyika are reported under Tanzania.

3/ Less than $500.

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

Commodity	TSUS item
Saccharides, polysaccharides, and sugar alcohols, not elsewhere enumerated:	
Lactose	493.65
Levulose	493.66
Salicin	493.67
Other	493.68

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

U.S. trade position

Only a few of the monosaccharides, polysaccharides, and sugar alcohols covered by this summary have attained commercial significance. The domestic consumption of these products probably amounts to $25 million, or more, annually. U.S. imports are estimated to be less than 2 percent of domestic consumption, and exports are doubtlessly less than imports.

Description and uses

The term "saccharide" is generally used as a synonym for carbohydrate, a class of chemical compounds occurring in nature and composed of carbon, hydrogen, and oxygen; the simpler saccharides are commonly called sugars. Polysaccharides are, as the name implies, polymerized saccharides, and consist of a number of monosaccharide units joined chemically by a glycosidic linkage. Polysaccharides whose molecules contain less than 10 sugar units are termed oligosaccharides, and may be further differentiated as disaccharides, trisaccharides, etc. Other summaries cover the more frequently occurring monosaccharides and polysaccharides, such as sucrose, a disaccharide which is the common sugar of commerce (item 155.20); dextrose (glucose), a monosaccharide distributed widely in nature and also obtained by hydrolysis from many polysaccharides (item 155.60); starch (items 132.35, 132.50, and 132.55); and cellulose (various TSUS items).

Polyhydric alcohols are alcohols whose molecule contains three or more hydroxy groups, but the term is used sometimes to include glycols, whose molecule contains only two. Sugar alcohols are polyhydric alcohols that can be obtained by the reduction of carbohydrates (i.e., by the substitution of a hydroxy group for the aldehyde group of the sugar) and thus bear a close relationship to the simple sugar from which they may be derived.

Both free and combined (polymerized) sugars occur widely throughout the plant and animal kingdom. Sugar alcohols likewise occur in nature; however, the two that are the most important commercially (sorbitol and D-mannitol) are synthesized.

The simpler saccharides are used largely as foods for man and animals, or as fermenting media; most sugars have not generally been used as raw materials for chemical processing. It is likely that the disaccharide consumed in the largest volume is maltose, which is prepared from starch by partial hydrogenation. However, nearly all this sugar is consumed by its producer, the brewing industry, and thus little enters commerce. That which does is used as an additive to soft drinks, bread dough, confectionery, and infant food, as well as an ingredient of bee food, stamp-pad ink, and printing compositions. Lactose is the disaccharide sold in the largest quantities and is marketed in several refined grades ranging from about 98.0 to 99.9 percent purity. It is used in infant and other foods, fermentation processes, medicine, and bacteriological work. Levulose, usually prepared from inulin by hydrolysis under pressure, is used in food products such as bakery goods and confectionery. The so-called invert sugar, formed when sucrose is hydrolyzed by acid, is used in confectionery and in jams and jellies.

Except for xylans, which are essentially polymers of D-xylanopyranose found in wood tissue, and which are used industrially to make furfural, the polysaccharides included herein find their greatest use in medicine.

Sorbitol is by far the most important of the polyhydric alcohols covered by this summary. Its major use is in the manufacture of vitamin C. Cosmetics and toothpaste, surfactants, and pharmaceuticals are the next most important uses. Sorbitol, made by the catalytic hydrogenation of corn sugar or other sources of glucose, has an important use in dietary foods for diabetics because it is metabolized as levulose, which requires less insulin than sucrose. Derivatives of sorbitol have found extensive use as components of the newer polyurethane resin foams, particularly the rigid type. Sorbitol is also used in confectionery to increase shelf life, and in the manufacture of flexible glues and cork binders. Mannitol, another sugar alcohol made by the reduction of invert sugar, is used by the pharmaceutical industry as a base for chewable tablets.

This summary also covers salicin, which is a glycoside derived from the saccharide glucose. Its principal use is in medicine.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Saccharides, polysaccharides, and sugar alcohols, not elsewhere enumerated:		
493.65	Lactose	20% ad val.	10% ad val.
493.66	Levulose	40% ad val.	20% ad val.
493.67	Salicin	17.5% ad val.	8.5% ad val.
493.68	Other	20% ad val.	10% ad val.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption and production

Except for lactose, statistics on the U.S. consumption and production of the rare sugars, polysaccharides, and sugar alcohols are not available. Table 1 gives the domestic output of crude milk sugar, as reported by the U.S. Department of Agriculture; lactose production is somewhat less, depending on the loss in refining. Domestic consumption is supplied almost entirely by domestic production. In recent years, lactose production has fluctuated considerably, ranging from 36 million pounds, valued at $5 million, in 1961, to 65 million pounds, valued at $10 million, in 1965 (table 1).

Although the total output of the other raw saccharides and polysaccharides is unknown, their production (excluding lactose) is believed to amount to 1 or 2 million pounds, valued at several hundred thousand dollars.

Sorbitol, the most important of the polyhydric alcohols covered here, is the major outlet for dextrose (item 155.60), or corn sugar, and its annual production is probably nearly 100 million pounds per

year, valued at about $15 million. Production of mannitol and other polyhydric alcohols is relatively small.

Most of the relatively few monosaccharides produced commercially are made by six or seven small firms which specialize in the manufacture of either fine chemicals or biochemicals. Lactose or refined milk sugar, is, however, produced mainly by 10 or 15 pharmaceutical manufacturers and by large dairy organizations. Polysaccharides are also made by some producers of fine chemicals or biochemicals. The minor polyhydric alcohols are made by manufacturers of chemical specialties; however, sorbitol is made by five relatively large organizations which produce a large number of other chemicals. Two of the sorbitol producers consume all of their own output.

U.S. exports

Official export statistics on the rare saccharides and their related products are not available. Exports are believed to be small and to consist mainly of sorbitol; moreover, sorbitol exports are probably small relative to sorbitol production.

Although very little of the domestic production of saccharides, polysaccharides, and polyhydric alcohols other than sorbitol is exported as such, substantial amounts of lactose and other sugars are exported as constituents of baby and geriatric foods.

U.S. imports

Statistics on imports of the rare saccharides and related products are given in tables 2, 3, and 4. Lactose has been imported chiefly from the Netherlands, although West Germany was the principal source in 1966 and Canada was an important source in 1964. The United Kingdom, formerly the major supplier, is no longer a significant source. Imports during the period 1961-65 averaged about 500,000 pounds, valued at $66,000, per year, but in 1966 they increased to 1,352,000 pounds, valued at $132,000 (table 2). Imports supplied 1 to 2 percent of domestic consumption during the 1961-65 period.

Little levulose is imported. There were no imports during the years 1961, 1963, or 1964. Imports during other recent years were as follows:

Country	1962	1965	1966
	Quantity (1,000 pounds)		
West Germany	2	5	34
France	-	1	5
Total	2	6	39
	Value (1,000 dollars)		
West Germany	2	4	27
France	-	1	4
Total	2	5	31

Imports of salicin are likewise small. During the period 1961-66 they ranged in volume from 565 ounces avoirdupois, valued at $2,000, to 2,627 ounces, valued at $4,700. Because of higher prices, 1966 imports, though only 1,251 ounces, had an aggregate value of $5,000 (table 3).

Imports of sugar alcohols and miscellaneous saccharides (item 493.68) have fluctuated widely during the period 1961-66. In 1961, imports were less than 5,000 pounds, with an aggregate value of $14,000; by 1963 they had reached 573,000 pounds, with a value of $210,000. Imports during 1966 were 144,000 pounds, with an aggregate value of $156,000. In 1966, Denmark was the principal supplier, followed by Italy and France (table 4). Imports from Denmark are understood to have consisted primarily of a saccharide composition derived from seaweed. In addition to sorbitol, mannitol and seaweed extract, the other imported products include xylose, galactose, and inulin.

Table 1.--Lactose: U.S. production 1/, 1961-66

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

Year	Quantity	Value
1961	35,528	4,974
1962	52,334	7,327
1963	39,423	6,449
1964	41,344	5,995
1965	65,046	9,757
1966	65,149	9,772

1/ Reported as "crude milk sugar"; value estimated from quoted sales price for edible lactose.

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

Note.--Statistics on exports are not available, but exports, if any, are probably negligible.

Table 2.--Lactose: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Netherlands	510	376	424	439	398	455
West Germany	16	5	-	-	40	897
Canada	-	-	65	164	6	-
Sweden	33	11	-	-	-	-
United Kingdom	47	-	-	-	3	-
All other	1/ 5	-	-	-	-	-
Total	611	392	489	603	447	1,352
	Value (1,000 dollars)					
Netherlands	62	48	53	60	64	72
West Germany	4	4	-	-	5	60
Canada	-	-	4	11	1	-
Sweden	4	1	-	-	-	-
United Kingdom	6	-	-	-	2/	-
All other	1/ 1	-	-	-	-	-
Total	77	53	57	71	70	132

1/ All from Switzerland.
2/ Less than $500.

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

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

Country	1961	1962	1963	1964	1965	1966
	Quantity (avoirdupois ounces)					
West Germany	-	468	1,057	880	565	1,251
France	2,557	352	480	-	-	-
United Kingdom	70	-	282	-	-	-
Total	2,627	820	1,819	880	565	1,251
	Value					
West Germany	-	$2,303	$3,836	$3,201	$2,007	$4,961
France	$4,225	2,006	2,328	-	-	-
United Kingdom	495	-	504	-	-	-
Total	4,720	4,309	6,668	3,201	2,007	4,961

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

Table 4.--Sugar alcohols and saccharides, not elsewhere enumerated: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (pounds)					
Denmark	-	-	-	18,567	44,865	80,183
Italy	4,016	3,930	5,049	3,075	5,185	12,721
France	-	-	-	-	13,228	45,195
Netherlands	-	440	-	440	1,160	1,766
Switzerland	154	54,272	10,868	5,007	1,172	714
West Germany	741	766	551,956	275,575	232	167
All other	55	6,125	4,862	2,432	1/ 36,879	3,335
Total	4,966	65,533	572,735	305,096	102,721	144,081
	Value					
Denmark	-	-	-	$24,804	$58,304	$99,428
Italy	$8,331	$8,358	$11,092	6,774	12,777	22,145
France	-	-	-	-	2,894	21,341
Netherlands	-	1,201	-	962	2,516	3,850
Switzerland	763	22,855	6,376	5,164	4,230	3,130
West Germany	3,616	2,625	184,342	91,060	2,500	727
All other	1,190	1,821	8,743	3,285	1/ 11,482	5,016
Total	13,900	36,860	210,283	132,049	94,703	155,637

1/ Includes 33,069 pounds, valued at $5,316, from Japan.

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

Commodity	TSUS item
Sheep dip----------	493.75

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

U.S. trade position

The United States reportedly exports at least 25 percent of its production of sheep dip. Imports (valued at $3,700 in 1965, nil in 1966) have been small in comparison with both production and exports.

Description and uses

Sheep dip is a collective term applied to a group of products used to combat infestations of sheep and other livestock. Such products may be formulated solely from non-benzenoid materials or they may be products containing benzenoid materials described in part 1 of schedule 4. The principal method of application is to immerse the animal in a dip solution; sometimes the solution is applied as a spray, but it is considered to be a less-effective method than the dip.

In the past, such materials as creosote oil and sodium arsenite were the principal active ingredients used in sheep dip; however, virtually all of these materials have been replaced in recent years in domestically produced sheep dip formulations by synthetic organic pesticides such as DDT and toxaphene. Active ingredients such as these have proved less harmful when applied to livestock other than sheep than some of the previously used materials.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.75	Sheep dip----------	Free	Free

The duty-free status was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963; the duty-free status

has been bound since January 1948 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

U.S. consumption, production, and exports

Trade sources estimate that current domestic consumption of sheep dip ranges between 10 million pounds and 15 million pounds per year.

Consumption of sheep dip is about evenly divided between a wettable-powder type and a concentrated-liquid type. Both forms are diluted with water to a usable concentration before applying.

There are now about 30 to 40 companies selling sheep dip domestically. Two or three of these companies are basic manufacturers who produce their own raw materials; the others are formulators who purchase their raw materials.

About 7 of these 30 to 40 companies now account for considerably more than half of the sheep dip sold each year. These top seven companies have plants located in Illinois, Michigan, Missouri, North Carolina, and Texas.

The production of sheep dip is reported to be between 15 million pounds and 20 million pounds per year at present. Synthetic organic pesticides are reported to account at present for more than 90 percent of the total annual production of sheep dip.

Trade sources estimate that exports of sheep dip now total about 5 million pounds per year. This figure represents between 25 percent and 33 percent of the reported annual production.

Central America and South America are reported to be the major export markets.

U.S. imports

Australia has been the sole source of imports of sheep dip into the United States. During the period 1958-66, annual imports have ranged between 15,000 pounds, valued at $2,000, in 1962. and 117,000 pounds, valued at $23,000, in 1959. There were no imports during the years 1958, 1960, 1961, and 1966. In 1965, imports (20,000 pounds) had a total value of only $3,700.

Trade sources report that a substantial portion of these imports consist of a golden colored, coal-tar based liquid dip which is used exclusively on sheep. This dip is applied to the sheep just prior to livestock shows, as it purportedly imparts a golden color to the animals' fleece.

Commodity	TSUS item
Tall oil----------	493.82

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

U.S. trade position

U.S. consumption, supplied almost entirely by domestic production, increased substantially between 1961 and 1966. The aggregate value of consumption in 1966 was about $38 million. Exports between 1961 and 1966 amounted to less than 5 percent of U.S. production.

Description and uses

Tall oil, a growing source of fatty acid and rosin, is a by-product in the manufacture of paper pulp (item 250.02) from pulp wood by the sulfate (kraft) process. The average yield of crude tall oil is about 1 percent, by weight, of the pulpwood processed in this manner. In the United States, southern pine is the principal kind of wood utilized.

Crude tall oil usually consists of approximately equal parts of fatty acids and rosin and about 7 percent neutral materials; the fatty acid-rosin content, however, may vary to the extent that one is twice as great as the other, depending upon the origin of the pulpwood.

Of the crude tall oil produced in the United States, 90 percent is refined by fractional distillation and 5 percent is acid refined; the remaining 5 percent is sold as crude tall oil. Fractional distillation yields several products differentiated primarily by the ratio of their fatty acid to rosin content as shown in the following table:

Product	Content (percent)			Percent of U.S. crude utilized
	Fatty acid	Rosin	Neutral material	
Tall oil fatty acids----------	90-98	1-10	1-10	34
Tall oil rosin----------	2-3	90-95	2-7	36
Distilled tall oil----------	60-85	14-37	1-3	13
Tall oil heads----------	40-75	0.1-1.5	25-60	7
Tall oil pitch----------	35-70	12-30	20-35	

Acid-refined tall oil has the following content:

Fatty acids----------	50-70 percent
Rosin----------	25-42 percent
Neutral materials-----	5-8 percent

Of the foregoing tall oil products, the fatty acids (in item 490.26), rosin (in item 188.50), and pitch (in item 793.00) are covered by other summaries; thus, in addition to the crude tall oil, acid refined tall oil and distilled tall oil are included in the provision for tall oil. Distilled tall oil accounts for about 13 percent of the crude tall oil utilized; acid-refined tall oil for about 5 percent. Tall oil heads, a low-boiling product of fractional distillation, are not normally articles of international commerce.

Uses for tall oil have increased in recent years because of its dependability of supply and low price, both of which have been related to the increasing production of wood pulp. These factors have improved the competitive position of tall oil with respect to other oils, such as linseed and soybean.

The following are the more important uses common to distilled and acid refined tall oil:

alkyd resins	metallic soaps	printing inks
caulking compounds	oleo resin varnishes	sulfated oils
drawing oils	paint removers	synthetic detergents
driers	phenolic resins	textile oils
linoleum	pigment wetting agents	well-drilling fluids
metal cleaners		

Other important uses, not common to the above types of refined tall oil covered here, are as follows:

Distilled	Acid refined
cutting oil	adhesives
epoxy resins	asphalt tile
vulcanized oils	core oils
latex emulsifiers	gloss oils
urethane resins	lubricants

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
493.82	Tall oil----------	10% ad val.	5% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

United States consumption of tall oil increased from 793 million pounds in 1961 to 1.2 billion pounds in 1966; the value of consumption in the latter year was about $38 million (table 1). Throughout this period, U.S. production furnished all or virtually all of U.S. consumption. Tall oil consumption was fostered by the relative cheapness of the product compared with possible substitutes, its price stability as contrasted with wide fluctuations in linseed and soybean oil prices, and the efforts of producers to improve its usefulness through research and development.

U.S. producers and production

Tall oil is produced in the United States by about 20 paper mills located mostly in the Southeast. Most of the larger mills refine the tall oil which they produce; some mills, however, sell crude tall oil to nearby chemical plants.

The trend of domestic production, since it began in 1935, has been upward; in 1966, output reached a high of 1,243 million pounds, valued at $40 million (table 1). As tall oil is a byproduct in the manufacture of sulfate pulp, producers have particularly promoted its use in order to avoid cumulative surpluses and waste disposal problems.

U.S. exports and imports

Between 1961 and 1966, U.S. exports of tall oil ranged from 50 million pounds, valued at $2.3 million in 1966 to 23 million pounds, valued at $1.5 million in 1965 (table 1) representing from 2 to 4 percent of the annual quantity of domestic production. In each of the years, 1961-64, when exports of crude and refined were reported separately, exports of refined tall oil were considerably larger, in both quantity and value, than the exports of crude tall oil (tables 2 and 3). In 1964, U.S. crude tall oil was exported to 16 countries and U.S. refined tall oil was exported to 33 countries.

On the basis of the combined value of exports of crude and refined tall oil, Italy was the most important market in 1961; Canada, in 1962 and again in 1964-66; and the United Kingdom in 1963.

The aggregate value of imports of tall oil dropped from $146,000 in 1961 (less than one percent of the value of U.S. consumption) to $8,000 in 1964; there were no imports in 1965 or 1966. Finland was the principal supplier in 1961, Sweden in 1962, and Canada in 1963 and 1964 (table 4).

The lack of appreciable competition from imports in the United States market is attributable to the large and growing U.S. production--by far, the largest in the world--and to the large demand abroad. Finland, Sweden, and Canada have been the principal foreign producers.

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

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

Year	Production 1/	Imports	Exports 2/	Apparent consumption
	Quantity			
1961	826,000	3/	33,408	4/ 793,000
1962	880,000	3/	26,936	4/ 853,000
1963	991,000	3/	30,489	4/ 961,000
1964	1,104,000	3/	34,263	4/ 1,070,000
1965	1,145,000	-	22,801	4/ 1,122,000
1966	1,243,000	-	50,108	4/ 1,193,000
	Value			
1961	26,350	146	1,929	24,567
1962	30,800	72	1,754	29,118
1963	35,379	11	2,135	33,255
1964	39,523	8	2,174	37,357
1965	40,304	-	1,511	38,793
1966	39,776	-	2,285	37,491

1/ Quantity and value of production are for crude tall oil; losses in refining are negligible. In the period under review, the increase in the value of production, attributable to the production of refined tall oil within the scope of this summary, ranged from 21 percent to 28 percent.

2/ Exports include both crude and refined tall oil.

3/ Not available.

4/ Ignoring imports.

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

Table 2.--Tall oil, crude: U.S. exports of domestic merchandise, by principal markets, 1961-64 1/

Country	1961	1962	1963	1964
	Quantity (1,000 pounds)			
Canada	924	7,381	6,867	7,145
Colombia	1,111	224	594	2,050
United Kingdom	158	392	-	680
Ecuador	-	66	-	840
Mexico	152	735	422	573
All other	4,618	1,604	1,037	591
Total	6,963	10,402	8,920	11,879
	Value (1,000 dollars)			
Canada	37	147	231	240
Colombia	56	12	25	70
United Kingdom	7	25	-	58
Ecuador	-	3	-	28
Mexico	7	11	14	22
All other	181	49	39	24
Total	288	247	309	442

1/ Exports of tall oil, crude, not separately classified after 1964.

