Industry & Trade Summary

Polyvinyl Chloride Resins in Primary Forms

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PREFACE

In 1991 the United States International Trade Commission initiated its current *Industry and Trade Summary* series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as those bearing on the competitiveness of U.S. industries in domestic and foreign markets.[1]

This report on polyvinyl chloride resins in primary forms covers the period 1989 through 1993 and represents one of approximately 250 to 300 individual reports to be produced in this series during the first half of the 1990s. Listed below are the individual summary reports published to date on the chemicals and textiles sectors.

USITC publication number	*Publication date*	*Title*
Chemicals:		
2458	November 1991	Soaps, Detergents, and Surface-Active Agents
2509	May 1992	Inorganic Acids
2548	August 1992	Paints, Inks, and Related Items
2578	November 1992	Crude Petroleum
2588	December 1992	Major Primary Olefins
2590	February 1993	Polyethylene Resins in Primary Forms
2598	March 1993	Perfumes, Cosmetics, and Toiletries
2736	February 1994	Antibiotics
2739	February 1994	Pneumatic Tires and Tubes
2741	February 1994	Natural Rubber
2743	February 1994	Saturated Polyesters in Primary Forms
2747	March 1994	Fatty Chemicals
2750	March 1994	Pesticide Products and Formulations
2823	October 1994	Primary Aromatics
2826	November 1994	Polypropylene Resins in Primary Forms
2845	March 1995	Polyvinyl Chloride Resins in Primary Forms
Textiles and apparel:		
2543	August 1992	Nonwoven Fabrics
2580	December 1992	Gloves
2642	June 1993	Yarn
2695	November 1993	Carpets and Rugs
2702	November 1993	Fur Goods
2703	November 1993	Coated Fabrics
2735	February 1994	Knit Fabric
2841	December 1994	Cordage

[1] The information and analysis provided in this report are for the purpose of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

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INTRODUCTION

This summary on polyvinyl chloride (PVC) resins covers one of the major categories of materials more commonly known as plastics. PVC resins are further distinguished in the plastics industry as a type of thermoplastic resin, meaning they can be repeatedly softened and reformed by increases in temperature.[1] All plastic materials in primary forms are contained in Standard Industrial Classification number 2821, but there are no separate statistics specifically for PVC. The PVC industry is one of the largest plastic producing industries, second only to the polyethylene family of plastics in terms of production levels. This summary will examine the U.S. PVC industry, major foreign PVC industries, and trade of this commodity during 1989-93.

The PVC resins covered in this report include homopolymers of vinyl chloride and copolymers of vinyl chloride in which vinyl chloride is the predominant monomer. The majority of PVC resins produced and traded in the United States are the homopolymer type.[2] As the world's largest producer of PVC resins, the United States is also one of the largest exporters of these resins and thus has maintained a substantial trade surplus during the past 5-year period.

As outlined in figure 1, production of PVC homopolymers or copolymers requires the chemical vinyl chloride, which is the principal raw material. To polymerize this chemical, the industry utilizes four main methods—suspension, bulk, emulsion, and solution polymerization; but suspension is the most common. After polymerization, the polymer is typically compounded with other chemicals or materials to aid in processibility before being fabricated into a final product. Typical products made from PVC resins include pipe & tubing, siding, flooring, packaging, pastes & coatings, and wall coverings.

[1] Thermoplastics and thermosets comprise the plastics industry. In contrast to thermoplastics, thermosets cannot be resoftened or reformed by increases in temperature after they have been formed or cured. Approximately 84 percent of all plastics produced in the United States, in terms of quantity, are thermoplastics while the remaining 16 percent are thermosets.