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

Table 3.--Tall oil, refined: U.S. exports of domestic merchandise, by principal markets, 1961-64 1/

Country	1961	1962	1963	1964
	Quantity (1,000 pounds)			
West Germany	473	2,285	2,461	3,925
Canada	3,926	2,329	2,377	2,731
United Kingdom	4,191	4,109	6,062	2,398
Mexico	126	639	1,026	772
Italy	9,835	2,100	1,484	1,367
All other	7,894	5,072	8,159	11,191
Total	26,445	16,534	21,569	22,384
	Value (1,000 dollars)			
West Germany	37	199	221	310
Canada	256	194	194	226
United Kingdom	359	451	542	189
Mexico	9	56	85	133
Italy	405	144	105	100
All other	575	463	679	774
Total	1,641	1,507	1,826	1,732

1/ Exports of tall oil, refined, not separately classified after 1964.

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

Table 4.--Tall oil: U.S. imports for consumption, by principal sources, 1961-66 1/

Country	1961	1962	1963	1964	1965	1966
	Value					
Canada	$1,835	$13,514	$9,079	$7,865	-	-
West Germany	3,857	2,227	1,729	-	-	-
United Kingdom	-	-	220	-	-	-
Sweden	49,558	56,652	-	-	-	-
Finland	85,529	-	-	-	-	-
All other	5,346	-	-	-	-	-
Total	146,125	72,393	11,028	7,865	-	-

1/ Quantity data not available.

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

November 1967
4:12

The following group of summaries covers all natural waxes of animal, vegetable, and mineral origin, chemical modifications of these waxes, some synthetic waxes, and artificial mixtures of any of the foregoing. Waxes are unctuous, fusible, lustrous substances. At room temperature, some waxes are solid, others liquid. There are differences in viscosity among those that are liquids.

There are dozens of animal, vegetable, and mineral sources of wax. Many of them are rarely utilized--and others, not utilized at all--in the commercial production of waxes. The variety of sources of natural wax utilized in domestic consumption has not increased for many years because of the abundant supply of petroleum waxes in the United States, generally adequate supplies of other natural waxes, the growing competition of plastics, and the growing importance of synthetic waxes.

Animal waxes include beeswax derived from honeycombs, spermaceti wax derived from the head oil of the sperm whale, wool wax derived from wool grease, and waxes that are secretions of various insects. Vegetable waxes occur predominantly as protective coatings (against loss of moisture) on the various parts of certain grasses, plants, and trees which grow chiefly in tropical or arid regions. The more important vegetable waxes are carnauba, candelilla, ouricury, and Japan.

Mineral waxes are of two basic groups, petroleum and non-petroleum. The principal types of petroleum waxes are paraffin and microcrystalline. The leading non-petroleum mineral waxes are montan and ozocerite (ozokerite).

Animal and vegetable waxes, and some non-petroleum mineral waxes, are compositions made up largely of non-glyceryl esters formed in nature from higher alcohols and higher fatty acids. Other non-petroleum mineral waxes are composed chiefly of hydrocarbons, and they resemble paraffins. Petroleum waxes are mixtures of solid hydrocarbons and are broadly defined as the waxes naturally occurring in various fractions of crude petroleum.

The synthetic and chemically modified natural waxes considered here have the physical properties of natural waxes and are suitable for use as waxes. The synthetic waxes, classified under the provision for "other mineral waxes" (item 494.24), are manufactured materials produced from non-wax materials of mineral origin; the chemically modified natural waxes are classified in the appropriate provision for animal, vegetable, or mineral waxes, not elsewhere enumerated. Chemically modified montan wax, for example, is classified under "other mineral waxes" (item 494.24).

Some products called waxes are not classified for Customs

purposes in schedule 4 of the TSUS. For example, ski wax, a mixture of wax and other materials, is classifiable under the provision for manufactures of wax in schedule 7 (item 792.32).

With the exception of non-petroleum mineral waxes, each group of waxes is represented in many regions of the world. Non-petroleum mineral waxes occur in certain brown coals (lignite) and shales found in Eastern Europe and, to a lesser extent, in the United States.

There are 40 or more establishments that manufacture, refine, or blend wax in the United States. On the basis of number of establishments, the States of New York and New Jersey are the leaders, and the greatest concentration is in the New York Metropolitan Area. Many of those engaged in refining and blending use both domestic and imported crude and refined natural waxes as well as synthetic waxes.

Blending of individual waxes eliminates variations caused by processing differences in the countries of origin, and blending of types of wax yields products more suitable for specific applications than a single wax, or products that would be lower in price than some of the component waxes. Although the blending of waxes is usually performed by firms specializing in that aspect of processing, blending is also performed by large manufacturers who utilize waxes in the formulation of end products.

About 80 percent of the U.S. supply of petroleum waxes is used in coating liquid containers and food packages. The balance of the supply of petroleum waxes, and all of the supply of the other waxes, are used (separately or in blends) for making candles, polishes, matches, crayons, chewing gum, carbon paper, cosmetics, pharmaceuticals, lubricants, finishes for leather, textile, wood and paper products, and many other applications. For some uses, natural waxes are competitive with each other, depending on price, while, for other uses, many waxes are complementary to each other. The petroleum waxes, since they are lower priced, and in considerably larger supply, are the prime source of competition for other waxes for many uses. Synthetic waxes compete with, or are complementary to, natural waxes.

Petroleum waxes comprise more than 95 percent of all natural waxes consumed in the United States. Consumption in 1966 was over 1 billion pounds, but was almost 15 percent less than 1961 consumption. The decline in the consumption of petroleum waxes is attributable largely to the displacement of cardboard milk cartons, coated with paraffin, by milk cartons coated with plastic material. The estimated annual U.S. consumption of non-petroleum natural waxes for 1966 is 50 million pounds, an increase of about 7 million pounds over the annual consumption in 1961. More than 99 percent of the consumption of petroleum waxes has been supplied by U.S. production in recent years, while probably only about 25 percent of the consumption of natural non-petroleum waxes has been supplied by U.S. produc-

tion, and this consisted predominantly of beeswax and spermaceti wax.

In 1966, imports of all natural waxes amounted to 40.1 million pounds, valued at $12.5 million (see accompanying table). Non-petroleum waxes accounted for 96 percent of the quantity of imports of natural waxes, and 99 percent of the value, in that year.

During recent years, almost all of the exports of natural waxes consisted of petroleum waxes. In 1966, exports of petroleum waxes amounted to 525 million pounds, valued at $36 million.

See individual summaries on waxes under TSUS 494.02-494.30.

Waxes: U.S. imports for consumption, by kinds, 1961-66

Kind	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Total, all waxes	32,917	29,621	33,505	34,232	36,827	40,141
Animal waxes:						
Beeswax	5,452	4,944	4,512	4,594	4,441	4,464
Spermaceti	238	160	205	221	180	228
All other	205	338	476	419	538	558
Total	5,895	5,442	5,193	5,234	5,159	5,250
Vegetable waxes:						
Candelilla	2,601	2,533	2,601	3,053	2,404	3,042
Carnauba	12,750	9,623	13,248	12,793	13,628	14,407
Japan	1/	1/	1/	325	197	71
Ouricury	1,532	1,859	1,194	531	249	214
All other	2/ 752	2/ 647	2/ 561	161	349	428
Total	17,635	14,662	17,604	16,863	16,827	18,162
Mineral waxes:						
Montan	2,339	2,206	2,342	2,500	3,460	3,345
Petroleum	797	459	1,496	480	3,357	1,740
All other	6,351	6,852	6,870	9,151	8,018	11,639
Total	9,387	9,517	10,708	12,131	14,835	16,724
Artificial mixtures	3/	3/	4/	4	6	5

See footnotes on following page.

Waxes: U.S. imports for consumption, by kinds, 1961-66--Continued

Kind	1961	1962	1963	1964	1965	1966
	Value (1,000 dollars)					
Total, all waxes	15,006	11,577	11,862	12,564	12,441	12,505
Animal waxes:						
Beeswax	2,578	2,358	2,170	2,217	2,139	2,291
Spermaceti	52	34	44	45	38	49
All other	148	197	265	242	352	343
Total	2,778	2,589	2,479	2,504	2,529	2,683
Vegetable waxes:						
Candelilla	1,291	1,250	1,217	1,394	1,155	1,487
Carnauba	7,783	4,703	5,454	5,408	5,524	4,765
Japan	1/	1/	1/	123	69	24
Ouricury	686	644	351	175	117	99
All other	2/ 248	2/ 182	2/ 133	45	120	139
Total	10,008	6,779	7,155	7,145	6,985	6,514
Mineral waxes:						
Montan	468	374	383	374	494	583
Petroleum	71	52	113	61	216	153
All other	1,681	1,783	1,732	2,479	2,214	2,571
Total	2,220	2,209	2,228	2,914	2,924	3,307
Artificial mixtures	3/	3/	4/	1	3	1

1/ Included with other vegetable waxes.
2/ Includes Japan wax.
3/ Not available.
4/ Separate statistics not available until September 1963; however, there were no imports in the last 4 months of 1963.

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

Note.--Consists of both crude and refined wax; losses in refining generally have been very small.

Commodity	TSUS item
Beeswax, unbleached	494.02
Beeswax, bleached	494.04

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

U.S. trade position

Nearly half of U.S. consumption of beeswax in recent years has been supplied by imports which had an aggregate value of $2.3 million in 1966. Exports, if any, have been small.

Description and uses

Beeswax is a secretion produced by honeybees. It is composed principally of myricyl palmitate, cerotic acid, and hydrocarbons, and melts between 62° and 65° Centigrade (144° and 149° Fahrenheit). It is marketed in three grades--crude, yellow refined, and bleached.

Crude beeswax varies in color from a light yellow to a dark greenish brown; the color depends on the variety of bee, the food it consumes, the season of the year, and the care taken in preparing the wax for market. Refined beeswax is odorless and tasteless, and is lighter in color and more brittle than the crude. Bleached beeswax is a refined grade from which the color has been removed by the action of sunlight or chemicals.

About half of the domestic supply of beeswax is used in the cosmetics industry as an ingredient of cold cream, lipsticks, and other products, and about a third in the manufacture of church candles. Substantial quantities are made into foundations for honeycombs and resold to beekeepers. Other uses are as a finish for sewing thread, and as an ingredient of abrasive compositions and dental waxes. Beeswax has been almost entirely replaced by carnauba wax (item 494.12) in polishes, and by clay in modeling.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
	Beeswax:		
494.02	Not bleached--------	Free	Free
494.04	Bleached----------	15% ad val.	7.5% ad val.

The duty-free status of unbleached beeswax was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and was bound in the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT).

The rate of duty for bleached beexwax, effective January 1, 1972, reflects the final stage of a reduction negotiated under the GATT in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt from which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

Between 1961 and 1966, the annual consumption of crude beeswax in the United States declined slightly from 10.5 million pounds, valued at $4.8 million, to 9.2 million pounds, valued at $4.5 million (table 1). A gradual increase in the consumption of beeswax for cosmetics and church candles was offset by loss of former markets in polishes, modeling waxes, and other products.

At least half of the beeswax presently consumed is bleached. Some of it is refined and bleached by the industrial user, and some of it by concerns engaged primarily in refining and bleaching waxes and other materials.

U.S. producers

Beeswax is obtained as a byproduct of the extraction of honey (item 155.70), but accounts for less than 5 percent of the combined return to beekeepers. About 1,200 full-time beekeepers produce one-half of the output of beeswax; the remainder is produced by numerous hobbyists and small operators who keep bees for the pollination of orchard and field crops. Production occurs throughout the United States, but principally in California, Minnesota, Florida, and Wisconsin, which four States account for over one-third of total output.

U.S. production and exports

The production of beeswax in the United States decreased from 5.1 million pounds, valued at $2.2 million, in 1961, to 4.7 million pounds, valued at $2.2 million, in 1966 (table 1). The average price received by domestic beekeepers for the crude wax was almost stable at 44 to 46 cents a pound throughout the period. The yellow refined grade of beeswax was sold to consumers during this period at about 60 cents per pound; the bleached white grade at 68 cents per pound. Exports of beeswax, if any, were small.

U.S. imports

Imports of beeswax supply nearly half of U.S. consumption. Virtually all imports in recent years have been of the unbleached material; negligible amounts of bleached wax were imported in 1964-66 only. Between 1961 and 1966, U.S. imports declined slightly from 5.5 million pounds, valued at $2.6 million, to 4.5 million pounds, valued at $2.3 million (table 1).

Most of the U.S. imports come from Latin America and Africa (table 2).

The average value of imports of crude beeswax in recent years has been about 48 cents per pound--nearly 4 cents per pound higher than the average price obtained by domestic beekeepers. Foreign unbleached beeswax of good quality generally sells in the United States at 52 cents to 60 cents a pound and commands a higher price than the domestic because it can be bleached more easily. There are, however, considerable differences among the average values of imports from different countries, depending principally on the care taken to remove dirt and other impurities and otherwise to prepare the wax for market.

Foreign production and trade

The total world output of beeswax is estimated as somewhat more than 40 million pounds a year. About one-third of the total is produced in Europe and one-third in Africa. Most of the beeswax produced in Europe is consumed there, but nearly all of that produced in Africa is exported. Latin America, including the West Indies, supplies about one-fourth of the world's supply of beeswax, and, like Africa, exports most of its production.

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

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

Year	Production	Imports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity			
1961	5,087	5,452	10,539	51.7
1962	5,284	4,944	10,228	48.3
1963	5,466	4,512	9,978	45.2
1964	5,343	4,594	9,937	46.2
1965	5,368	4,441	9,809	45.3
1966	4,728	4,464	9,192	48.6
	Value			
1961	2,241	2,578	4,819	53.5
1962	2,329	2,358	4,687	50.3
1963	2,422	2,170	4,592	47.3
1964	2,369	2,217	4,586	48.3
1965	2,412	2,139	4,551	47.0
1966	2,199	2,291	4,490	51.0

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

Note.--Apparent consumption equals production plus imports. Although statistics are not available, exports are probably negligible.

Table 2.--Beeswax: U.S. imports for consumption, by principal sources, 1961-66

Country	1961 1/	1962 1/	1963 1/	1964	1965	1966
	Quantity (1,000 pounds)					
Ethiopia	560	676	596	731	708	745
Angola	483	715	349	593	717	917
Mexico	919	565	486	473	427	681
Chile	632	684	611	689	460	594
Brazil	1,028	666	1,060	475	885	172
All other	1,830	1,638	1,410	2/ 1,633	3/ 1,244	4/ 1,355
Total	5,452	4,944	4,512	4,594	4,441	4,464
	Value (1,000 dollars)					
Ethiopia	269	317	275	338	333	424
Angola	229	331	162	283	328	416
Mexico	452	276	237	242	220	369
Chile	267	342	314	333	234	323
Brazil	498	313	497	225	421	85
All other	863	779	685	2/ 796	3/ 603	4/ 674
Total	2,578	2,358	2,170	2,217	2,139	2,291

1/ All imports are of crude beeswax.

2/ Includes 224 pounds of bleached beeswax, valued at $734, from the United Kingdom.

3/ Includes 2,569 pounds of bleached beeswax, valued at $1,657, from West Germany.

4/ Includes 2,894 pounds of bleached beeswax, valued at $1,928, from West Germany.

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

Commodity	TSUS item
Spermaceti wax----------	494.06

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

U.S. trade position

Domestic production has supplied more than 95 percent of U.S. consumption of spermaceti wax in recent years. Average annual imports during the period 1961-66 amounted to about 200,000 pounds, valued at more than $40,000.

Description and uses

Spermaceti wax is a coproduct in the manufacture of refined sperm oil from crude sperm oil.

The wax, a white crystalline solid, mostly cetyl palmitate, is consumed principally in the manufacture of cosmetic creams, lotions and soaps, medicinal ointments and salves, in candles, and in sizings for textiles and paper.

Stearic acid (item 490.12) and paraffin (in item 494.22) compete with spermaceti wax in the manufacture of candles; blends containing paraffin compete with it to some degree in the preparation of face creams and pharmaceuticals.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.06	Spermaceti wax---	2.5¢ per lb.	1.2¢ per lb.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty

for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and exports

Domestic consumption of spermaceti wax during 1961-66 is estimated to have amounted to nearly 6 million pounds, valued at $2 million annually. During this period, 95 percent, or more, of U.S. consumption was supplied by U.S. production.

Spermaceti wax is produced in the United States primarily from imported crude sperm oil by a large Minnesota concern which also has other output. There is some processing of imported spermaceti wax by one or more of the establishments discussed in the general statement to the wax summaries.

U.S. production for the years 1961-66 is estimated to have ranged from 4.4 million pounds in 1964 to 6.4 million pounds in 1966 (table 1). Separate data on U.S. exports are not available, but these are presumably considerably smaller than imports.

U.S. imports

During 1961-66, U.S. imports of spermaceti wax ranged from 160,000 pounds in 1962 to 238,000 pounds in 1961. In 1966, imports amounted to 228,000 pounds, valued at $49,000. The only sources of imports were the United Kingdom, Japan, Norway, and West Germany (table 2).

Table 1.--Spermaceti wax: U.S. production and imports for consumption, 1961-66

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

Year	Production	Imports	Ratio (percent) of imports to production
	Quantity		
1961	5,575	238	4.3
1962	6,210	160	2.6
1963	6,010	205	3.4
1964	4,385	221	5.0
1965	6,325	180	2.8
1966	6,380	228	3.6
	Value		
1961	1,785	52	1/
1962	2,020	34	1/
1963	1,955	44	1/
1964	1,425	45	1/
1965	2,060	38	1/
1966	2,075	49	1/

1/ Not meaningful.

Source: Production: Quantities estimated from official statistics on the consumption of crude sperm oil in the production of refined sperm oil, compiled by the Fish and Wildlife Service, U.S. Department of the Interior; values computed from price data in trade literature; imports, compiled from official statistics of the U.S. Department of Commerce.

Table 2.--Spermaceti wax: U.S. imports for consumption, by source, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
United Kingdom	217	127	191	191	142	208
Japan	20	30	14	30	34	-
Norway	-	-	-	-	4	12
West Germany	1	3	-	-	-	8
Total	238	160	205	221	180	228
	Value (1,000 dollars)					
United Kingdom	48	27	42	40	30	45
Japan	3	5	2	5	7	-
Norway	*	-	-	-	1	2
West Germany	1	2	-	-	-	2
Total	52	34	44	45	38	49

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

Commodity	TSUS item
Candelilla wax----------	494.10

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

U.S. trade position

The United States, which accounts for about 70 percent of the world's imports and consumption of candelilla wax, obtains virtually all of its supply from Mexico. Annual U.S. imports during 1961-66 were valued at between $1.2 and $1.5 million.

Description and uses

Candelilla wax, an article of commerce since about 1900, is obtained from the shrubs Pedilanthus pavonis, Euphorbia antisiphilitica, and Euphorbia cerifera which are native to the arid sections of northern Mexico and the southwestern United States. The wax occurs as a secretion covering the leafless stems of the shrub. To obtain the crude wax, the stems are boiled in water and sulfuric acid; the wax obtained is then sent to refineries where it is refined one or more times.

Candelilla wax melts between 66° and 71° C., becoming highly fluid. It contracts very little on hardening, and becomes glossy, waterproof, rigid, and strong.

Candelilla wax is used in the manufacture of electric insulating materials, in leather processing, and as an ingredient of candles and other wax articles, chewing gum, printing inks, cosmetics, metal polish, floor wax, as well as in the manufacture of paper (including carbon paper), typewriter ribbons, cordage, paints, tires, other rubber products, explosives, and wax matches. Candelilla wax, carnauba wax (item 494.12), and ouricury wax (item 494.16) are substituted for each other in many uses. The extent of substitution varies with changes in price relationships.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.10	Candelilla wax----------	Free	Free

The duty-free status was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and is not bound as a trade agreement concession.

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

Domestic consumption of candelilla wax is supplied predominantly by imports. There is believed to be some U.S. cultivation of the plants and production of the crude wax, but the domestic industry consists essentially of processing the imported wax. (See the general statement on waxes for information about the domestic producers.) Exports, if any, probably consist of wax that has been processed.

During the period 1961-66, annual imports ranged in quantity from 2,404,000 pounds to 3,053,000 pounds and in value from $1.2-$1.5 million. Mexico supplied all of the imports in some years, and virtually all in others. Total imports, according to official U.S. Department of Commerce statistics are as follows:

Year	Quantity 1,000 pounds	Value 1,000 dollars
1961----------	2,601	$1,291
1962----------	2,533	1,250
1963----------	2,601	1,217
1964----------	3,053	1,394
1965----------	2,404	1,155
1966----------	3,042	1,487

Foreign production and trade

Mexico is by far the world's largest producer of candelilla wax. Mexican production, sales, and exports of candelilla wax are under the control of the Banco Nacional de Comercio Exterior (National Foreign Trade Bank), a semigovernmental institution. Generally, more than 70 percent of Mexico's exports of this wax are to the United States.

Candelilla wax produced by cooperative agricultural communities (ejidos) and refined and exported under the control of the National Foreign Trade Bank is not subject to Mexican Government export duty. Candelilla wax, exported without meeting these conditions is subject to an export duty at the rate of 4.75 pesos per gross kilogram, plus 13 percent of the official price (14 pesos per gross kilogram in 1966). All candelilla wax exported in 1964 and 1965, and 95 percent of that exported in 1963, was free of this export duty.

Commodity	TSUS item
Carnauba wax----------	494.12

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

U.S. trade position

Crude carnuba wax the U.S. consumption of which is supplied solely by imports, practically all from Brazil, is imported into the United States in larger quantities than any other natural wax. In 1966, U.S. imports of carnauba wax amounted to 14.4 million pounds, valued at $4.8 million.

Description and uses

Carnauba wax, sometimes known as Brazil wax, is a product of the carnauba or wax-palm tree, Copernica cerifera. Almost the entire world production is secured from Northerm Brazil, although the carnauba palm grows elsewhere in Brazil, and in other countries.

The wax is gathered from September to March by cutting the leaves from the tree before they are fully opened, and drying them for two or three days in the sun. The surfaces of the leaves become covered by a white powdery mass which is brushed off, and then melted in boiling water. Upon cooling, the wax collects as a solid mass.

The crude product from the tree is green or yellow. It is very hard and brittle and can be readily powdered. Refining and bleaching improve the color and the refined product is almost white.

In practically all of its uses, carnauba wax is superior--and in some uses, far superior--to all other waxes. In most of the products and processes in which it is used, carnauba wax is used as a blend with other waxes or non-wax materials. Carnauba wax is used as an ingredient in many types of polishes; in cosmetic creams and lipsticks; in precision casting; as an ingredient of special types of lubricants; for buffing wooden ware; as a glazing for candies, gums, pills, and paper; in carbon paper inks; in varnishes, lacquers, and enamels; in candles; and in salves and ointments. Whether or not used in combination with other waxes, carnauba wax is the non-petroleum wax used in the largest quantities in polishes and special types of lubricants.

Among the substitutes for carnauba wax are ouricury wax, candelilla wax, sugar-cane wax, montan wax, synthetic waxes, and oxidized paraffin waxes.

Crude carnauba wax is sold in the United States as a powder; the refined grades appear as a powder, as lumps and flakes, and in molded form.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.12	Carnauba wax--------	Free	Free

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

U.S. consumption, production, and trade

U.S. consumption of crude carnauba wax is supplied entirely by imports. Domestic production consists of refining these imports, and of processing imported refined carnauba wax. Statistics on the U.S. production of refined carnauba wax are not available, but such production is known to be substantial. (See the general statement on waxes for information on domestic producers.)

Carnauba wax is imported into the United States in larger quantities than any other natural wax. In the period, 1961-66, these imports ranged from 9.6 million pounds in 1962 to 14.4 million pounds in 1966 (see accompanying table). Imports in 1966 had an aggregate value of $4.8 million. Brazil has consistently supplied virtually all of the imports of carnauba wax. Between 1961 and 1966, the prices paid by U.S. importers declined. This is attributable to increased competition from petroleum waxes.

There are no separate data available on U.S. exports of refined carnauba wax, but they are believed to be small or negligible.

Foreign production and trade

Brazil supplies almost the entire world consumption of carnauba wax. In March 1967 the exportation of carnauba wax from Brazil was placed under the control of the Coordinating Commission for the Exportation of Carnauba Wax (CCECC) which was authorized to control quality of the product, appoint exclusive selling agents, and fix maximum and minimum selling prices.

Carnauba wax: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Brazil	12,748	9,609	13,207	12,624	13,626	14,365
Argentina	-	14	-	99	-	9
Mexico	-	-	-	55	-	33
All other	2	-	41	15	2	-
Total	12,750	9,623	13,248	12,793	13,628	14,407
	Value (1,000 dollars)					
Brazil	7,781	4,694	5,419	5,335	5,523	4,743
Argentina	-	9	-	35	-	5
Mexico	-	-	-	29	-	17
All other	2	-	15	9	1	-
Total	7,783	4,703	5,434	5,408	5,524	4,765

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

Commodity	TSUS item
Japan wax	494.14

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

U.S. trade position

The United States is wholly dependent on imports (virtually all from Japan) for its supply of Japan wax. The value of annual imports declined from $123,000 in 1964 to $24,000 in 1966. There is some domestic processing (upgrading of the imported wax).

Comment

Japan wax, sometimes called Sumac wax, is obtained from the berries of a small cultivated sumac-like tree, Rhus surcedanea, which grows in Japan and China. After requiring eight years to reach maturity, the production life of the tree is about 100 years; the annual yield is 30-45 pounds of berries containing about 15 percent crude wax.

The many grades of Japan wax are distinguished by brand names, such as Kitagumi, Chikusan, Shimidzu, Takada, Puji-Sakura, and Dove. Japan wax is light in color and has a gummy texture; it is malleable, has a tallowy odor, and darkens on aging.

Japan wax is refined by melting and filtration, and is bleached by exposure to sunlight. It is used in polishes, candles, textile finishes, cosmetics, lubricants, pencils, crayons, matches, metal-buffing compounds, and pharmaceuticals.

In the United States there is competition to Japan wax from mixtures of natural and synthetic waxes (wholly or predominantly of domestic origin) with chemical analyses closely approximating Japan wax.

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated)

is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.14	Japan wax----------	Free	Free

The duty-free status was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and has been bound since September 1955 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT).

Domestic consumption of Japan wax is supplied entirely by imports, virtually all from Japan. Imports, in those years for which official Department of Commerce statistics are available, have varied widely in quantity and aggregate value. In 1958, imports were 22,400 pounds, valued at $5,299. By 1964, they had climbed to 324,979 pounds, valued at $122,795. In 1966, they declined to 71,128 pounds, valued at $24,432, as shown in the following table.

Year	Quantity Pounds	Value
1958----------	22,400	$5,299
1959----------	76,608	16,417
1964----------	324,979	122,795
1965----------	196,671	68,535
1966----------	71,128	24,432

Virtually all imports during the above years came from Japan. Most of the wax imported had been refined, although some of the U.S. wax producers (see general statement) refine imported crude Japan wax or further refine imported wax.

Commodity	TSUS item
Ouricury wax----------	494.16

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

U.S. trade position

U.S. consumption of ouricury wax is supplied entirely by imports, virtually all of which have come from Brazil. In 1966, imports of ouricury wax were valued at $99,000.

Comment

Ouricury (ouricuri) wax is an amorphous, hard, brittle, and lustrous wax, brown in color. It is obtained from the leaves of the ouricury palm which is native to Brazil. Despite many similarities between ouricury wax and carnauba wax (item 494.12), the amount of ouricury wax obtained per tree is relatively small and it is more difficult to gather because it must be scraped from the leaves with sharp instruments. Thus, the crude wax contains a considerable amount of foreign matter (up to 25 percent) which can be removed only with some difficulty.

The wax is purified by screening or filtering the melted crude. After being cooled, it is broken into lumps and graded. There are several grades of crude with various degrees of impurities; refined grades are designated as powdered, lumped, or flaked. The color varies with the care used in purifying the wax.

Ouricury wax comes closest to carnauba wax in properties and is cheaper in price. Its principal uses are as a substitute for carnauba in products where its darker color is acceptable, such as in the manufacture of carbon paper; in floor, furniture, and shoe polishes, and in mold-release lubricants.

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item		Rate prior to January 1, 1968	Rate effective January 1, 1972
494.16	Ouricury wax-------	Free	Free

The dury-free status was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963, and was bound in the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT).

Since ouricury wax is primarily a lower cost substitute for carnauba wax, its consumption tends to increase when the differential between its price and the price of carnauba wax is widest; however, other waxes are being used increasingly as carnauba substitutes.

It is believed that most ouricury wax is imported in refined condition; however, some processing may occur in the United States (see general statement on waxes regarding U.S. wax manufacturing).

U.S. imports of ouricury wax amounted to 1.5 million pounds in 1961, increased to almost 1.9 million pounds in 1962, and then decreased in successive years to almost 200,000 pounds in 1966. Imports in 1966 had an aggregate value of $99,000. Brazil was virtually the only source, supplying more than 99 percent of these imports during the 1961-66 period (see accompanying table).

Exports of (refined) ouricury wax by the United States are presumed to have been negligible or nil.

The ouricury palm grows wild on about 60 million acres of land in the State of Bahia in Brazil. This area accounts for virtually the entire world production of ouricury wax. In recent years, from 80 to 90 percent of Brazil's total exports of this wax has gone to the United States.

Ouricury wax: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Brazil	1,532	1,859	1,183	527	249	214
All other	-	-	11	4	-	-
Total	1,532	1,859	1,194	531	249	214
	Value (1,000 dollars)					
Brazil	686	644	348	174	117	99
All other	-	-	3	1		- -
Total	686	644	351	175	117	99

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

Commodity	TSUS item
Montan wax----------	494.20

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

U.S. trade position

U.S. consumption of montan wax is supplied predominantly by imports. In 1966, these were valued at about $580,000.

Comment

Montan wax is a chemically complex bituminous wax, structurally not unlike other natural waxes. The crude wax is readily extracted from lignites and has a resinous content which varies in relation to its geographical origin.

To obtain the wax, the coal or lignite is granulated and dried, and the crude wax extracted by means of a solvent. The crude wax is usually refined prior to marketing by one of two processes. In the more important process, the resin is removed by solvent processing and the residue treated chemically to yield a variety of useful refined waxes. In the other refining process, vacuum distillation of the crude wax produces a so-called "double-refined" wax.

Refined montan waxes are produced primarily in West Germany, from crude waxes obtained from East Germany. Refined grades produced in the United States, West and East Germany, and Czechoslovakia are basically similar, but certain variations result in different end-uses.

The most important use of the East German and domestic montan waxes is as body in the ink of "one-time" carbon paper; this use accounts for about three-fourths of U.S. consumption of domestic and imported montan waxes. This wax is also used in shoe polishes.

The most extensive use of Czechoslovakian montan wax occurs in the automobile industry, for the impregnation of felts, and in molded rubber products.

Because of the differences in the montan waxes from different sources, they are not readily interchangeable. Other waxes may be substituted for montan wax, but they are generally much higher priced.

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.20	Montan wax--------	Free	Free

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

U.S. consumption of montan wax is supplied predominantly by imports. There is one domestic producer extracting montan wax from lignite at a plant in California. East and West Germany and Czechoslovakia are the only significant sources of imports. Virtually all of the montan wax imported by the United States has originated in East Germany and Czechoslovakia; imports from West Germany consist of treated wax from crudes originating in East Germany and Czechoslovakia. During 1961-66, U.S. imports of montan wax ranged between 2.2 million pounds in 1962 and 3.5 million pounds in 1965; they amounted to 3.3 million pounds, with an aggregate value of $583,000, in 1966 (see accompanying table). U.S. exports of montan wax are believed to have been very small in recent years.

Most of the world supply of montan wax is obtained from East Germany, where its extraction is an old and well-established industry. Wax-containing coals, however, have been mined and processed for wax in Czechoslovakia, the U.S.S.R., Australia, and New Zealand, as well as the United States.

Montan wax: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
East Germany	1,453	1,821	1,710	1,910	2,753	2,026
West Germany	820	350	566	546	663	1,216
Czechoslovakia	66	33	33	44	44	88
All other	-	2	33	-	-	15
Total	2,339	2,206	2,342	2,500	3,460	3,345
	Value (1,000 dollars)					
East Germany	178	241	243	274	378	365
West Germany	277	126	129	91	107	199
Czechoslovakia	13	6	6	9	9	18
All other	-	1	5	-	-	1
Total	468	374	383	374	494	583

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

Commodity	TSUS item
Paraffin and other petroleum waxes	494.22

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

U.S. trade position

Paraffin and other petroleum waxes are minor coproducts derived from crude petroleum. Consumption (valued at $63 million in 1966) has declined in recent years because of the competition of plastics. In 1966, one-third of the quantity of U.S. production was exported. Imports have been negligible.

Description and uses

Petroleum waxes are mixtures of solid hydrocarbons occurring in paraffinic and mixed-base (but not in asphalt-base) crude oils. They consist of paraffin waxes and microcrystalline waxes. 1/ Paraffin waxes are obtained from the wax distillate or lighter lube oil fractions of crude oil refining, and microcrystalline waxes are derived from the heavier oil stocks. Paraffin waxes have larger crystals, a lower melting point, and less unseparated oil content than microcrystalline waxes.

Paraffin and other petroleum waxes are colorless, odorless, and tasteless solids. They are impervious to water and water vapor and are not affected by most strong acids and alkalies. Paraffin waxes commonly melt between 128° and 150° F. and the microcrystalline waxes, between 130° and 180° F.

The two principal commercial grades of paraffin waxes are crude scale and refined. Crude-scale waxes contain 1 to 6 percent of entrapped oil, have low softening temperatures, and are usually slightly yellow in color. Refined paraffin waxes have a low oil content (0.1 to 0.5 percent) and are almost white in color. The unrefined material,

1/ While the term "paraffin" is frequently used to refer to all petroleum waxes, this summary limits its use to large-crystal, as distinguished from microcrystalline waxes.

for which there is limited demand, is slack wax containing 5 to 15 percent of oil.

About four-fifths of all petroleum wax is used in making containers (cartons and cups for liquids) and for food packaging. The remaining one-fifth is used in candles, polishes, matches, crayons, textiles, chewing gum, and for the manufacture of explosives, chlorinated paraffins, and carbon paper.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.22	Paraffin and other petroleum waxes---	0.5¢ per lb.	Free

The duty-free status reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of the five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption

The apparent consumption of paraffin and other petroleum waxes fell from about 1.27 billion pounds in 1961 to an average of less than 1.10 billion pounds a year in 1962-66 (table 1). The value of 1966 consumption ($63 million) was 22 percent less than the value of 1961 consumption. The decrease was caused largely by a switch from paraffin to polyethylene in the manufacture of milk cartons, as well as the increasing use of plastic coatings for other paper products.

U.S. production and trade

Paraffin and other petroleum waxes are coproducts obtained in the manufacture of lubricating oils. Waxes must be removed to prevent their separation out from the finished oils in cold weather. They are produced in 35 of the nearly 300 petroleum refineries in the United States. Ten of the producers are in Pennsylvania and seven are in Texas. The others are scattered among a number of States.

U.S. production of paraffin and other petroleum waxes declined from about 1.619 billion pounds, valued at $106 million, in 1961, to 1.435 billion pounds, valued at $94 million, in 1963, and increased to 1.616 billion pounds, valued at $99 million, in 1966 (table 1). Of the total production in recent years, between 15 and 20 percent has been microcrystalline wax, between 20 and 25 percent crude-scale paraffin wax, and the balance, refined or semi-refined paraffin wax.

U.S. exports of paraffin and other petroleum waxes increased from 347 million pounds, valued at $25 million, in 1961, to 525 million pounds, valued at $36 million, in 1966. Exports accounted for about one-fifth of the quantity of U.S. production in 1961, but one-third in 1966. The Common Market countries and Mexico, Canada, the United Kingdom, and South Africa have been the principal markets (table 2).

U.S. imports of paraffin and other petroleum waxes have not exceeded 1 percent of the quantity of domestic production since the end of World War II and in most years they have been less than one-tenth of 1 percent. Between 1961 and 1966 imports ranged in annual value from $52,000 to $216,000. In 1966, 1.7 billion pounds with an aggregate value of $153,000 were imported. Canada has been the principal source of imports in recent years and West Germany has usually been the next most importance source (table 3).

Although production in other countries has been increasing relatively rapidly, the United States in 1962 was still, by far, the world's major producer of petroleum waxes. In 1962, the most recent year for which data are available, the United States produced 1.5 billion pounds of paraffin wax. Other countries produced no more than 10 percent of the amount in that year (table 4).

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

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

Year	Production	Imports	Exports	Apparent consumption
	Quantity			
1961	1,618,680	797	346,766	1,272,711
1962	1,498,840	459	400,429	1,098,870
1963	1,435,280	1,496	407,310	1,029,466
1964	1,498,560	480	486,092	1,012,948
1965	1,527,680	3,357	460,815	1,070,222
1966	1,616,160	1,740	525,429	1,092,471
	Value			
1961	106,024	71	24,694	81,401
1962	98,174	52	28,484	69,742
1963	94,011	113	29,094	65,030
1964	98,156	61	32,849	65,368
1965	93,647	216	30,072	63,791
1966	99,071	153	36,027	63,197

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

Table 2.--Microcrystalline wax, and paraffin wax, crystalline: U.S. exports of domestic merchandise, by principal markets, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
West Germany	27,572	41,187	37,823	49,861	62,232	82,208
Mexico	46,012	42,531	51,170	47,200	47,220	54,529
Canada	41,534	37,707	39,001	40,773	41,236	35,727
Republic of South Africa	6,188	9,554	12,796	34,051	38,516	30,816
Colombia	38,211	29,281	27,966	22,843	8,705	36,166
Japan	7,392	11,496	8,826	11,168	10,289	14,111
United Kingdom	25,280	23,559	21,981	21,301	19,108	19,772
France	12,715	14,966	15,137	15,879	12,648	13,405
Italy	12,940	14,783	17,147	29,576	29,641	24,003
Netherlands	13,197	15,096	19,295	26,689	11,673	13,028
Guatemala	11,182	12,218	12,263	16,804	13,210	16,149
Venezuela	6,099	9,717	11,842	19,203	13,450	5,400
All other	98,444	1/ 138,334	132,063	150,744	152,887	2/ 180,115
Total	346,766	400,429	407,310	486,092	460,815	525,429
	Value (1,000 dollars)					
West Germany	1,969	2,533	2,384	3,148	3,026	4,677
Mexico	2,268	2,340	2,999	2,777	2,677	3,044
Canada	2,810	2,549	2,565	2,659	2,690	2,404
Republic of South Africa	382	645	826	2,161	2,501	2,286
Colombia	2,167	1,705	1,587	1,237	466	1,948
Japan	904	1,413	1,704	1,377	1,327	1,786
United Kingdom	2,170	2,112	2,186	1,973	1,664	1,784
France	1,540	1,751	1,751	1,876	1,458	1,635
Italy	1,076	1,211	1,317	1,860	1,834	1,574
Netherlands	1,167	1,236	1,464	1,854	975	1,119
Guatemala	670	690	647	848	672	822
Venezuela	406	586	718	1,169	774	367
All other	7,165	1/ 9,713	8,946	9,910	10,008	2/ 12,581
Total	24,694	28,484	29,094	32,849	30,072	36,027

1/ Includes 25,055,000 pounds, valued at $1,495,000, exported to Brazil.

2/ Includes 25,201,000 pounds, valued at $1,539,000, exported to Brazil.