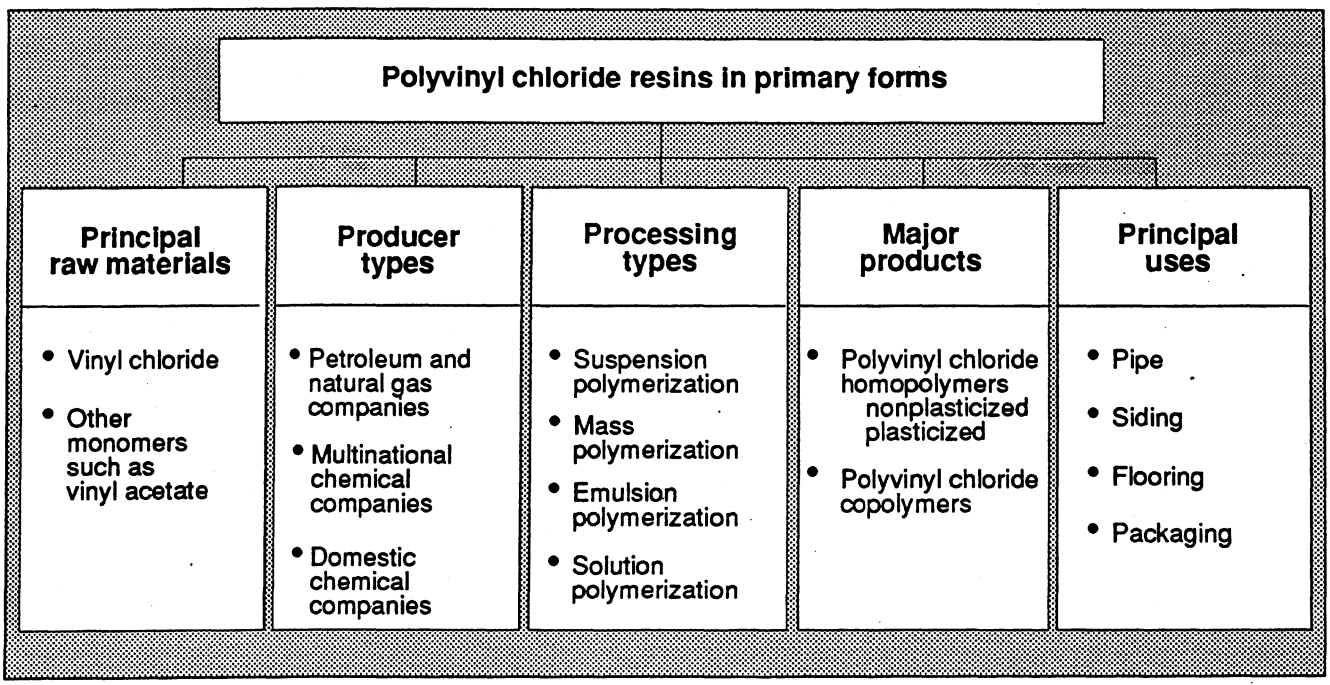
[2] See app. A for a glossary of industry terms.

U.S. INDUSTRY PROFILE

Background

The PVC industry began in Germany during the late 19th and early 20th centuries with the laboratory preparation of the PVC precursor, vinyl chloride. The first polymerization of vinyl chloride reportedly occurred in 1872 as the material, in a sealed test tube, was found to polymerize into white, flaky solids when

Figure 1
U.S. polyvinyl chloride industry: Principal raw materials, producer types, production methods, major products, and principal uses



Source: Compiled by USITC staff from various sources.

exposed to sunlight.[3] During 1910-30, several patents were issued that disclosed a methodology for production of vinyl chloride and PVC. PVC was introduced in the United States in the 1920s, as indicated by patents issued to E.I. duPont de Nemours & Co., and Carbon and Carbide Chemicals Corp. (now Union Carbide). B.F. Goodrich also played an early role in U.S. PVC developments in the 1920-30s.[4] However, PVC was not produced in significant quantities until World War II when PVC was found to be a useful substitute for certain materials in short supply because of the war. One early war application was as a rubber[5] replacement in wire and cable insulation and covering.[6] In the years following the war, production of PVC resins increased significantly, and PVC resins were the leading plastic resins produced in the United States until 1957 when production of polyethylenes surpassed PVC resin production.