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

November 1967
4:12

Table 3.--Paraffin and other petroleum waxes: U.S. imports for consumption, by sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Canada	704	437	798	418	747	1,547
West Germany	6	21	694	31	35	186
United Kingdom	1/	1	-	31	26	7
Switzerland	-	-	-	1/	-	-
Sweden	-	-	2	-	-	-
Netherlands	87	-	2	-	-	-
Mexico	-	-	-	-	2,549	-
Indonesia	-	-	-	-	-	-
Total	797	459	1,496	480	3,357	1,740
	Value (1,000 dollars)					
Canada	62	46	66	46	60	125
West Germany	3	5	45	10	6	26
United Kingdom	1	1	-	5	2	2
Switzerland	-	-	-	2/	-	-
Sweden	-	-	2	-	-	-
Netherlands	5	-	2/	-	-	-
Mexico	-	-	-	-	148	-
Indonesia	-	-	-	-	-	-
Total	71	52	113	61	216	153

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

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

Table 4.--Paraffin wax: Production in certain countries, 1957-62

(In thousands of pounds)

Country	1957	1958	1959	1960	1961	1962
United Kingdom	69,440	67,200	69,440	80,640	87,360	85,120
West Germany	107,959	105,737	107,789	128,052	155,026	170,919
Mexico	81,406	89,481	100,950	89,533	91,674	86,486
Burma	22,183	23,878	26,853	29,167	29,911	38,407
Indonesia	204,803	198,605	224,441	229,515	201,566	1/
Japan	77,833	81,290	88,935	100,966	101,147	110,793
United States	1,529,024	1,470,560	1,576,512	1,650,880	1,619,520	1,498,560

1/ Not available.

Source: Overseas Geological Surveys of Great Britain-Statistical Summary of the Mineral Industry, 1957-62.

Commodity	TSUS item
Animal waxes not elsewhere enumerated	494.08
Vegetable waxes not elsewere enumerated	494.18
Mineral waxes not elsewhere enumerated	494.24
Artificial mixtures of two or more of the waxes in items 494.02-494.24	494.30

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

U.S. trade position

U.S. consumption of most of the articles considered in this summary is predominantly supplied by imports. In 1966, these imports amounted to 12.6 million pounds, valued at $3.1 million. With the exception of mixtures, exports are believed to be negligible.

Description and uses

This summary covers animal, vegetable, and mineral waxes (i.e., natural waxes) not elsewhere enumerated; chemically modified natural waxes; synthetic waxes (see general statement on waxes); and artificial mixtures of any two or more of the waxes covered by TSUS items 494.02-.24. There are scores of animal, vegetable, and mineral waxes not enumerated in the TSUS, but the following types are those which have been more important in recent decades:

Animal waxes.--Wool wax, frequently called wool grease, is a complex mixtures of high-molecular fatty acids, alcohols, and esters. Industrial applications include its use in stuffing leather, dressing furs, and as an ingredient of printing inks, rust preventives, and metal-working lubricants.

Chinese insect wax is obtained from the leaves and stems of certain trees where it is deposited by the insect Ericerus pela. This insect occurs in China, Japan, and Okinawa. The wax is used in candles, furniture polishes, and sizing and coatings for paper and cloth.

Shellac wax is a byproduct in the manufacture of spirit shellac from which the wax is removed by solvent treatment. The wax is used in insulating materials and polishes.

Vegetable waxes.--Ceroxylon wax, also known as palm wax (although it is not the only wax derived from palm trees), is gathered in the Andes Mountains of Colombia. Two species of the genus Ceroxylon are the commercial sources. The wax coats the outside of the trunk, from which it is scraped as a hard flaky white material. Ceroxylon wax is used in the manufacture of inks for carbon paper, of lubricants and water repellents for rope and twine, and as an ingredient in certain polishes.

Raffia wax is obtained from the leaves of the Malagasi raffia palm as well as from other species of palm native to tropical Africa or South America. The wax is extracted from the leaf residue after the fibrous portion of the leaf has been removed. Raffia wax is used chiefly in the manufacture of candles. In the United States raffia wax is used only occasionally.

Sugar-cane wax is obtained as a byproduct of sugar-cane milling. The wax occurs as a thin white layer on the exterior of the stem of the sugar cane. About 40 percent of the available wax is recovered by filtration from the juice after milling; it is not considered economical to recover the balance. Sugar-cane wax is used in certain polishes, in printing inks, and in inks for carbon paper.

Mineral waxes.--Ozocerite (ozokerite) is a hydrocarbon wax which is contained in veins of wax shale, occurring close to the surface of the earth. The shale is mined chiefly in Poland, Austria, and the Soviet Ukraine. In the United States, there is small-scale, occasional mining of this material. Ozocerite is closely similar to paraffin wax in appearance and composition; therefore, it is suitable for mixture with the cheaper paraffins. Purification of the crude wax is achieved by treatment with sulfuric acid and filtration through clay. The wide application of ozocerite is attributable to its compatability with many substances and its affinity for solvents. Ceresin is an alternate name often applied to ozocerite, although mixtures of ozocerite and paraffin wax and of beeswax and paraffin wax are also known as ceresin. Ozocerite is used in cosmetics, paints, varnishes, and printing inks.

Synthetic waxes as well as chemically modified natural waxes, have been classified under the provisions covered by this summary. Synthetic waxes made by the Fischer-Tropsch synthesis from carbon monoxide and hydrogen are manufactured materials produced from non-wax substances and are classified as "other mineral waxes" (item 494.24). There are certain wax-like products, however, produced by the Fischer-Tropsch process as well as by other processes, and having characteristics of both waxes and synthetic resins, which are classifiable

under the provisions for synthetic resins because of their predominantly resinous characteristics.

Artificial mixtures.--Artificial mixtures of two or more waxes are produced to reduce costs or to adapt waxes for specific end-uses. (See the general statement on waxes.) For example, paraffin often is blended with one or more higher priced waxes, yielding mixtures that are not only less expensive than any of the higher priced component waxes, but also, for certain end-uses, are superior to any of these waxes. Polyethylene or other plastics may also be included in mixtures.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.08	Animal waxes, not elsewhere enumerated----------	Free	Free
494.18	Vegetable waxes, not elsewhere enumerated--	Free	Free
494.24	Mineral waxes, not elsewhere enumerated--	Free	Free
494.30	Artificial mixtures of two or more of the waxes in items 494.02-494.24---------	The highest rate applicable to any component wax.	The highest rate applicable to any component wax.

The duty-free status of unenumerated waxes was provided for in the Tariff Act of 1930 as originally enacted and in the Tariff Schedules of the United States (TSUS), effective August 31, 1963. The duty-free status of unenumerated animal waxes covered by item 494.08 was bound for the first time in the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT). The duty-free status of the unenumerated vegetable waxes covered by item 494.18, and of ceresin wax (in item 494.24), was bound in a concession under the GATT, effective in January 1948; the duty-free status of the mineral waxes covered in item 494.24, other than ceresin, was bound in June 1951. The rate of duty applicable to artificial mixtures of waxes (i.e., the highest rate applicable to

any component wax), which provision first became effective under the TSUS on August 31, 1963, is a GATT trade agreement rate as a result of the Kennedy Round.

U.S. consumption

The bulk of the U.S. consumption of each group (animal, vegetable, and mineral) of unenumerated natural waxes is supplied by imports. The bulk of the U.S. consumption of artificial mixuures of two or more waxes, considered here, is supplied by domestic production using imported or domestic waxes.

U.S. producers and production

Wool wax is produced, in conjunction with other products of wool grease, by at least one establishment in the northeastern part of the United States. Sugar cane wax is produced in at least one establishment in Louisiana. There is small-scale production of ozocerite wax in Utah and Texas. The artificial mixtures of waxes are produced in 20 or more establishments, located chiefly in the States of New York and New Jersey (see the general statement on waxes). Such mixtures are also made by some of the large industrial users of wax. Production statistics are not available for any of the waxes or mixtures of waxes considered here.

U.S. exports and imports

U.S. exports of the waxes covered by this summary are not separately classified. With the exception of artifical mixtures, they are believed to be negligible.

U.S. imports of miscellaneous natural animal waxes increased from 205,000 pounds, valued at $148,000, in 1961, to 558,000 pounds, valued at $343,000, in 1966 (table 1). The United Kingdom was by far the major supplier. An analysis of these imports for 1964 and 1965 shows that they consisted almost entirely of wool wax.

U.S. imports of miscellaneous natural vegetable waxes dropped from 752,000 pounds, valued at $248,000, in 1961, to 428,000 pounds, valued at $139,000, in 1966 (table 2). Japan was the dominant supplier.

U.S. imports of miscellaneous natural mineral waxes increased from 6.4 million pounds, valued at $1.7 million, in 1961, to 11.6 million pounds, valued at $2.6 million, in 1966 (table 3). West Germany and the Republic of South Africa were practically the only suppliers.

Imports of artificial mixtures of waxes have been almost negligible. During the period 1964-66, total quantities ranged from 4,000 to 6,000 pounds annually, with values of from $1,000 to $3,000, coming mostly from West Germany.

Table 1.--Animal waxes other than beeswax and spermaceti wax: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
United Kingdom	137	209	198	244	467	393
West Germany	43	47	105	67	21	62
Italy	-	-	-	10	9	-
Haiti	-	-	-	-	8	-
Netherlands	5	33	163	93	33	99
All other	20	49	10	5	-	4
Total	205	338	476	419	538	558
	Value (1,000 dollars)					
United Kingdom	94	128	131	159	304	233
West Germany	44	28	67	35	31	50
Italy	-	-	-	12	10	-
Haiti	-	-	-	-	4	-
Netherlands	3	21	63	33	3	56
All other	7	20	4	3	-	4
Total	148	197	265	242	352	343

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

Table 2.--Vegetable waxes, other than candelilla, carnauba, Japan, 1/ and ouricury waxes: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
Japan	406	357	278	39	227	317
United Kingdom	6	25	16	45	45	40
Colombia	83	76	33	22	39	41
Brazil	46	-	-	-	18	7
Republic of South Africa	80	102	219	50	20	-
All other	131	87	15	5	-	23
Total	752	647	561	161	349	428
	Value (1,000 dollars)					
Japan	106	92	80	13	78	96
United Kingdom	3	10	7	16	15	13
Colombia	47	30	11	7	13	17
Brazil	31	-	-	-	11	3
Republic of South Africa	13	15	29	6	3	-
All other	48	35	6	3	-	10
Total	248	182	133	45	120	139

1/ Includes Japan wax in 1961-63.

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

Table 3.--Mineral waxes other than montan wax and petroleum waxes: U.S. imports for consumption, by principal sources, 1961-66

Country	1961	1962	1963	1964	1965	1966
	Quantity (1,000 pounds)					
West Germany	2,546	2,902	2,890	4,217	4,077	3,769
Republic of South Africa	3,672	3,931	3,911	4,930	3,919	7,827
United Kingdom	31	9	4	-	18	3
Brazil	-	7	-	4	-	-
Canada	-	1/	28	-	-	-
All other	102	3	37	-	4	70
Total	6,351	6,852	6,870	9,151	8,018	11,639
	Value (1,000 dollars)					
West Germany	1,091	1,218	1,183	1,761	1,639	1,490
Republic of South Africa	553	552	533	715	567	1,057
United Kingdom	10	6	1	-	6	1
Brazil	-	5	-	3	-	-
Canada	-	2/	7	-	-	-
All other	27	2	8	-	2	23
Total	1,681	1,783	1,732	2,479	2,214	2,571

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

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

Commodity	TSUS item
Usefully radioactive isotopes	494.50

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

U.S. trade position

U.S. consumption of radioactive isotopes is supplied primarily by domestic production. In recent years, U.S. imports of these isotopes have been substantial, averaging $2 million annually, slightly in excess of estimated exports.

Comment

Isotopes are forms of a chemical element having the same or very closely related properties and the same atomic number, but different atomic weights (mass numbers). They are differentiated by appending the mass number to the name of the element by which they are identified--e.g., carbon-13. Most elements as found in nature are mixtures of isotopes in a definite ratio. For example, carbon, as found in nature, is composed primarily of carbon-12 with a small amount of carbon-14 and with a much lesser amount of carbon-13. Some isotopes are composed of atoms having unstable nuclei which emit complex radiations and thus produce certain physical or chemical effects; these are termed radioactive isotopes. Some radioactive isotopes occur naturally, and others are produced by bombarding normally stable isotopes with neutrons or with high-energy charged particles such as protons or deuterons.

This summary covers all chemical elements and isotopes, and their compounds (including benzenoid compounds described under part 1 of schedule 4), which are usefully radioactive except the naturally occurring elements, thorium and uranium, and their compounds. Natural thorium (item 632.52), uranium (item 629.50), compounds of thorium (items 422.10, 422.12, 422.14, and 427.14), and compounds of uranium (items 421.58, 422.50, and 422.52) are covered by separate summaries.

The isotopes and their compounds covered by this summary number in the hundreds, and vary widely in composition, properties, and unit value. Most of them are used primarily for research in the fields of medicine, biology, and industry. Those produced in quantity, however, are used principally in radiation diagnosis and therapy; in the preservation of foodstuffs; in the sterilization of medical supplies; in

activating chemical systems; in tracing and controlling the course of biological, chemical, and industrial processes; and as power sources in remote systems.

With the exception of radium, extracted in limited quantities from ores, the isotopes produced in quantity are primarily the products of cyclotrons and the products and byproducts of nuclear reactors. They include: Carbon-14, cesium-137, cobalt-60, hydrogen-3 (tritium), iridium-192, iodine-131, mercury-203, phosphorus-32, polonium-210, and strontium-90.

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is indicated below:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.50	Usefully radioactive isotopes----------	Free	Free

The duty-free status for most of the articles covered herein was derived from paragraph 1749 in the Tariff Act of 1930 which covered "radium, and salts of, and radioactive substitutes" and has been bound since January 1948 as a concession granted by the United States in the General Agreement on Tariffs and Trade (GATT). The Tariff Schedules of the United States (TSUS), effective August 31, 1963, clarified and expanded the provision by introducing the "usefully radioactive" concept in lieu of "radioactive substitutes [of radium]".

Official statistics on the total production of the radioactive elements, isotopes, and compounds covered by this summary are not available. Commercial shipments, including shipments of isotopes or their compounds by the primary producer (primary shipments), and shipments of chemicals produced for specific end uses from purchased primary material (secondary shipments), are estimated to have had a value of $11 million in 1965 and are believed to be increasing. The U.S. Atomic Energy Commission provides the bulk of primary shipments (valued at about $2 million in 1965); primary or secondary shipments are made by about 40 firms that produce one or more chemicals. Plants are not confined to any particular region. For some of the small producing concerns, these chemicals are a substantial source of income.

The value of U.S. exports is estimated to have almost equalled the value of imports in recent years. Exports are composed of both primary and secondary radioactive chemicals. The principal countries of destination have been Canada, Belgium, France, West Germany, and the United Kingdom.

November 1967
4:12

U.S. imports of these isotopes have originated chiefly in Canada, the United Kingdom, and Belgium. They are composed of both primary and secondary radioactive chemicals, with cobalt-60, iridium-192, iodine-131, hydrogen-3, and carbon-14 predominating. Recent imports have been as follows:

Year	Value	Quantity
1964	$1.9 million	290,000 curies
1965	2.8 "	513,000 "
1966	2.1 "	228,000 "

Commodity	TSUS item
Non-radioactive isotopes	494.52

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

U.S. trade position

Nearly all of U.S. consumption of non-radioactive isotopes is supplied by domestic production. It is estimated that U.S. exports of these isotopes exceed imports.

Comment

Isotopes are forms of a chemical element having the same or very closely related properties and the same atomic number but different atomic weights (mass numbers). They are differentiated by appending the mass number to the name of the element by which they are identified--e.g., carbon 13.

Elements in nature are commonly mixtures of different isotopes. The isotopes covered by this summary are mainly those separated from the naturally occurring element. Compounds containing these isotopes, including benzenoid compounds described in part 1 of schedule 4 as well as compounds described elsewhere in schedule 4, are also covered. The separation of the isotopes is effected by diffusion through porous tubes, by electromagnetic means, or by fractional electrolysis. Isotopes made by bombarding natural elements with neutrons or high-energy charged particles such as protons or deuterons are normally radioactive and as such are not covered by this summary. This summary also includes "enriched isotopes"--i.e., mixtures of isotopes in which the proportion of a desired isotope has been made greater than the proportion in the naturally occurring element from which it is derived. Compounds of non-radioactive isotopes are also covered here. Usefully radioactive isotopes (item 494.50) are discussed in a separate summary.

Among the isotopes included herein are hydrogen-2 (deuterium or heavy hydrogen), helium-3, lithium-6, boron-10, carbon-13, nitrogen-15, and oxygen-18. Non-radioactive isotopes are produced by various processes (fractional distillation, electromagnetic separation, and thermal diffusion, among others). In addition to military applications, they are used for diagnostic and research purposes, as moderators (heavy water or deuterium oxide) in nuclear reactors, and as

neutron absorbers (boron-10).

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.52	Non-radioactive isotopes	10.5% ad val.	5% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

It is estimated that substantially all U.S. consumption of the isotopes considered in this summary is supplied by domestic production. The Atomic Energy Commission provides nearly all of the primary domestic output and consumes large quantities of this output in its own operations. Some of the primary production is converted by secondary producers to chemicals for specific end uses. During 1965, the AEC sold 31.5 short tons (4.1 tons to domestic purchases) of deuterium in the form of heavy water, and realized somewhat in excess of $4 million of revenue from these transactions; total sales increased about eight-fold to 239.3 tons in 1966, primarily because of purchase for foreign reactors. Sales to domestic users that year totaled 7.3 tons.

U.S. exports of non-radioactive isotopes are not separately reported in official statistics, other than for the figures cited above. In addition to foreign sales of heavy water, there were substantial quantities shipped, primarily to Canada, under lease arrangements.

U.S. imports in recent years of non-radioactive isotopes have had the following aggregate values:

1964-------	$358,000
1965-------	250,000
1966-------	239,000

Imports originated chiefly in Canada, Israel, Switzerland, France, and the United Kingdom. The principal isotopes imported have been deuterium, carbon-13, oxygen-18, and nitrogen-15.

November 1967
4:12

Commodity	TSUS item
Cements, not elsewhere enumerated-------	494.60

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

U.S. trade position

U.S. consumption of the cements considered in this summary, believed to exceed $100 million annually, is supplied almost entirely by domestic production. It is believed that exports exceed imports.

Description and uses

This summary covers cements, including cements containing benzenoid materials described under part 1 of schedule 4, other than those specially provided for elsewhere in the Tariff Schedules. These cements--substances capable of holding materials together by surface attachment--include formulations, often liquid solutions, made from a variety of materials, including rubber and synthetic resins.

Rubber substances other than cements are covered by separate summaries dealing with items 446.05-446.30. Synthetic plastics materials are covered by summaries on items 445.05-445.75 and 405.25 (benzenoid); animal glue, vegetable glue, and casein glue are covered by summaries on items 455.30-455.46. The following types of cement are included in summaries covering the TSUS item numbers shown: Dental cement (item 495.15), cement of gypsum (items 512.31-.35), and hydraulic cement (item 511.21-.25).

The cements covered by this summary have diverse applications, which include bookbinding, industrial fabricating, the manufacture of safety glass, shoe and other leather products, packaging, and textile products, including tire cords. Heavy-duty uses include flexible joints for steel bridges and concrete pavement.

Because varied formulations are needed to produce cements with widely differing physical characteristics suitable for the many uses and methods of application, there is a relatively wide range in unit values for different types and grades.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
494.60	Cements, not elsewhere enumerated----------	5% ad val.	2.5% ad val.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption and production

It is believed that the volumes of both consumption and domestic production of these cements are many times that of imports and probably exceed $100 million annually.

The cements covered by this summary are produced by an estimated 30 to 50 large and small firms. It does not appear that cements are the major source of income for any but perhaps a few of the smaller firms.

U.S. exports and imports

It is believed that exports of these cements exceed imports.

U.S. imports of cements not elsewhere enumerated exceeded 9 million pounds in both 1961 and 1962; they were less than 4 million pounds in both 1963 and 1964, and less than 1-1/2 million pounds in both 1965 and 1966. The unit values of the materials imported during the period 1961-66 varied considerably, however, and the value of imports in 1966 ($398,000) was only exceeded in this period by the value of imports in 1962 ($467,000). The chief sources of imports were Canada, West Germany, and the United Kingdom (see accompanying table). During the period 1961-64, Canada was the chief source of low-value imports.

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

Country	1961	1962	1963	1964	1965	1966
	Quantity (pounds)					
Canada	9,945	8,656	2,780	2,738	304	564
West Germany	319	279	61	373	256	298
United Kingdom	43	69	13	508	383	412
Japan	2	37	12	42	37	18
All other	84	69	47	124	104	36
Total	10,393	9,110	3,003	3,785	1,084	1,328
	Value (1,000 dollars)					
Canada	201	190	41	72	119	199
West Germany	102	136	30	116	85	120
United Kingdom	10	12	6	52	49	57
Japan	1	10	6	19	19	11
All other	71	119	8	22	22	11
Total	385	467	91	281	294	398

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

Commodity	TSUS item
Wadding, gauze, bandages, dressing, plasters, and similar articles coated or impregnated with medicinals	495.05
Surgical sutures, surgical suture materials, and absorbable surgical hemostats, all the foregoing which are sterile	495.10
First-aid kits put up and packaged for retail sale	495.20

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

U.S. trade position

U.S. imports of the products covered by this summary (with an aggregate value of about $500,000 in 1966) are estimated to comprise less than 1 percent of the value of U.S. consumption; exports are believed to be somewhat larger than imports.

Description and uses

This summary deals with wadding, gauze, bandages, dressing, plasters, and similar articles coated or impregnated 1/ with medicinals; sterile materials, consisting of surgical sutures, surgical suture materials, and absorbable surgical hemostats; and first-aid kits put up and packaged for retail sale. Iodoform, tyrothricin, merbromin (mercurochrome), and sulfathiazole are the medicinals used principally for impregnating the bandages and dressings included.

1/ "Uncoated" textile bandages are classifiable under various provisions of Schedule 3; "uncoated" adhesive products such as pressure-sensitive strips and tapes, under item 790.55 in Schedule 7.

Surgical sutures are of two classes: Absorbable and non-absorbable. The absorbable type is principally surgical gut obtained from healthy sheep. Absorbable sutures are digested during the healing process by the tissue in which they are embedded. Non-absorbable surgical sutures effectively resist enzymic digestion in living material; the principal non-absorbable suture material is silk. Sutures used to "tie off" blood vessels to prevent hemorrhage are known as ligatures.

Absorbable surgical hemostats are used to stop bleeding; they either cause the blood to clot or materially aid the normal clotting mechanism of the blood. Some hemostats may be used internally as they are absorbed by the surrounding tissue after the bleeding has been arrested.

First-aid kits for retail sale include a container for holding the first-aid articles, whether of a sealed one-time or permanent use type. These kits normally contain relatively few medicinal items, all of which are of a non-prescription nature inasmuch as first aid is only an immediate, temporary treatment given in case of accident or sudden illness before the services of a physician can be secured. The non-prescription medicinals usually include such items as tincture of iodine, spirits of ammonia, and zinc ointment (or its equivalent) for burns; in addition the kits usually contain gauze bandages, adhesive dressings, etc.

U.S. tariff treatment

The column 1 rates of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) are as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
495.05	Wadding, gauze, bandages, dressing, plasters, and similar articles coated or impregnated with medicinals	8% ad val.	1/ 4% ad val.
495.10	Surgical sutures, surgical suture materials, and absorbable surgical hemostats, all the foregoing which are sterile	17.5% ad val.	8.5% ad val.
495.20	First-aid kits put up and packaged for retail sale	20% ad val.	10% ad val.

1/ The rates of duty for 1970, 1971, and 1972 are contingent--see footnote 1 to Staged Rates and Historical Notes to part 13 of schedule 4 of the Tariff Schedules of the United States Annotated (1968), as shown in appendix A to this volume.

The rates effective January 1, 1972, reflect the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968), an excerpt of which is reproduced as appendix A to this volume. The rates shown above as existing prior to January 1, 1968, are the rates applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption, production, and exports

Trade sources estimate that the value of domestic sales of the medical and surgical supplies dealt with in the summary were about $50 million in 1966. About 75 percent to 80 percent of this total reportedly was accounted for by the sales of sterile surgical sutures and suture materials, with the sale of first-aid kits (including new

and refill industrial orders) accounting for most of the remainder. The value of sales of sterile absorbable surgical hemostats was believed to be no more than $3 million in 1966. Medicinally impregnated or coated articles probably represent less than 1 percent of the total market for wadding, gauze, and similar articles; these are, as a rule, prepared when needed by hospitals and similar institutions.

The items discussed in this summary are produced domestically by about 40 companies located mainly in the North Central and Northeastern States. Ten of these firms annually account for more than three-fourths of the total sales of all the medical and surgical supplies discussed herein. Most of the firms manufacture a variety of these supplies, including medical and surgical instruments and appliances. It is believed that the items dealt with in this summary are not the major source of income for most of the producers.

Export statistics are not available for first-aid kits for the years preceding 1965. In 1965, U.S. exports of first-aid kits totaled $268,444, and in 1966, $227,304. Canada was the principal market in both years. Another export category for which data were reported for the first time in 1965 comprises both sterile and nonsterile surgical sutures, as well as surgical suture materials and absorbable surgical hemostats; also included in this basket category are statistics on roentgenographic contrast media (diagnostic aids). U.S. exports of these products amounted to about $7 million in both 1965 and 1966, but the percentage of this total represented by articles covered by this summary is not available.

Export statistics for wadding, bandages, and similar articles coated or impregnated with medicinals were also reported for the first time in 1965. The heading for this category includes the phrase, "or put up for retail sale", and trade sources believe that the inclusion of "or" instead of "and" in the description permits the reporting of such articles as untreated wadding under this item number. These sources estimate, however, that U.S. exports of coated or impregnated wadding and similar articles accounted for less than 1 percent of the $8.8 million total value of this basket category in 1966.

U.S. imports

Import statistics on the medical and surgical supplies discussed in this summary were not available prior to the effective date of the TSUS, August 31, 1963. U.S. imports of the medicinally impregnated or coated wadding and other articles covered here during the succeeding years were as follows:

Year	Quantity 1,000 pounds	Value 1,000 dollars
1964----------	257	321
1965----------	291	370
1966----------	314	416

The United Kingdom and Japan were the major suppliers. The value of U.S. imports of sterile surgical sutures and suture materials and absorbable hemostats totaled $9,000 annually in both 1964 and 1965, and $37,000 in 1966; the United Kingdom and West Germany were the principal sources of these imports. In 1964, 1965, and 1966, the value of U.S. imports of first-aid kits amounted to $12,000, $5,000, and $6,000, respectively; Canada was the principal supplier.

Commodity	TSUS item
Dental cements	495.15

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

U.S. trade position

U.S. consumption of dental cements, estimated at about $75 million annually, is supplied almost entirely by domestic production. U.S. imports of these cements (valued at $162,000 in 1966) have been small; exports are believed to be smaller than imports.

Description and uses

Dental cements are used for the retention of restorations or prosthetic appliances within the oral cavity, or as a restorative filling material. In addition, a number of secondary uses are found for these materials in almost all branches of dentistry. Most cements are sold in small (1/2- to 1-ounce) containers, with the liquid and solid components packaged separately.

Five types of cements are currently of major importance:

(1) Zinc phosphate cements, which set within a few minutes. Immediately prior to use the cement powder containing a zinc compound is combined with an orthophosphoric acid solution. The powder may consist of zinc oxide or a zinc oxide-magnesium oxide mixture with minor additions of other chemicals including bacteriocides and pigmenting agents. This type of cement is used to hold inlays and crowns in place, as cavity linings, and as temporary fillings.

(2) Copper phosphate cements, which are formulated in a manner similar to zinc phosphate cements, except that a copper compound is used in place of the zinc oxide. These cements are used only as temporary fillings because of their high solubility and are not suitable for front teeth because of their dark color.

(3) Silicate cements, employing powders produced by fusing mixtures of the oxides of silicon, aluminum, calcium, and other metals and sodium or calcium phosphates

with a suitable flux, usually sodium carbonate. The fused glass-like material is then ground to a powder. The liquid used in combination with the powder is a mixture similar to the liquid used in zinc phosphate cements with a water content of 28-44 percent. These cements have a hardness similar to tooth dentin but the material is much softer than natural tooth enamel. Silicate cements must be used only in semi-permanent restorations because of low strength, low wear resistance, and high solubility.

(4) Zinc silicate cements, which are hybrid-type cements produced by combining the ingredients used in the powders of zinc phosphate and zinc silicate cements.

(5) Resin cements, based on methyl methacrylate, which polymerize to a solid resin. The powder consists largely of methyl methacrylate polymer to which various fillers and an organic peroxygen compound are added. The liquid composition used in combination with the powder is basically methyl methacrylate monomer, with a promoter to activate the organic peroxide in the powder when the cement is mixed. These cements have properties ranging from excellent to poor.

Dental cements sell at prices as high as $15 to $16 a pound. Imported cements are like, and directly competitive with, the domestic products.

A variety of materials are actually used for permanent fillings, such as gold, certain plastics, and silver amalgams (compounds with mercury) which are not covered by this summary.

U.S. tariff treatment

The column 1 rate of duty applicable to imports (see general headnote 3 in the Tariff Schedules of the United States Annotated) is as follows:

TSUS item	Commodity	Rate prior to January 1, 1968	Rate effective January 1, 1972
495.15	Dental cements----------	5% ad val.	2.5% ad val. 1/

1/ The rates of duty for 1970, 1971, and 1972 are contingent--see footnote 1 to Staged Rates and Historical Notes to part 13 of schedule 4 of the Tariff Schedules of the United States Annotated (1968), as shown in appendix A to this volume.

The rate effective January 1, 1972, reflects the final stage of a reduction negotiated under the General Agreement on Tariffs and Trade (GATT) in the Kennedy Round. The first of five annual stages of this reduction became operative January 1, 1968. Rates of duty for each of the individual stages are given in the Tariff Schedules of the United States Annotated (1968) an excerpt from which is reproduced as appendix A to this volume. The rate shown above as existing prior to January 1, 1968, is the rate applicable on August 31, 1963, the effective date of the TSUS.

U.S. consumption and production

U.S. consumption is supplied mostly by domestic production. Sixteen concerns in 10 states (located mainly in the northeast and middle west) manufacture dental cements. Dental cements provide a large portion of the income of many of the smaller concerns, but account for only a very small portion of the income of several large firms, which manufacture a variety of dental apparatus and equipment.

In recent years, the value of sales of domestic dental cements is believed to have been about $75 million annually.

U.S. exports and imports

Official data on U.S. exports of dental cements are not available but exports are believed to be smaller than imports.

Imports of dental cements were not separately classified until the effective date of the TSUS, August 31, 1963. Imports during the balance of that year had an aggregate value of $72,000, implying an annual volume of imports in 1963 of perhaps $200,000. In 1964, however, imports dropped to an aggregate value of only $21,000. Imports during 1965 aggregated $178,000, and during 1966 aggregated $162,000 (see accompanying table). In addition to variations in total imports a wide variation in unit values of the products supplied also took place, with New Zealand and Poland (in 1965 and 1966 respectively) supplying major portions of total U.S. imports, at very low unit values. Switzerland, West Germany, and the United Kingdom have been consistent suppliers of high-valued dental cements.

Dental cements: U.S. imports for consumption, by principal sources, 1963-66

Country	1963 1/	1964	1965	1966
	Quantity (pounds)			
Switzerland	5,241	613	6,788	6,588
Poland	-	-	-	154,322
West Germany	1,279	1,530	4,589	5,033
Belgium	-	-	-	938
France	22	57	-	587
United Kingdom	420	270	1,410	760
Other	-	851	2/ 223,740	1,112
Total	6,962	3,321	236,527	169,340
	Value			
Switzerland	$67,380	$10,127	$96,083	$80,482
Poland	-	-	-	35,269
West Germany	4,322	5,806	18,904	19,415
Belgium	-	-	-	13,440
France	442	1,055	-	5,877
United Kingdom	261	2,312	5,665	3,616
Other	-	1,355	2/ 57,400	3,720
Total	72,405	20,655	178,052	161,819

1/ September-December only.
2/ Includes 223,710 pounds, valued at $55,960, from New Zealand.

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

A P P E N D I X E S

GENERAL HEADNOTES AND RULES OF INTERPRETATION

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

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

3. Rates of Duty. The rates of duty in the "Rates of Duty" columns numbered 1 and 2 of the schedules apply to articles imported into the customs territory of the United States as hereinafter provided in this headnote:

(a) Products of Insular Possessions.

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

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

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

(c) Products of the Philippine Republic.

(i) Products of the Philippine Republic imported into the customs territory of the United States, whether imported directly or indirectly, are subject to the rates of duty which are set forth in column numbered 1 of the schedules or to fractional parts of the rates in the said column 1, as hereinafter prescribed in subdivisions (c)(ii) and (c)(iii) of this headnote.

(ii) Except as otherwise prescribed in the schedules, a Philippine article, as defined in subdivision (c)(iv) of this headnote, imported into the customs territory of the United States and entered on or before July 3, 1974, is subject to that rate which results from the application of the following percentages to the most favorable rate of duty (i.e., including a preferential rate prescribed for any product of Cuba) set forth in column numbered 1 of the schedules:

(A) 20 percent, during calendar years 1963 through 1964,

(B) 40 percent, during calendar years 1965 through 1967,

(C) 60 percent, during calendar years 1968 through 1970,

(D) 80 percent, during calendar years 1971 through 1973,

(E) 100 percent, during the period from January 1, 1974, through July 3, 1974.

(iii) Except as otherwise prescribed in the schedules, products of the Philippine Republic, other than Philippine articles, are subject to the rates of duty (except any preferential rates prescribed for products of Cuba) set forth in column numbered 1 of the schedules.

(iv) The term "Philippine article", as used in the schedules, means an article which is the product of the Philippines, but does not include any article produced with the use of materials imported into the Philippines which are products of any foreign country (except materials produced within the customs territory of the United States) if the aggregate value of such imported materials when landed at the Philippine port of entry, exclusive of any landing cost and Philippine duty, was more than 20 percent of the appraised customs value of the article imported into the customs territory of the United States.

(d) Products of Canada.

(i) Products of Canada imported into the customs territory of the United States, whether imported directly or indirectly, are subject to the rates of duty set forth in column numbered 1 of the schedules. The rates of duty for a Canadian article, as defined in subdivision (d)(ii) of this headnote, apply only as shown in the said column numbered 1.

(ii) The term "Canadian article", as used in the schedules, means an article which is the product of Canada, but does not include any article produced with the use of materials imported into Canada which are products of any foreign country (except materials produced within the customs territory of the United States), if the aggregate value of such imported materials when landed at the Canadian port of entry (that is, the actual purchase price, or if not purchased, the export value, of such materials, plus, if not included therein, the cost of transporting such materials to Canada but exclusive of any landing cost and Canadian duty) was --

(A) with regard to any motor vehicle or automobile truck tractor entered on or before December 31, 1967, more than 60 percent of the appraised value of the article imported into the customs territory of the United States; and

(B) with regard to any other article (including any motor vehicle or automobile truck tractor entered after December 31, 1967), more than 50 percent of the appraised value of the article imported into the customs territory of the United States.

1/ By virtue of section 401 of the Tariff Classification Act of 1962, the application to products of Cuba of either a preferential or other reduced rate of duty in column 1 is suspended. See general headnote 3(e), infra. The provisions for preferential Cuban rates continue to be reflected in the schedules because, under section 401, the rates therefor in column 1 shall form the bases for determining the rates of duty applicable to certain products, including "Philippine articles".

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

General Headnotes and Rules of Interpretation

(e) Products of Communist Countries. Notwithstanding any of the foregoing provisions of this headnote, the rates of duty shown in column numbered 2 shall apply to products, whether imported directly or indirectly, of the following countries and areas pursuant to section 401 of the Tariff Classification Act of 1962, to section 231 or 257(e)(2) of the Trade Expansion Act of 1962, or to action taken by the President thereunder:

Albania
Bulgaria
China (any part of which may be under Communist domination or control)
Cuba 1/
Czechoslovakia
Estonia
Germany (the Soviet zone and the Soviet sector of Berlin)
Hungary
Indochina (any part of Cambodia, Laos, or Vietnam which may be under Communist domination or control)
Korea (any part of which may be under Communist domination or control)
Kurile Islands
Latvia
Lithuania
Outer Mongolia
Rumania
Southern Sakhalin
Tanna Tuva
Tibet
Union of Soviet Socialist Republics and the area in East Prussia under the provisional administration of the Union of Soviet Socialist Republics.

(f) Products of All Other Countries. Products of all countries not previously mentioned in this headnote imported into the customs territory of the United States are subject to the rates of duty set forth in column numbered 1 of the schedules.

(g) Effective Date; Exceptions - Staged Rates of Duty. Except as specified below or as may be specified elsewhere, pursuant to section 501(a) of the Tariff Classification Act of 1962 (P.L. 87-456, approved May 24, 1962), the rates of duty in columns numbered 1 and 2 become effective with respect to articles entered on or after the 10th day following the date of the President's proclamation provided for in section 102 of the said Act. If, in column numbered 1, any rate of duty or part thereof is set forth in parenthesis, the effective date shall be governed as follows:

(i) If the rate in column numbered 1 has only one part (i.e., 8¢ (10¢) per lb.), the parenthetical rate (viz., 10¢ per lb.) shall be effective as to articles entered before July 1, 1964, and the other rate (viz., 8¢ per lb.) shall be effective as to articles entered on or after July 1, 1964.

(ii) If the rate in column numbered 1 has two or more parts (i.e., 5¢ per lb. + 50% ad val.) and has a parenthetical rate for either or both parts, each part of the rate shall be governed as if it were a one-part rate. For example, if a rate is expressed as "4¢ (4.5¢) per lb. + 8% (9%) ad val.", the rate applicable to articles entered before July 1, 1964, would be "4.5¢ per lb. + 9% ad val."; the rate applicable to articles entered on or after July 1, 1964, would be "4¢ per lb. + 8% ad val.".

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

1/ In Proclamation 3447, dated February 3, 1962, the President, acting under authority of section 620(a) of the Foreign Assistance Act of 1961 (75 Stat. 445), as amended, prohibited the importation into the United States of all goods of Cuban origin and all goods imported from or through Cuba, subject to such exceptions as the Secretary of the Treasury determines to be consistent with the effective operation of the embargo.

4. Modification or Amendment of Rates of Duty. Except as otherwise provided in the Appendix to the Tariff Schedules --

(a) a statutory rate of duty supersedes and terminates the existing rates of duty in both column numbered 1 and column numbered 2 unless otherwise specified in the amending statute;

(b) a rate of duty proclaimed pursuant to a concession granted in a trade agreement shall be reflected in column numbered 1 and, if higher than the then existing rate in column numbered 2, also in the latter column, and shall supersede but not terminate the then existing rate (or rates) in such column (or columns);

(c) a rate of duty proclaimed pursuant to section 336 of the Tariff Act of 1930 shall be reflected in both column numbered 1 and column numbered 2 and shall supersede but not terminate the then existing rates in such columns; and

(d) whenever a proclaimed rate is terminated or suspended, the rate shall revert, unless otherwise provided, to the next intervening proclaimed rate previously superseded but not terminated or, if none, to the statutory rate.

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

(a) corpses, together with their coffins and accompanying flowers,
(b) currency (metal or paper) in current circulation in any country and imported for monetary purposes,
(c) electricity,
(d) securities and similar evidences of value, and
(e) vessels which are not "yachts or pleasure boats" within the purview of subpart D, part 6, of schedule 6,

are not articles subject to the provisions of these schedules.