Description and Production Methods

Polyvinyl chloride homopolymers are synthesized from the monomer vinyl chloride (CH_2=CHCl) and therefore have the vinyl chloride repeating structure (—CH_2-CHCl—)$_n$. Commercially produced PVC typically has between 500 and 1,500 repeating units in the polymer chain structure.[7] PVC copolymers contain vinyl chloride as the principal monomer in combination with other monomers in the polymer chain.[8] Although there are numerous copolymers commercially produced, the most common copolymer is that of vinyl chloride and vinyl acetate. Other copolymers consist of vinyl chloride with any of the following—vinylidene chloride, acrylic esters, propylene, ethylene, or trifluorochloroethylene. Typically the comonomer is distributed randomly in the vinyl chloride polymer chain. Also included in this summary are a small number of terpolymers that contain three chemically distinct monomers; vinyl chloride, however, is the dominant monomer.

The monomers, or raw materials used to produce PVC are derived from petrochemical feedstocks. The principal monomer, vinyl chloride, is typically produced from ethylene dichloride which in turn, is produced from ethylene. Natural gas and crude petroleum are the feedstocks for ethylene production. Production or synthesis of PVC resins takes place in a reactor vessel where the raw material chemicals (monomers) are chemically combined by addition polymerization to produce PVC. Most PVC resins are produced through one of four processes. Because each process typically produces a resin with specific qualities or attributes, the likely end use of the resin is an important factor in determining which process is followed. The four commercially used production methods are discussed below.

Processes

Suspension process

The suspension polymerization process is the most widely used in the world today.[9] This process can be described as a batch process whereby the monomer(s), water, initiator,[10] and dispersing agent[11] are fed into the reactor vessel and heated to the reaction temperature. The monomer, ordinarily insoluble, is dispersed in the vessel by mechanical agitation and by the initiator. When the reaction is near completion, the material, which can be described as a slurry, is discharged from the reaction vessel to a degasser or stripper where unreacted monomer is removed. This is followed by filtration, centrifugation, and finally, drying. The resins produced from this process can possess a wide range of properties and are therefore used in a variety of end uses.[12]

Mass (or bulk) process

In contrast to the popular suspension process, the mass polymerization process utilizes two reactor vessels for two polymerization stages, and uses only monomer and an initiator in the reactor. In the first stage of the reaction, PVC is polymerized in liquid

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[3] W.V. Titow, *PVC Plastics, Properties, Processing, and Applications,* (New York: Elsevier Science Publishing Co., Inc., 1990), p. 8; and Morris Kaufman, *History of PVC,* (London: MacLaren and Sons, Ltd., 1969), p. 46.

[4] Ibid., p. 9, pp. 45–54.

[5] Rubber was viewed as a critical raw material to the war effort. Since the United States did not have a significant domestic source for natural rubber or have easy access to a secure foreign source, finding a suitable alternative was very important.

[6] Titow, *PVC Plastics,* p. 10.

[7] Ibid., p. 53.

[8] Copolymers can be further distinguished as block, graft, or random copolymers. In block copolymers, the polymer chain contains sections or blocks of the same monomer that are interspersed with the other monomer(s). The blocks can be uniform or random in length. A graft copolymer consists of a main polymer backbone or chain that has side chains of a different monomer attached at intervals. Random copolymers consist of alternating monomers along the polymer chain. The monomers can be single monomers or of varying lengths.

[9] One source reports that 90 percent of U.S. capacity in 1990 was the suspension process. "Vinyl-Based Resins," *Modern Plastics Encyclopedia '91,* (New York: McGraw Hill, 1990), p. 133.

[10] The initiators, or catalysts, typically used are benzoyl peroxide, dibutyl peroxide carbonate, and azobisisobutylonitrile.

[11] The dispersing agents typically used include polyvinyl alcohol or a cellulose derivative.