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

(a) Imported Empty: Containers or holders if imported empty are subject to tariff treatment as imported articles and as such are subject to duty unless they are within the purview of a provision which specifically exempts them from duty.

(b) Not Imported Empty: Containers or holders if imported containing or holding articles are subject to tariff treatment as follows:

(i) The usual or ordinary types of shipping or transportation containers or holders, if not designed for, or capable of, reuse, and containers of usual types ordinarily sold at retail with their contents, are not subject to treatment as imported articles. Their cost, however, is, under section 402 or section 402a of the tariff act, a part of the value of their contents and if their contents are subject to an ad valorem rate of duty such containers or holders are, in effect, dutiable at the same rate as their contents, except that their cost is deductible from dutiable value upon submission of satisfactory proof that they are products of the United States which are being returned without having been advanced in value or improved in condition by any means while abroad.

(ii) The usual or ordinary types of shipping or transportation containers or holders, if designed for, or capable of, reuse, are subject to treatment as imported articles separate and distinct from their contents. Such holders or containers are not part of the dutiable value of their contents and are separately subject to duty upon each and every importation into the customs territory of the United States unless within the scope of a provision specifically exempting them from duty.

(iii) In the absence of context which requires otherwise, all other containers or holders are subject to the same treatment as specified in (ii) above for usual or ordinary types of shipping or transportation containers or holders designed for, or capable of, reuse.

7. Commingling of Articles. (a) Whenever articles subject to different rates of duty are so packed together or mingled that the quantity or value of each class of articles cannot be readily ascertained by customs officers (without physical segregation of the shipment or the contents of any entire package thereof), by one or more of the following means:

(I) sampling,

(II) verification of packing lists or other documents filed at the time of entry, or

(III) evidence showing performance of commercial settlement tests generally accepted in the trade and filed in such time and manner as may be prescribed by regulations of the Secretary of the Treasury,

the commingled articles shall be subject to the highest rate of duty applicable to any part thereof unless the consignee or his agent segregates the articles pursuant to subdivision (b) hereof.

(b) Every segregation of articles made pursuant to this headnote shall be accomplished by the consignee or his agent at the risk and expense of the consignee within 30 days (unless the Secretary authorizes in writing a longer time) after the date of personal delivery or mailing, by such employee as the Secretary of the Treasury shall designate, of written notice to the consignee that the articles are commingled and that the quantity or value of each class of articles cannot be readily ascertained by customs officers. Every such segregation shall be accomplished under customs supervision, and the compensation and expenses of the supervising customs officers shall be reimbursed to the Government by the consignee under such regulations as the Secretary of the Treasury may prescribe.

(c) The foregoing provisions of this headnote do not apply with respect to any part of a shipment if the consignee or his agent furnishes, in such time and manner as may be prescribed by regulations of the Secretary of the Treasury, satisfactory proof --

(I) that such part (A) is commercially negligible, (B) is not capable of segregation without excessive cost, and (C) will not be segregated prior to its use in a manufacturing process or otherwise, and

(II) that the commingling was not intended to avoid the payment of lawful duties.

Any article with respect to which such proof is furnished shall be considered for all customs purposes as a part of the article, subject to the next lower rate of duty, with which it is commingled.

(d) The foregoing provisions of this headnote do not apply with respect to any shipment if the consignee or his agent shall furnish, in such time and manner as may be prescribed by regulations of the Secretary of the Treasury, satisfactory proof --

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

(II) that the shipment is not capable of segregation without excessive cost and will not be segregated prior to its use in a manufacturing process or otherwise; and

(III) that the commingling was not intended to avoid the payment of lawful duties.

Any merchandise with respect to which such proof is furnished shall be considered for all customs purposes to be dutiable at the rate applicable to the material present in greater quantity than any other material.

(e) The provisions of this headnote shall apply only in cases where the schedules do not expressly provide a particular tariff treatment for commingled articles.

8. Abbreviations. In the schedules the following symbols and abbreviations are used with the meanings respectively indicated below:

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

9. Definitions. For the purposes of the schedules, unless the context otherwise requires --

(a) the term "entered" means entered, or withdrawn from warehouse, for consumption in the customs territory of the United States;

(b) the term "entered for consumption" does not include withdrawals from warehouse for consumption;

(c) the term "withdrawn for consumption" means withdrawn from warehouse for consumption and does not include articles entered for consumption;

(d) the term "rate of duty" includes a free rate of duty; rates of duty proclaimed by the President shall be referred to as "proclaimed" rates of duty; rates of duty enacted by the Congress shall be referred to as "statutory" rates of duty; and the rates of duty in column numbered 2 at the time the schedules become effective shall be referred to as "original statutory" rates of duty;

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

(f) the terms "of", "wholly of", "almost wholly of", "in part of" and "containing", when used between the description of an article and a material (e.g., "furniture of wood", "woven fabrics, wholly of cotton", etc.), have the following meanings:

(I) "of" means that the article is wholly or in chief value of the named material;

(II) "wholly of" means that the article is, except for negligible or insignificant quantities of some other material or materials, composed completely of the named material;

(III) "almost wholly of" means that the essential character of the article is imparted by the named material, notwithstanding the fact that significant quantities of some other material or materials may be present; and

(IV) "in part of" or "containing" mean that the article contains a significant quantity of the named material.

With regard to the application of the quantitative concepts specified in subparagraphs (II) and (IV) above, it is intended that the de minimis rule apply.

10. General Interpretative Rules. For the purposes of these schedules --

(a) the general, schedule, part, and subpart headnotes, and the provisions describing the classes of imported articles and specifying the rates of duty or other import restrictions to be imposed thereon are subject to the rules of interpretation set forth herein and to such other rules of statutory interpretation, not inconsistent therewith, as have been or may be developed under administrative or judicial rulings;

(b) the titles of the various schedules, parts, and subparts and the footnotes therein are intended for convenience in reference only and have no legal or interpretative significance;

(c) an imported article which is described in two or more provisions of the schedules is classifiable in the provision which most specifically describes it; but, in applying this rule of interpretation, the following considerations shall govern:

(i) a superior heading cannot be enlarged by inferior headings indented under it but can be limited thereby;

(ii) comparisons are to be made only between provisions of coordinate or equal status, i.e., between the primary or main superior headings of the schedules or between coordinate inferior headings which are subordinate to the same superior heading;

(d) if two or more tariff descriptions are equally applicable to an article, such article shall be subject to duty under the description for which the original statutory rate is highest, and, should the highest original statutory rate be applicable to two or more of such descriptions, the article shall be subject to duty under that one of such descriptions which first appears in the schedules;

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

(i) a tariff classification controlled by use (other than actual use) is to be determined in accordance with the use in the United States at, or immediately prior to, the date of importation, of articles of that class or kind to which the imported articles belong, and the controlling use is the chief use, i.e., the use which exceeds all other uses (if any) combined;

(ii) a tariff classification controlled by the actual use to which an imported article is put in the United States is satisfied only if such use is intended at the time of importation, the article is so used, and proof thereof is furnished within 3 years after the date the article is entered;

(f) an article is in chief value of a material if such material exceeds in value each other single component material of the article;

(g) a headnote provision which enumerates articles not included in a schedule, part, or subpart is not necessarily exhaustive, and the absence of a particular article from such headnote provision shall not be given weight in determining the relative specificity of competing provisions which describe such article;

(h) unless the context requires otherwise, a tariff description for an article covers such article, whether assembled or not assembled, and whether finished or not finished;

(ij) a provision for "parts" of an article covers a product solely or chiefly used as a part of such article, but does not prevail over a specific provision for such part.

11. Issuance of Rules and Regulations. The Secretary of the Treasury is hereby authorized to issue rules and regulations governing the admission of articles under the provisions of the schedules. The allowance of an importer's claim for classification, under any of the provisions of the schedules which provide for total or partial relief from duty or other import restrictions on the basis of facts which are not determinable from an examination of the article itself in its condition as imported, is dependent upon his complying with any rules or regulations which may be issued pursuant to this headnote.

12. The Secretary of the Treasury is authorized to prescribe methods of analyzing, testing, sampling, weighing, gauging, measuring, or other methods of ascertainment whenever he finds that such methods are necessary to determine the physical, chemical, or other properties or characteristics of articles for purposes of any law administered by the Customs Service.

General statistical headnotes:

1. Statistical Requirements for Imported Articles. Persons making customs entry or withdrawal of articles imported into the customs territory of the United States shall complete the entry or withdrawal forms, as provided herein and in regulations issued pursuant to law, to provide for statistical purposes information as follows:

(a) the number of the Customs district and of the port where the articles are being entered for consumption or warehouse, as shown in Statistical Annex A of these schedules;

(b) the name of the carrier or the means of transportation by which the articles were transported to the first port of unloading in the United States;

(c) the foreign port of lading;

(d) the United States port of unlading;

(e) the date of importation;

(f) the country of origin of the articles expressed in terms of the designation therefor in Statistical Annex B of these schedules;

(g) a description of the articles in sufficient detail to permit the classification thereof under the proper statistical reporting number in these schedules;

(h) the statistical reporting number under which the articles are classifiable;

(ij) gross weight in pounds for the articles covered by each reporting number when imported in vessels or aircraft;

(k) the net quantity in the units specified herein for the classification involved;

(l) the U.S. dollar value in accordance with the definition in Section 402 or 402a of the Tariff Act of 1930, as amended, for all merchandise including that free of duty or dutiable at specific rates; and

(m) such other information with respect to the imported articles as is provided for elsewhere in these schedules.

2. Statistical Annotations. (a) The statistical annotations to the Tariff Schedules of the United States consist of --

(i) the 2-digit statistical suffixes,
(ii) the indicated units of quantity,
(iii) the statistical headnotes and annexes, and
(iv) the italicised article descriptions.

(b) The legal text of the Tariff Schedules of the United States consists of the remaining text as more specifically identified in headnote 10(a) of the general headnotes and rules of interpretation.

(c) The statistical annotations are subordinate to the provisions of the legal text and cannot change their scope.

3. Statistical Reporting Number. (a) General Rule: Except as provided in paragraph (b) of this headnote, and in the absence of specific instructions to the contrary elsewhere, the statistical reporting number for an article consists of the 7-digit number formed by combining the 5-digit item number with the appropriate 2-digit statistical suffix. Thus, the statistical reporting number for live monkeys dutiable under item 100.95 is "100.9520".

(b) Wherever in the tariff schedules an article is classifiable under a provision which derives its rate of duty from a different provision, the statistical reporting number is, in the absence of specific instructions to the contrary elsewhere, the 7-digit number for the basic provision followed by the item number of the provision from which the rate is derived. Thus, the statistical reporting number of mixed apple and grape juices, not containing over 1.0 percent of ethyl alcohol by volume, is "165.6500-165.40".

4. Abbreviations. (a) The following symbols and abbreviations are used with the meanings respectively indicated below:

s. ton	-	short ton
C.	-	one hundred
Cwt.	-	100 lbs.
mg.	-	milligram
M.	-	1,000
bd. ft.	-	board feet
M. bd. ft.	-	1,000 board feet
mc.	-	millicurie
cord	-	128 cubic feet
square	-	amount to cover 100 square feet of surface
sup. ft.	-	superficial foot
oz.	-	ounces avoirdupois
fl. oz.	-	fluid ounce
oz. troy	-	troy ounce
pf. gal.	-	proof gallon

(b) An "X" appearing in the column for units of quantity means that no quantity (other than gross weight) is to be reported.

(c) Whenever two separate units of quantity are shown for the same article, the "v" following one of such units means that the value of the article is to be reported with that quantity.

Amendments and Modifications

PROVISIONS	
Gen Hdnte 3(a)(i)	Language "Except as provided in headnote 6 of schedule 7, part 2, subpart B," added; language "except that all articles" deleted and language "except that all such articles" inserted in lieu thereof. Pub. L. 89-805, Secs. 1(a), (c), Nov. 10, 1966, 80 Stat. 1521, 1522, effective date Jan. 1, 1967. Language "Except as provided in headnote 4 of schedule 7, part 7, subpart A," added. Pub. L. 89-806, Secs. 2(b), (c), Nov. 10, 1966, 80 Stat. 1523, effective date March 11, 1967.
Gen Hdnte 3(d), (e), (f) and (g)	Headnotes 3(d), (e), and (f) redesignated as headnotes 3(e), (f), and (g), respectively, and new headnote 3(d) added. Pub. L. 89-283, Secs. 401(a), 403, Oct. 21, 1965, 79 Stat. 1021, 1022; entered into force Oct. 22, 1965, by Pres. Proc. 3682, Oct. 21, 1965, 3 CFR, 1965 Supp., p. 68.
Gen Hdnte 6(b)(i)	Language "and containers of usual types ordinarily sold at retail with their contents," added. Pub. L. 89-241, Secs. 2(a), 4, Oct. 7, 1965, 79 Stat. 933, 934, effective date Dec. 7, 1965.

219

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS

Schedule 4 headnotes:

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

2. (a) The term "compounds", as used in this schedule, means substances occurring naturally or produced artificially by the reaction of two or more ingredients, each compound --
(i) consisting of two or more elements,
(ii) having its own characteristic properties different from those of its elements and from those of other compounds, and
(iii) always consisting of the same elements united in the same proportions by weight with the same internal arrangement.
The presence of impurities which occur naturally or as an incident to production does not in itself affect the classification of a product as a compound.

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

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

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

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty	
				1	2
		PART 3. - DRUGS AND RELATED PRODUCTS			
		Part 3 headnotes:			
		1. Any product described in this part which is a mixture containing as an ingredient any product described in part 1 of this schedule remains classifiable in part 3 unless the part 1 ingredient, as used in the mixture, imparts therapeutic or medicinal properties thereto. Notwithstanding the provisions of part 1 of this schedule, niacin, niacinamide, meso-inositol hexanicotinate, and pyridoxine (vitamin B_6), regardless of source, are classifiable in part 3 of this schedule.			
		2. For the purposes of the tariff schedules, the term "drugs" means those substances, whether natural or synthetic, having therapeutic or medicinal properties and chiefly used as medicines or as ingredients in medicines.			
		3. For the purposes of this part -- (a) "natural substances" are those substances found in nature which comprise whole plants and herbs, anatomical parts thereof, vegetable saps, extracts, secretions and other constituents thereof; whole animals, anatomical parts thereof, glands or other animal organs, extracts, secretions and other constituents thereof, and which have not had changes made in their molecular structure as found in nature; (b) a "synthetic substance" is a chemical compound made by the artificial combination of elements or radicals by any physical or chemical process; (c) the term "crude", as used in relation to natural products, means any product which has not been advanced in value or improved in condition by shredding, grinding, chipping, crushing, distilling, evaporating, extracting, by artificial mixing with other substances or by any other process or treatment beyond that which is essential to its proper packing and the prevention of decay or deterioration pending manufacture; and (d) the term "advanced", as used in relation to natural products, means any product which has been advanced in value or improved in condition from its crude state by any mechanical or physical process whatever beyond that which is essential to its proper packing and the prevention of decay or deterioration pending manufacture, but does not include any product which has been artificially mixed with other substances or the molecular structure of which as found in nature has been changed.			
		Subpart A. - Natural Drugs, Crude or Advanced			
		Subpart A headnote:			
		1. This subpart covers only products which are natural drugs, crude or advanced.			

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		PART 8. - SURFACE-ACTIVE AGENTS; SOAPS AND SYNTHETIC DETERGENTS			
		Part 8 headnote:			
		1. This part covers surface-active agents, soaps, and synthetic detergents, except those provided for in items 405.30 and 405.55 of part 1C of this schedule. This part also covers certain specified products which may or may not be surface-active agents. The addition of any product described in part 1 of this schedule to these products as a color, brightener, germicide, deodorizer, whitener, or scent does not affect their classification under this part (8).			
		Subpart A. - Surface-Active Agents			
		Subpart A headnote:			
		1. The term "surface-active agents", as used in item 465.05 means synthetic organic chemical compounds, or mixtures thereof, which function as surface tension modifiers and are chiefly used for any one or combination of the following purposes: As detergents, wetting agents, emulsifiers, dispersants, or foaming agents.			
		Fatty substances of animal (including marine animal) or vegetable origin:			
		Not sulfonated or sulfated:			
		Fatty-acid esters, ethers, and other-esters of polyhydric alcohols:			
465.05	00	**Derived from coconut, palm-kernel, or palm oil**	Lb.....	2.7¢ per lb. + 13% ad val.	6¢ per lb. + 30% ad val.
465.10	00	**Other**	Lb.....	3.3¢ per lb. + 13.5% ad val.	7.5¢ per lb. + 30% ad val.
		Fatty-acid amides, amines, and quaternary ammonium salts:			
465.15	00	**Derived from coconut, palm-kernel, or palm oil**	Lb.....	2.7¢ per lb. + 13% ad val.	6¢ per lb. + 30% ad val.
465.20	00	**Other**	Lb.....	3.3¢ per lb. + 13.5% ad val.	7.5¢ per lb. + 30% ad val.
		Sodium and potassium salts of fats, oils, and greases, and of fatty acids derived therefrom:			
465.25	00	**Derived from coconut, palm-kernel, or palm oil**	Lb.....	9% ad val.	25% ad val.
465.30	00	**Other**	Lb.....	1.3¢ per lb. + 9% ad val.	3¢ per lb. + 25% ad val.

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 1
Schedule 4,
Part 8

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3822 (Kennedy Round). Dec. 16, 1967. 32 F.R. 19002:

TSUS item	Prior rate	Rate of duty, effective with respect to articles entered on and after January 1 --				
		1968	1969	1970	1971	1972
465.05	3¢ per lb. + 15% ad val.	2.7¢ per lb. + 13% ad val.	2.4¢ per lb. + 12% ad val.	2.1¢ per lb. + 10% ad val.	1.8¢ per lb. + 9% ad val.	1.5¢ per lb. + 7.5% ad val.
465.10	3.75¢ per lb. + 15% ad val.	3.3¢ per lb. + 13.5% ad val.	3¢ per lb. + 12% ad val.	2.5¢ per lb. + 10.5% ad val.	2.2¢ per lb. + 9% ad val.	1.8¢ per lb. + 7.5% ad val.
465.15	3¢ per lb. + 15% ad val.	2.7¢ per lb. + 13% ad val.	2.4¢ per lb. + 12% ad val.	2.1¢ per lb. + 10% ad val.	1.8¢ per lb. + 9% ad val.	1.5¢ per lb. + 7.5% ad val.
465.20	3.75¢ per lb. + 15% ad val.	3.3¢ per lb. + 13.5% ad val.	3¢ per lb. + 12% ad val.	2.5¢ per lb. + 10.5% ad val.	2.2¢ per lb. + 9% ad val.	1.8¢ per lb. + 7.5% ad val.
465.25	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.30	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
465.35	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.40	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
465.45	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.50	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
465.55	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.60	0.75¢ per lb. + 10.5% ad val.	0.6¢ per lb. + 9.4% ad val.	0.6¢ per lb. + 8% ad val.	0.5¢ per lb. + 7% ad val.	0.4¢ per lb. + 6% ad val.	0.3¢ per lb. + 5% ad val.
465.65	14% ad val.	12.5% ad val.	11% ad val.	9.5% ad val.	8% ad val.	7% ad val.
465.70	0.75¢ per lb. + 14% ad val.	0.65¢ per lb. + 12.5% ad val.	0.6¢ per lb. + 11% ad val.	0.52¢ per lb. + 9.5% ad val.	0.45¢ per lb. + 8% ad val.	0.3¢ per lb. + 7% ad val.
465.75	2¢ per lb. + 14% ad val.	1.8¢ per lb. + 12.5% ad val.	1.6¢ per lb. + 11% ad val.	1.4¢ per lb. + 9.5% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.
465.80	1.5¢ per lb. + 14% ad val.	1.3¢ per lb. + 12.5% ad val.	1.2¢ per lb. + 11% ad val.	1¢ per lb. + 9.5% ad val.	0.9¢ per lb. + 8% ad val.	0.7¢ per lb. + 7% ad val.
465.85	14% ad val.	12.5% ad val.	11% ad val.	9.5% ad val.	8% ad val.	7% ad val.
465.87	16¢ per lb.	14.4¢ per lb.	12.5¢ per lb.	11¢ per lb.	9.5¢ per lb.	8¢ per lb.
465.90	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.92	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
465.95	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
466.05	8.5% ad val.	7.5% ad val.	6.5% ad val.	5.5% ad val.	5% ad val.	4% ad val.
466.10	1¢ per lb. + 10% ad val.	0.9¢ per lb. + 9% ad val.	0.8¢ per lb. + 8% ad val.	0.7¢ per lb. + 7% ad val.	0.6¢ per lb. + 6% ad val.	0.5¢ per lb. + 5% ad val.
466.15 1/	1¢ per lb. + 6.5% ad val.	0.9¢ per lb. + 5.5% ad val.	0.8¢ per lb. + 5% ad val.	0.7¢ per lb. + 4.5% ad val.	0.6¢ per lb. + 3.5% ad val.	0.5¢ per lb. + 3% ad val.
466.20	14% ad val.	12.5% ad val.	11% ad val.	9.5% ad val.	8% ad val.	7% ad val.
466.25	1¢ per lb. + 8.5% ad val.	0.9¢ per lb. + 7.5% ad val.	0.8¢ per lb. + 6.5% ad val.	0.7¢ per lb. + 5.5% ad val.	0.5¢ per lb. + 5% ad val.	0.5¢ per lb. + 4% ad val.
466.30	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.

1/ See footnote 1 to Kennedy Round Staged Rates at the end of schedule 4, part 2.

Other Amendments and Modifications

PROVISION

Part 8--Language "This part also covers certain specified products which may or may not be surface-active agents." added. Pub. L. 89-241, Secs. 2(a), 24(c), Oct. 7, 1965, 79 Stat. 933, 938, effective date Dec. 7, 1965.

Subpt A--Headnote 2 deleted. Pub. L. 89-388, Secs. 1(f)(2), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966.

465.05--465.15 Rates of duty for items 465.05 and 465.15 (column 1--4.5¢ per lb. + 15% ad val.; column 2--7.5¢ per lb. + 30% ad val.) reduced by 1.5¢ per lb. Pub. L. 89-388, Secs. 1(e)(1), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for these items had been temporarily reduced by 1.5¢ per lb. by former items 907.70 and 907.71.

465.25--465.35--465.45 Rates of duty for items 465.25, 465.35, and 465.45 (column 1--3¢ per lb. + 10% ad val.; column 2--3¢ per lb. + 25% ad val.) reduced by 3¢ per lb. Pub. L. 89-388, Secs. 1(e)(2), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for these items had been temporarily reduced by 3¢ per lb. by former items 907.72, 907.73, and 907.74.

PROVISION

465.55--Rates of duty for item 465.55 (column 1--1.5¢ per lb. + 10.5% ad val.; column 2--1.5¢ per lb. + 25% ad val.) reduced by 1.5¢ per lb. Pub. L. 89-388, Secs. 1(e)(3), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for this item had been temporarily reduced by 1.5¢ per lb. by former item 907.75.

465.65--Rates of duty for item 465.65 (column 1--3¢ per lb. + 14% ad val.; column 2--3¢ per lb. + 35% ad val.) reduced by 3¢ per lb. Pub. L. 89-388, Secs. 1(e)(2), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for this item had been temporarily reduced by 3¢ per lb. by former item 907.77.

465.87--Item 465.87 added. Pub. L. 89-241, Secs. 2(a), 24(b), Oct. 7, 1965, 79 Stat. 933, 938, effective date Dec. 7, 1965.

465.92--Item 465.92 added. Pub. L. 89-241, Secs. 2(a), 24(c), Oct. 7, 1965, 79 Stat. 933, 938, effective date Dec. 7, 1965.

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		PART 13. - FATTY SUBSTANCES, CAMPHOR, CHARS AND CARBONS, ISOTOPES, WAXES, AND OTHER PRODUCTS			
		Part 13 headnote:			
		1. Any product described in this part and also in part 1 of this schedule is classifiable under the said part 1, except any product provided for in item 493.10, 493.75, 494.50, 494.52, or 494.60, and except any product provided for in subpart C of this part.			
		Subpart A. - Fatty Substances			
490.05	00	Fats, oils, and greases, all the foregoing, of animal (including marine animal) or vegetable origin, which have been halogenated, nitrated, or vulcanized	Lb.	16% ad val.	20% ad val.
		Fatty substances, not sulfonated or sulfated, and not specially provided for:			
		Fatty acids:			
		Of animal (including marine animal) origin:			
490.10	00	Oleic acid	Lb.	2.7¢ per lb. + 9% ad val.	3¢ per lb. + 20% ad val.
490.12	00	Stearic acid	Lb.	2.7¢ per lb. + 11% ad val.	3¢ per lb. + 25% ad val.
490.14	00	Other	Lb.	1.3¢ per lb. + 9% ad val.	3¢ per lb. + 20% ad val.
		Of vegetable origin:			
490.20	00	Derived from linseed oil	Lb.	4¢ per lb. + 9% ad val.	4.5¢ per lb. + 20% ad val.
490.22	00	Derived from hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	Lb.	2¢ per lb. + 9% ad val.	4.5¢ per lb. + 20% ad val.
490.24	00	Derived from coconut, palm-kernel, or palm oil	Lb.	9% ad val.	20% ad val.
490.26	00	Other	Lb.	9% ad val.	20% ad val.

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

Page 274

4 - 13 - A
490.30 - 491.00

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS
Part 13. - Fatty Substances, Camphor, Chars and Carbons, Isotopes, Waxes, and Other Products

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		Fatty substances, etc. (con.):			
		Salts:			
		Of animal (including marine animal) origin:			
490.30	00	Lithium stearate	lb.	1.3¢ per lb. + 9% ad val.	3¢ per lb. + 25% ad val.
490.32	00	Other	lb.	1.3¢ per lb. + 9% ad val.	3¢ per lb. + 25% ad val.
		Of vegetable origin:			
		Derived from linseed oil:			
490.40	00	Cobalt linoleate	lb.	6.5¢ per lb.	14.5¢ per lb.
490.42	00	Lead linoleate	lb.	2¢ per lb. + 13.5% ad val.	4.5¢ per lb. + 30% ad val.
490.44	00	Other	lb.	2¢ per lb. + 9% ad val.	4.5¢ per lb. + 25% ad val.
490.46	00	Derived from hempseed, kapok, perilla, rapeseed, sesame, or sunflower oil	lb.	2¢ per lb. + 9% ad val.	4.5¢ per lb. + 25% ad val.
490.48	00	Derived from coconut, palm-kernel, or palm oil	lb.	9% ad val.	25% ad val.
490.50	00	Other	lb.	9% ad val.	25% ad val.
		Fatty alcohols of animal (including marine animal) or vegetable origin:			
490.65	00	Oleyl	lb.	2.2¢ per lb. + 11% ad val.	6¢ per lb. + 30% ad val.
		Other:			
490.73	00	Derived from coconut, palm-kernel, or palm oil	lb.	9% ad val.	25% ad val.
490.75	00	Other	lb.	9% ad val.	25% ad val.
		Esters:			
490.90	00	Of animal (including marine animal) origin	lb.	0.65¢ per lb. + 9% ad val.	1.5¢ per lb. + 25% ad val.
		Of vegetable origin:			
490.92	00	Derived from coconut, palm-kernel, or palm oil	lb.	9% ad val.	25% ad val.
490.94	00	Other	lb.	9% ad val.	25% ad val.
491.00	00	Artificial mixtures of two or more of the fatty substances provided for in this subpart or in part 8A of this schedule, not specially provided for	lb.	9% ad val., but not less than the highest rate applicable to any component	25% ad val., but not less than the highest rate applicable to any component

Item	Stat. Suffix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		Subpart B. - Camphor, Chars and Carbons, Isotopes, Waxes, and Other Products			
		Subpart B headnote: 1. For the purposes of this part -- (a) the term "crude", in items 493.02, 493.20, and 493.55, has the same meaning as is given for that term in headnote 3(c) of part 3 of this schedule; and (b) the term "advanced" in items 493.04, 493.21, and 493.56, has the same meaning as is given for that term in headnote 3(d) in part 3 of this schedule.			
		Barbasco or cube root, and derris, tube or tuba root:			
493.02	00	Crude	Lb.	Free	Free
493.04	00	Advanced	Lb.	0.5% ad val.	10% ad val.
493.10	00	Blackings, powders, liquids, and creams for polishing and cleaning, all the foregoing in immediate containers holding not over 10 pounds each	X	5% ad val.	25% ad val.
		Casein and mixtures in chief value thereof:			
493.15	00	Casein	Lb.	Free	Free
493.16	00	Other	Lb.	2.4¢ per lb.	5.5¢ per lb.
493.18	00	Cellulose compounds, not specially provided for	Lb.	14.4¢ per lb.	45¢ per lb.
		Camphor:			
		Natural:			
493.20	00	Crude	Lb.	0.4¢ per lb.	1¢ per lb.
493.21	00	Advanced	Lb.	2.5¢ per lb.	5¢ per lb.
493.22	00	Synthetic	Lb.	4.5¢ per lb.	5¢ per lb.
		Chars and carbons:			
493.25	00	Bone char	Lb.	18% ad val.	20% ad val.
493.26	00	Decolorizing and gas or vapor absorbing chars and carbons, whether or not activated	Lb.	13% ad val.	45% ad val.
493.30	00	Dextrine and soluble or chemically treated starches	Lb.	1.125¢ per lb. 1/	3¢ per lb.
493.35	00	Fibrin	Lb.	Free	Free
493.40	00	Mineral salts obtained by evaporation from the waters of a designated mineral spring	Lb.	Free	Free
493.42	00	Preparations containing over 50 percent by weight of monosodium glutamate	X	16% ad val.	25% ad val.
		Pitch:			
493.45	00	Burgundy	Lb.	Free	Free
493.46	00	Marine glue	Lb.	14% ad val.	20% ad val.
493.47	00	Wood	Lb.	0.45¢ per lb.	1¢ per lb.
493.50	00	Products chiefly used as assistants in preparing or finishing textiles, not specially provided for	Lb.	11% ad val.	25% ad val.
		Pyrethrum or insect flowers:			
493.55	00	Crude	Lb.	Free	Free
493.56	00	Advanced	Lb.	2% ad val.	10% ad val.

1/ Rate temporarily increased by proclamation. See Appendix to Tariff Schedules.

SCHEDULE 4. - CHEMICALS AND RELATED PRODUCTS
Part 13. - Fatty Substances, Camphor, Chars and Carbons, Isotopes, Waxes, and Other Products

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		Polysaccharides, rare saccharides, and their polyhydric alcohols:			
493.65	00	Lactose	Lb.	18% ad val.	50% ad val.
493.66	00	Levulose	Lb.	36% ad val.	50% ad val.
493.67	00	Salicin	Oz.	15.5% ad val.	50% ad val.
493.68	00	Other	Lb.	18% ad val.	50% ad val.
493.75	00	Sheep dip	Lb.	Free	Free
493.82	00	Tall oil	X.	9% ad val.	20% ad val.
		Waxes, animal (including marine animal), vegetable, and mineral, and artificial mixtures thereof:			
		Animal waxes:			
		Beeswax:			
494.02	00	Not bleached	Lb.	Free	Free
494.04	00	Bleached	Lb.	13% ad val.	30% ad val.
494.06	00	Spermaceti wax	Lb.	2.2¢ per lb.	3.5¢ per lb.
494.08	00	Other	Lb.	Free	Free
		Vegetable waxes:			
494.10	00	Candelilla	Lb.	Free	Free
494.12	00	Carnauba	Lb.	Free	Free
494.14	00	Japan	Lb.	Free	Free
494.16	00	Ouricury	Lb.	Free	Free
494.18	00	Other	Lb.	Free	Free
		Mineral waxes:			
494.20	00	Montan	Lb.	Free	Free
494.22	00	Paraffin and other petroleum waxes	Lb.	0.4¢ per lb.	1¢ per lb.
494.24	00	Other	Lb.	Free	Free
494.30	00	Artificial mixtures of two or more of the foregoing waxes	Lb.	The highest rate applicable to any component wax	The highest rate applicable to any component wax
494.40	00	Wood tar oil and wood tar	Lb.	0.5¢ per lb.	1¢ per lb.
494.50		Chemical elements, isotopes, and compounds, all the foregoing (except natural thorium and uranium in a metallic state, and except compounds of natural thorium and uranium), whether or not described elsewhere in this schedule, which are usefully radioactive		Free	Free
	20	*With cobalt-60 radioactivity only*	*Curie*		
	40	*Other*	*No*		
494.52	00	Non-radioactive isotopes and their compounds, whether or not described elsewhere in this schedule	X.	9% ad val.	25% ad val.
494.60	00	Cements, not specially provided for	Lb.	4% ad val.	20% ad val.
		Subpart C. - Miscellaneous Medical Supplies			
495.05	00	Wadding, gauze, bandages, dressing, plasters, and similar articles coated or impregnated with medicinals	Lb.	7% ad val.	20% ad val.
495.10	00	Surgical sutures, surgical suture materials, and absorbable surgical hemostats, all the foregoing which are sterile	X.	15.5% ad val.	40% ad val.
495.15	00	Dental cements	Lb.	4% ad val.	20% ad val.
495.20	00	First-aid kits put up and packaged for retail sale	X.	18% ad val.	45% ad val.

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 1
Schedule 4,
Part 13

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3822 (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002

TSUS item	Prior rate	Rate of duty, effective with respect to articles entered on and after January 1 --				
		1968	1969	1970	1971	1972
490.10	3¢ per lb. + 10% ad val.	2.7¢ per lb. + 9% ad val.	2.4¢ per lb. + 8% ad val.	2¢ per lb. + 7% ad val.	1.8¢ per lb. + 6% ad val.	1.5¢ per lb. + 5% ad val.
490.12	3¢ per lb. + 12.5% ad val.	2.7¢ per lb. + 11% ad val.	2.4¢ per lb. + 10% ad val.	2.1¢ per lb. + 8.5% ad val.	1.8¢ per lb. + 7% ad val.	1.5¢ per lb. + 6% ad val.
490.14	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
490.20	4.5¢ per lb. + 10% ad val.	4¢ per lb. + 9% ad val.	3.5¢ per lb. + 8% ad val.	3¢ per lb. + 7% ad val.	2.5¢ per lb. + 6% ad val.	2.2¢ per lb. + 5% ad val.
490.22	2.25¢ per lb. + 10% ad val.	2¢ per lb. + 9% ad val.	1.8¢ per lb. + 8% ad val.	1.5¢ per lb. + 7% ad val.	1.3¢ per lb. + 6% ad val.	1.1¢ per lb. + 5% ad val.
490.24	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.26	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.30	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
490.32	1.5¢ per lb. + 10% ad val.	1.3¢ per lb. + 9% ad val.	1.2¢ per lb. + 8% ad val.	1¢ per lb. + 7% ad val.	0.9¢ per lb. + 6% ad val.	0.7¢ per lb. + 5% ad val.
490.40	7.25¢ per lb.	6.5¢ per lb.	5.8¢ per lb.	5¢ per lb.	4.3¢ per lb.	3.6¢ per lb.
490.42	2.25¢ per lb. + 15% ad val.	2¢ per lb. + 13.5% ad val.	1.8¢ per lb. + 12% ad val.	1.5¢ per lb. + 10.5% ad val.	1.3¢ per lb. + 9% ad val.	1¢ per lb. + 7.5% ad val.
490.44	2.25¢ per lb. + 10% ad val.	2¢ per lb. + 9% ad val.	1.8¢ per lb. + 8% ad val.	1.5¢ per lb. + 7% ad val.	1.3¢ per lb. + 6% ad val.	1.1¢ per lb. + 5% ad val.
490.46	2.25¢ per lb. + 10% ad val.	2¢ per lb. + 9% ad val.	1.8¢ per lb. + 8% ad val.	1.5¢ per lb. + 7% ad val.	1.3¢ per lb. + 6% ad val.	1¢ per lb. + 5% ad val.
490.48	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.50	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.65	2.5¢ per lb. + 12.5% ad val.	2.2¢ per lb. + 11% ad val.	2¢ per lb. + 10% ad val.	1.7¢ per lb. + 8.5% ad val.	1.5¢ per lb. + 7% ad val.	1.2¢ per lb. + 6% ad val.
490.73	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.75	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.90	0.75¢ per lb. + 10.5% ad val.	0.65¢ per lb. + 9% ad val.	0.6¢ per lb. + 8% ad val.	0.5¢ per lb. + 7% ad val.	0.4¢ per lb. + 6% ad val.	0.3¢ per lb. + 5% ad val.
490.92	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
490.94	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
491.00	10.5% ad val., but not less than the highest rate applicable to any component	9% ad val., but not less than the highest rate applicable to any component	8% ad val., but not less than the highest rate applicable to any component	7% ad val., but not less than the highest rate applicable to any component	6% ad val., but not less than the highest rate applicable to any component	5% ad val., but not less than the highest rate applicable to any component
493.04	1% ad val.	0.5% ad val.	0.5% ad val.	Free	Free	Free
493.10	6% ad val.	5% ad val.	4.5% ad val.	4% ad val.	3.5% ad val.	3% ad val.
493.16	2.75¢ per lb.	2.4¢ per lb.	2¢ per lb.	1.9¢ per lb.	1.5¢ per lb.	1.3¢ per lb.
493.18	16¢ per lb.	14.4¢ per lb.	12.5¢ per lb.	11¢ per lb.	9.5¢ per lb.	8¢ per lb.
493.20 1/	0.5¢ per lb.	0.4¢ per lb.	0.4¢ per lb.	0.2¢ per lb.	0.2¢ per lb.	0.2¢ per lb.
493.21 1/	3¢ per lb.	2.5¢ per lb.	2.4¢ per lb.	2¢ per lb.	1.5¢ per lb.	1.5¢ per lb.
493.22	5¢ per lb.	4.5¢ per lb.	4¢ per lb.	3.5¢ per lb.	3¢ per lb.	2.5¢ per lb.
493.25	20% ad val.	18% ad val.	16% ad val.	14% ad val.	12% ad val.	10% ad val.
493.26	15% ad val.	13% ad val.	12% ad val.	10% ad val.	9% ad val.	7.5% ad val.
493.46	16% ad val.	14% ad val.	12.5% ad val.	11% ad val.	9.5% ad val.	8% ad val.
493.47 1/	0.5¢ per lb.	0.45¢ per lb.	0.4¢ per lb.	0.35¢ per lb.	0.3¢ per lb.	0.25¢ per lb.
493.50	12.5% ad val.	11% ad val.	10% ad val.	8.5% ad val.	7% ad val.	6% ad val.
493.56	2.5% ad val.	2% ad val.	1% ad val.	1% ad val.	Free	Free
493.65	20% ad val.	18% ad val.	16% ad val.	14% ad val.	12% ad val.	10% ad val.
493.66	40% ad val.	36% ad val.	32% ad val.	28% ad val.	24% ad val.	20% ad val.
493.67	17.5% ad val.	15.5% ad val.	14% ad val.	12% ad val.	10% ad val.	8.5% ad val.
493.68	20% ad val.	18% ad val.	16% ad val.	14% ad val.	12% ad val.	10% ad val.
493.82	10% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.

1/ See footnote 1 at the end of this list of Staged Rates.