[12] Titow, *PVC Plastics,* pp. 63–66; G. Margaret Wells, *Handbook of Petrochemicals and Processes,* (Brookfield, VT: Gower Publishing Company, 1991), pp. 313–316; and Leonard I. Nass and Charles A. Heiberger, eds., *Encyclopedia of PVC,* 2d ed., rev. and exp., (New York: Marcel Dekker, Inc., 1986), pp. 72–152.

vinyl chloride monomer utilizing strong mechanical agitation. After only about 10-percent polymerization conversion, the material is transferred to a second reactor. There, more monomer and initiator are added to the reaction and the polymer is formed in a dry phase to a powder. Removal of excess monomer is accomplished by degassing or by utilization of an inert gas. Mass-polymerized PVC resins can also be used in a wide variety of applications.[13]

Emulsion process

The emulsion process is the oldest commercial method to produce PVC resins. Production of PVC via this method requires dispersion of the monomer in an aqueous solution containing emulsifiers, and use of a water-soluble initiator. In contrast to the suspension method, polymerization occurs in micelle[14] structures in the aqueous solution. PVC resins made by the emulsion process are best suited to paste applications.[15]

Solution process

Although the least utilized of the PVC production processes, solution polymerization is important for the production of surface-coating resins. One key difference of this process, compared with the others, is the use of a solvent medium for polymerization instead of water, which increases production costs. In addition, this process is mainly used in the production of copolymers.

Attributes

PVC resins are some of the most versatile materials available because they are highly resistant to chemicals, corrosion, and environmental stress, and can be rigid, flexible, or fluid in form. As stated above, the polymerization process is one important determinant of polymeric properties, but equally important is the role additives play in determining PVC characteristics. Plasticizers, stabilizers, fillers, lubricants, impact modifiers, and other additives are typically combined with PVC resins to aid in processibility, improve properties, and reduce costs. However, plasticizers are probably the most important additives because they allow inherently rigid material to become flexible and pliable, thereby characterizing different types of PVC resins. When PVC resins enter commerce they are typically described as follows:

Rigid or unplasticized—PVC resins that contain no plasticizer and are rigid or sometimes even brittle. (e.g., pipe, window frames, and doors)

Flexible or plasticized—PVC resins that have a significant amount of plasticizer to soften the compound and make it more flexible. (e.g., hose and shower curtains)

Dispersion—PVC resins of fine particle size dispersed in liquid plasticizer (also may be referred to as plastisols or organosols). (e.g., coated fabrics)

Industry Structure

In 1993, the U.S. PVC industry was comprised of 13 firms that operated 26 production facilities (figure 2). Most firms are located in the Texas/Louisiana area because this area contains the majority of petrochemical processing facilities in the United States. Plants tend to be located close to raw material supply or located at the same facility. The U.S. industry is truly one of global participants consisting of U.S.-based national and multinational chemical companies, foreign-owned firms, and U.S.-foreign joint ventures. Eight of the thirteen firms are owned by U.S.-based parents while the remaining five have full, or partial, foreign ownership as follows: Shintech (Japan), Formosa (Taiwan), Vista (German), Vygen (Republic of Korea), and CertainTeed (France). U.S. producers and their respective capacities are depicted in table 1.

Of the 13 PVC firms, 7 operate upstream vinyl chloride production plants.[16] Vertical integration of PVC production is viewed as a logical strategic move to exert some control over feedstock costs. Firms that must purchase vinyl chloride in the open market typically obtain long-term contracts with suppliers to secure a steady supply and to hedge against price volatility.

In recent years, the United States has witnessed the growth of foreign-owned firms in the PVC industry as well as the vinyl chloride industry. Japanese-owned Shintech and Taiwanese-owned Formosa are currently the largest and third largest U.S. PVC producers. Growth of foreign investment in the U.S. industry has reportedly been prompted by lack of Far East chlorine-caustic soda chemical infrastructure to support large-scale PVC production in those countries. As a result, Japanese and Taiwanese interests have acquired or built U.S. PVC and vinyl chloride operations in recent years. As evidence of U.S. competitiveness in this industry, at least one foreign firm seems to have located in the United States to supply world markets for PVC. It has been reported that one of the foreign-owned PVC producers exports a substantial amount (25 percent) of production; as a comparison, the U.S. industry as a whole exported an average of 14 percent of 1993 production.[17]

According to industry sources, a recent decision by the U.S. Federal Trade Commission (FTC) is likely to

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[13] Ibid.

[14] See app. A for definition.

[15] Titow, *PVC Plastics*, pp. 63–66; Wells, *Handbook of Petrochemicals and Processes*, pp. 313–316; and Nass and Heiberger, eds., *Encyclopedia of PVC*, pp. 72–152.