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

STAGED RATES AND HISTORICAL NOTES

Notes p. 2
Schedule 4,
Part 13

Staged Rates

Modifications of column 1 rates of duty by Pres. Proc. 3821 (Kennedy Round), Dec. 16, 1967, F.R. 19002--(con.):

TSUS item	Prior rate	Rate of duty, effective with respect to articles entered on and after January 1 --				
		1968	1969	1970	1971	1972
494.04	15% ad val.	13% ad val.	12% ad val.	10% ad val.	9% ad val.	7.5% ad val.
494.06	2.5¢ per lb.	2.2¢ per lb.	2¢ per lb.	1.7¢ per lb.	1.5¢ per lb.	1.2¢ per lb.
494.22	0.5¢ per lb.	0.4¢ per lb.	0.3¢ per lb.	0.2¢ per lb.	0.1¢ per lb.	Free
494.52	10.5% ad val.	9% ad val.	8% ad val.	7% ad val.	6% ad val.	5% ad val.
494.60	5% ad val.	4% ad val.	4% ad val.	3% ad val.	3% ad val.	2.5% ad val.
495.05 1/	8% ad val.	7% ad val.	6% ad val.	5.5% ad val.	4.5% ad val.	4% ad val.
495.10	17.5% ad val.	15.5% ad val.	14% ad val.	12% ad val.	10% ad val.	8.5% ad val.
495.15 1/	5% ad val.	4% ad val.	4% ad val.	3% ad val.	3% ad val.	2.5% ad val.
495.20	20% ad val.	18% ad val.	16% ad val.	14% ad val.	12% ad val.	10% ad val.

1/ In accordance with general note 3(f) to Schedule XX (Geneva - 1967), the rates of duty for this item in the columns headed 1970, 1971, 1972 will become effective unless the European Economic Community and the United Kingdom do not proceed with certain reductions provided for in their respective schedules annexed to the Geneva (1967) Protocol to the GATT. If these two participants do not so proceed, the President shall so proclaim, and the rate of duty in the column headed 1969 will continue in effect unless or until the President proclaims that they have agreed so to proceed. See related footnote 1 to Kennedy Round Staged Rates at the end of schedule 4, parts 3, 4, 5, 7, 8, 9, and 13; schedule 5, part 1; schedule 6, part 2; and schedule 7, parts 2, 9, 12, and 13.

Other Amendments and Modifications

PROVISION	
Subpt A--Headnote 1 hdnte 1	Headnote 1 deleted. Pub. L. 89-388, Secs. 1(f)(3), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966.
490.24--Rates of duty for items 490.24 (column 1--3¢ per lb. + 10% ad val.; column 2--3¢ per lb. + 20% ad val.), 490.48 (column 1--3¢ per lb. + 10% ad val.; column 2--3¢ per lb. + 25% ad val.), and 490.73 (column 1--3¢ per lb. + 10.5% ad val.; column 2--3¢ per lb. + 25% ad val.) reduced by 3¢ per lb. Pub. L. 89-388, Secs. 1(e)(2), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for these items had been temporarily reduced by 3¢ per lb. by former items 907.85, 907.86, and 907.87.	490.24 490.48 490.73

PROVISION	
490.92--Rates of duty for item 490.92 (column 1--1.5¢ per lb. + 10.5% ad val.; column 2--1.5¢ per lb. + 25% ad val.) reduced by 1.5¢ per lb. Pub. L. 89-388, Secs. 1(c)(3), 2, April 13, 1966, 80 Stat. 110, effective date April 13, 1966. The rates of duty for this item had been temporarily reduced by 1.5¢ per lb. by former item 907.88.	490.92
493.18--Item 493.18 added. Pub. L. 89-241, Secs. 2(a), 2(d), Oct. 7, 1965, 79 Stat. 933, 938, effective date Dec. 7, 1965.	493.18

Statistical Notes

PROVISION	Effective date
490.14--	
00--Estab. (transferred from 490.1420 & 40)	*Jan. 1, 1966*
20--Disc. (transferred to 490.1400)	*do*
40--Disc.	*do*
490.24--See Other Amendments and Modifications	
00--Estab. (transferred from 490.2420 & 40)	*Jan. 1, 1966*
20--Disc. (transferred to 490.2400)	*do*
40--Disc.	*do*
490.26--	
00--Estab. (transferred from 490.2620 & 40)	*Jan. 1, 1966*
20--Disc. (transferred to 490.2600)	*do*
40--Disc.	*do*

PROVISION	Effective date
490.48--See Other Amendments and Modifications	
490.73--See Other Amendments and Modifications	
490.92--See Other Amendments and Modifications	
493.18--See Other Amendments and Modifications	
00--Estab. (transferred from 120.6000pt)	*Dec. 7, 1965*
493.30--See Amendments and Modifications (item 946.48)	
494.50--	
00--Disc. (transferred to 494.5020 & 40)	*Jan. 1, 1966*
20--Estab. (transferred from 494.5000pt)	*do*
40--Estab.	*do*

APPENDIX TO THE TARIFF SCHEDULES

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		PART 2. - TEMPORARY MODIFICATIONS PROCLAIMED PURSUANT TO TRADE-AGREEMENTS LEGISLATION Part 2 headnote: 1. This part contains the temporary modifications of the provisions in the tariff schedules proclaimed by the President pursuant to trade-agreements legislation. Unless otherwise stated, the modified provisions are effective until suspended or terminated.			
		Subpart A. - Escape-Clause Actions Subpart A headnote: 1. This subpart contains the temporary modifications of the provisions of the tariff schedules proclaimed by the President pursuant to the escape-clause procedures prescribed in section 7 of the Trade Agreements Extension Act of 1951, as amended, or in sections 301 and 351 or 352 of the Trade Expansion Act of 1962.			
922.50	1/	Wilton (including brussels) and velvet (including tapestry) floor coverings, and floor coverings of like character or description, provided for in item 360.46 of part 5A of schedule 3	.....	40% ad val.	No change
		Glass (including blown or drawn glass, but excluding cast or rolled glass and excluding pressed or molded glass) (whether or not containing wire netting), in rectangles, not ground, not polished and not otherwise processed, weighing over 16 oz. but not over 28 oz. per sq. ft., provided for in items 542.31-.37, inclusive, and 542.71-.77, inclusive, of part 3B of schedule 5:			
		Ordinary glass:			
		Weighing over 16 oz. but not over 28 oz. per sq. ft.:			
923.31	1/	Measuring not over 40 united inches (item 542.31)	1/	1.1¢ per lb.	No change
923.33	1/	Measuring over 40 but not over 60 united inches (item 542.33)	1/	1.5¢ per lb.	No change
923.35	1/	Measuring over 60 but not over 100 united inches (item 542.35)	1/	1.5¢ per lb.	No change
923.37	1/	Measuring over 100 united inches (item 542.37)	1/	1.4¢ per lb.	No change
		Colored or special glass:			
		Weighing over 16 oz. but not over 28 oz. per sq. ft.:			
923.71	1/	Measuring not over 40 united inches (item 542.71)	1/	1.1¢ per lb. + 2.5% ad val.	No change
923.73	1/	Measuring over 40 but not over 60 united inches (item 542.73)	1/	1.5¢ per lb. + 2.5% ad val.	No change
923.75	1/	Measuring over 60 but not over 100 united inches (item 542.75)	1/	1.5¢ per lb. + 2.5% ad val.	No change
923.77	1/	Measuring over 100 united inches (item 542.77)	1/	1.4¢ per lb. + 2.5% ad val.	No change
		1/ See Appendix statistical headnote 1.			

Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty 2
		Subpart D. Temporary Modifications Pursuant to Section 252 of the Trade Expansion Act of 1962			
945.13	1/	Potato starch (provided for in item 132.50)	1/	2.5¢ per lb.	No change
945.16	1/	Brandy provided for in items 168.20 and 168.22		$5 per gal.	No change
945.19	1/	Dextrine and soluble or chemically treated starches (provided for in item 495.30)	1/	3¢ per lb.	No change
945.69	1/	Automobile trucks valued at $1,000 or more (provided for in item 692.02)	1/	25% ad val.	No change

1/ See Appendix statistical headnote 1.

APPENDIX A

TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1968)

HISTORICAL NOTES

Notes p. 2
Appendix,
Part 2

Amendments and Modifications--(con.)

PROVISION	
932.10--Increased column 1 rates of duty provided in items 932.11 (932.10 ($1.35 each), 932.11 ($1.125 each), 932.12 ($1.125 each), 932.13 ($1.05 each), 932.14 (93¢ each), 932.15 ($4¢ each), 932.16 (75¢ each), 932.20 ($2.50 each), 932.21 ($2.025 each), 932.22 ($2.00 each), 932.23 ($1.75 each), 932.24 ($1.35 each), 932.25 ($1.35 each), 932.26 ($1.25 each), 932.30 ($2.50 each + 13.5¢ for each jewel over 7), 932.31 ($2.025 each + 13.5¢ for each jewel over 7), 932.32 ($2.00 each + 13.5¢ for each jewel over 7), 932.33 ($1.75 each + 13.5¢ for each jewel over 7), 932.34 ($1.35 each + 13.5¢ for each jewel over 7), 932.35 ($1.35 each + 13.5¢ for each jewel over 7), 932.36 ($1.25 each + 13.5¢ for each jewel over 7), 934.-- (column 1 base rate + 75¢ each), and 935.-- (column 1 base rate + 75¢ each + 50¢ for each adjustment) for certain watch movements terminated and aforementioned items and item 933.-- deleted. Pres. Proc. 3761, Jan. 11, 1967, 32 F.R. 357, effective date Jan. 11, 1967.	
933.--	
934.--	
935.--	

PROVISION	
943.10--Increased column 1 rate of duty provided in item 943.10 (35% ad val.) for safety pins terminated and item deleted. Pres. Proc. 3703, Jan. 28, 1966, 3 CFR, 1966 Comp., p. 25, effective date Jan. 28, 1966.	
945.13--Item 945.13 added. Pres. Proc. 3564, Dec. 4, 1963, 3 CFR, 1959-1963 Comp., p. 318, effective date Jan. 7, 1964.	
945.16--Item 945.16 added. Pres. Proc. 3564, Dec. 4, 1963, 3 CFR, 1959-1963 Comp., p. 318, effective date Jan. 7, 1964. Article description modified by deleting "Brandy, valued over $9.00 per gallon (provided for in items 168.20 and 168.22) and inserting "Brandy provided for in items 168.20 and 168.22" in lieu thereof. Pres. Proc. 3822, (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002, effective date Jan. 1, 1968.	
945.49--Item 945.49 added. Pres. Proc. 3564, Dec. 4, 1963, 3 CFR, 1959-1963 Comp., p. 318, effective date Jan. 7, 1964.	
945.69--Item 945.69 added. Pres. Proc. 3564, Dec. 4, 1963, 3 CFR, 1959-1963 Comp., p. 318, effective date Jan. 7, 1964. Article description modified by deleting "692.05" and inserting "692.02" in lieu thereof. Pres. Proc. 3822, (Kennedy Round), Dec. 16, 1967, 32 F.R. 19002, effective date Jan. 1, 1968.	

Statistical Notes

PROVISION	Effective date
922.01--See Amendments and Modifications	
00--Disc.(transferred to 320.0194-320.9894)	*Oct.12, 1967*
922.02--See Amendments and Modifications	
00--Disc.(transferred to 320.0194-320.9894)	*Oct.12, 1967*
922.03--See Amendments and Modifications	
00--Disc.(transferred to 320.0194-320.9894)	*Oct.12, 1967*
922.04--See Amendments and Modifications	
00--Disc.(transferred to 321.0194-321.9894)	*Oct.12, 1967*
922.05--See Amendments and Modifications	
00--Disc.(transferred to 322.0194-322.9894)	*Oct.12, 1967*
922.50--See Amendments and Modifications	
00--Estab.(temporarily transferred from 360.4540)	*Sept.1, 1964*
Disc.(transferred to 360.4600)	*Jan. 1, 1968*

PROVISION	Effective date
927.50--See Amendments and Modifications	
40--Disc.(transferred to 650.0920)	*Oct. 12, 1967*
60--Disc.(transferred to 650.3920)	*do*
927.51--See Amendments and Modifications	
40--Disc.(transferred to 650.1120)	*Oct. 12, 1967*
60--Disc.(transferred to 650.4720)	*do*
927.52--See Amendments and Modifications	
40--Disc.(transferred to 650.5520)	*Oct. 12, 1967*
927.53--See Amendments and Modifications	
20--Disc.(transferred to 927.6040)	*Nov. 1, 1968*
30--Disc.(transferred to 927.6140)	*do*
40--Disc.(transferred to 927.6060)	*do*
50--Disc.(transferred to 927.6160)	*do*

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966

(In thousands of dollars. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

TSUS item	All countries: Amount in 1966	All countries: Percent change from 1965	First supplier: Country	First supplier: Value	Second supplier: Country	Second supplier: Value	Third supplier: Country	Third supplier: Value
Fats, oils, and greases, of animal or vegetable origin, halogenated, nitrated or vulcanized (p. 5)								
490.05	5	1/	U.K.	5	-	-	-	-
Fatty acids, of animal or vegetable origin, not sulfonated or sulfated, not elsewhere enumerated (p. 9)								
490.10	-	-100	-	-	-	-	-	-
490.12	6	-33	U.K.	4	W. Germany	2	-	-
490.14	184	+63	Netherlands	77	Norway	72	U.K.	22
490.20	1	-36	W. Germany	1	-	-	-	-
490.22	174	+100	Denmark	174	-	-	-	-
490.24	940	-30	W. Germany	488	Denmark	231	Netherlands	166
490.26	591	+43	W. Germany	232	Netherlands	147	France	62
Fatty acid salts, of animal or vegetable origin, not sulfonated or sulfated (p. 21)								
465.25	56	+29	Japan	56	-	-	-	-
465.30	6	+199	Switzerland	3	Denmark	2	W. Germany	1
490.30	-	1/	-	-	-	-	-	-
490.32	4	+30	Canada	3	Netherlands	-	-	-
490.40	-	1/	-	-	-	-	-	-
490.42	-	1/	-	-	-	-	-	-
490.44	10	1/	U.K.	10	-	-	-	-
490.46	-	-100	-	-	-	-	-	-
490.48	-	1/	-	-	-	-	-	-
490.50	21	+584	W. Germany	12	Netherlands	9	-	-
Fatty alcohols, of animal or vegetable origin, not sulfonated or sulfated (p. 29)								
490.65	458	+68	W. Germany	220	U.K.	185	Japan	30
490.73	383	-28	W. Germany	211	Japan	150	Denmark	12
490.75	267	-36	Netherlands	157	U.K.	55	W. Germany	41
Fatty esters, of animal or vegetable origin, not sulfonated or sulfated, not elsewhere enumerated (p. 35)								
490.90	232	-42	Switzerland	127	U.K.	54	Netherlands	27
490.92	27	-90	W. Germany	14	Belgium	8	Japan	4
490.94	51	+1,600	Japan	42	W. Germany	4	U.K.	3
Fatty substances, artificial mixtures of two or more, provided for in parts 8A and 13A of the TSUS, not elsewhere enumerated (p. 43)								
491.00	36	-43	W. Germany	19	Switzerland	10	Australia	4
Barbasco and derris (p. 47)								
493.02	335	+235	Peru	335	-	-	-	-
493.04	131	+59	Peru	131	-	-	-	-
Cleaning and polishing preparations (p. 51)								
493.10	647	-16	U.K.	466	W. Germany	96	Canada	30

See footnotes at end of table.

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966--Continued

(In thousands of dollars. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

TSUS item	All countries: Amount in 1966	All countries: Percent change from 1965	First supplier: Country	First supplier: Value	Second supplier: Country	Second supplier: Value	Third supplier: Country	Third supplier: Value
Casein and mixtures in chief value thereof (p. 57)								
493.15	27,165	+10	New Zealand	8,094	Argentina	6,085	Australia	5,474
493.16	1,621	-20	Canada	1,245	W. Germany	135	Netherlands	125
Camphor (p. 65)								
493.20	-	-100	-	-	-	-	-	-
493.21	256	-25	Taiwan	184	Japan	72	-	-
493.22	640	+9	U.K.	321	W. Germany	319	-	-
Bone char (p. 71)								
493.25	257	+90	U.K.	144	Portugal	54	Netherlands	34
Activated and other absorbing chars and carbons (p. 75)								
493.26	414	+7	Netherlands	219	U.K.	106	W. Germany	81
Dextrine and soluble or chemically treated starches (p. 81)								
493.30	3,311	+34	Netherlands	2,682	France	282	U.K.	175
Mineral salts (p. 87)								
493.40	2	+5	Italy	1	Czecho.	1	-	-
Burgundy pitch, marine glue pitch, wood pitch, tar and tar oil (p. 89)								
493.45	-	1/	-	-	-	-	-	-
493.46	1	1/	U.K.	1	-	-	-	-
493.47	2	-61	U.K.	2	-	-	-	-
494.40	1	1/	Sweden	1	-	-	-	-
Pyrethrum (p. 95)								
493.55	296	+93	Bur.-Rwa.	131	Kenya	98	Tanzania	60
493.56	7,292	+24	Kenya	3,303	Tanzania	1,837	Ecuador	1,371
Saccharides and related chemicals not elsewhere enumerated (p. 101)								
493.65	132	+89	Netherlands	72	W. Germany	60	-	-
493.66	31	+558	W. Germany	27	France	4	-	-
493.67	5	+147	W. Germany	5	-	-	-	-
493.68	156	+64	Denmark	99	Italy	22	France	21
Sheep Dip (p. 111)								
493.75	-	-100	-	-	-	-	-	-
Tall oil (p. 113)								
493.82	-	1/	-	-	-	-	-	-
Beeswax (p. 127)								
494.02	2,289	+7	Ethiopia	424	Angola	416	Mexico	369
494.04	2	+16	W. Germany	2	U.K.	2/	-	-

See footnotes at end of table.

Value of U.S. imports for consumption, by TSUS items included in the individual summaries of this volume, total and from the 3 principal suppliers, 1966--Continued

(In thousands of dollars. The dollar value of imports shown is defined generally as the market value in the foreign country and therefore excludes U.S. import duties, freight, and transportation insurance)

TSUS item	All countries		First supplier		Second Supplier		Third supplier	
	Amount in 1966	Percent change from 1965	Country	Value	Country	Value	Country	Value
Spermaceti wax (p. 133)								
494.06	49	+28	U.K.	45	Norway	2	W. Germany	2
Candelilla wax (p. 137)								
494.10	1,487	+29	Mexico	1,487	-	-	-	-
Carnauba wax (p. 141)								
494.12	4,765	-14	Brazil	4,743	Mexico	17	Argentina	5
Japan wax (p. 145)								
494.14	24	-64	Japan	24	-	-	-	-
Ouricury wax (p. 147)								
494.16	99	-16	Brazil	99	-	-	-	-
Montan wax (p. 151)								
494.20	583	+18	E. Germany	365	W. Germany	199	Czecho.	18
Paraffin and other petroleum waxes (p. 155)								
494.22	153	-29	Canada	125	W. Germany	26	U.K.	2
Miscellaneous waxes and mixtures (p. 163)								
494.08	343	-3	U.K.	233	Netherlands	56	W. Germany	50
494.18	139	+16	Japan	96	Colombia	17	U.K.	13
494.24	2,571	+16	W. Germany	1,490	Rep SAf	1,057	Netherlands	8
494.30	1	-51	W. Germany	1	-	-	-	-
Usefully radioactive isotopes (p. 171)								
494.5020	808	3/	Canada	791	U.K.	17	-	-
494.5040	1,296	3/	Canada	514	U.K.	501	Belgium	164
Non-radioactive isotopes (p. 175)								
494.52	239	-4	Canada	120	Israel	43	U.K.	22
Cements not elsewhere enumerated (p. 177)								
494.60	398	+35	Canada	199	W. Germany	120	U.K.	57
Medical and surgical supplies (p. 181)								
495.05	416	+13	U.K.	375	Japan	38	Switzerland	2
495.10	37	+322	U.K.	23	Spain	8	W. Germany	6
495.20	6	+13	Canada	5	France	1	-	-
Dental cements (p. 187)								
495.15	162	-9	Switzerland	80	Poland	35	W. Germany	19

1/ None imported in 1965.
2/ Less than $500.
3/ Part of TSUSA item 494.5000 in 1965. The total value of TSUSA items 494.5020 and 494.5040 in 1966 represents a decrease of 25 percent from the value of TSUSA 494.5000 in 1965.

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