[16] "VCM Gets Tighter Thanks to PVC Boom," *Chemical Marketing Reporter*, Apr. 4, 1994, pp. 3–12.

[17] Eric Culp, "PVC," *Modern Plastics*, Jan. 1994, pp. 47–48.

Figure 2
Geographic distribution of polyvinyl chloride producers

Source: Compiled by USITC staff.

affect the U.S. PVC industry structure in the near future.[18] The FTC ruling involved Occidental Chemical Corporation, currently the second largest producer and the largest U.S.-based producer, and its acquisition of Tenneco Polymers Inc.'s PVC business in 1986. In 1993, the FTC determined that Occidental's acquisition was "likely to lessen competition in U.S. markets for mass and suspension grades of PVC homopolymer, suspension PVC copolymer, and dispersion PVC."[19] The ruling requires Occidental to divest two PVC facilities in Addis, LA, and Burlington, NJ, by early 1995, and it prohibits Occidental from acquiring assets of any other U.S. PVC producer for 10 years without prior FTC approval.[20] These divestures will result in a 30 percent, or 281,000 metric tons (mt), reduction in Occidental's production capacity. However, an Occidental official has stated that the company will add PVC capacity so that 1996 capacity will be equivalent to 1994 capacity.[21]

Most major world PVC producers view the United States as a desirable place to locate at least some of their production facilities for at least six reasons: (1) access to the large U.S. market and the ability to provide a quick response to customer orders; (2) easy access to raw materials; (3) access to relatively inexpensive capital to finance capital-intensive production facilities; (4) availability of skilled labor; (5) access to new product and production technology; and (6) U.S. political stability, which insures protection of assets. These advantages tend to offset various tax and other incentives offered in other countries.

PVC production is not considered labor intensive. Employment and wage data for the PVC and plastics industry are set out in table 2. Separate labor statistics specifically for PVC resins are not available except by USITC estimation.

[18] 58 *Federal Register* 26788, and 59 *Federal Register* 15735.

[19] "Occidental Ordered to Sell PVC Plants," *Chemical Marketing Reporter,* Apr. 12, 1993, pp. 3-19.

[20] Ibid., and Andrew Wood, "OxyChem Agrees to Sell PVC Units but Will Expand Capacity," *Chemical Week,* Feb. 2, 1994, p. 9.

[21] Wood, "OxyChem Agrees to Sell PVC," *Chemical Marketing Reporter,* p. 9.

Table 1
Polyvinyl chloride: Plant capacities by company in the United States, as of January 1994
(1,000 metric tons per year)

Company	Capacity
Shintech	1,077
Oxychem	943
Formosa	862
Geon	567
Georgia–Gulf	404
Borden	386
Vista	381
Westlake	249
CertainTeed	129
Vygen	79
Union Carbide	64
Goodyear	57
Keysor	27
Total	5,225

Source: "Major U.S. Resin Capacities, Jan. 1, 1994," *Modern Plastics,* Jan. 1994, p. 80.

Table 2
U.S. employment data for polyvinyl chloride resins in primary forms, 1989–93

Year	Total employment[1]	Production workers[1]	Average weekly earnings	Average weekly hours	Average overtime hours
1989	12,148	7,131	$629.28	43.7	5.3
1990	11,982	7,061	649.44	44.0	5.6
1991	11,856	7,033	666.86	43.5	5.5
1992	11,704	7,075	703.48	44.3	6.0
1993	11,481	7,158	736.06	44.8	6.4

[1] Estimated by USITC staff.

Note.—Data for average weekly earnings, average weekly hours, and average overtime are for total SIC category 2821 which includes production of all plastics materials, synthetic resins, and nonvulcanizable elastomers.

Source: U.S. Department of Labor, Bureau of Labor Statistics, except as noted.

Consumer Characteristics and Factors Affecting Demand

PVC resins in primary forms are sold to a wide variety of industries (table 3). Consuming industries include those that manufacture products such as PVC pipe, vinyl siding, vinyl flooring, and certain packaging materials. These consumers typically purchase PVC resins and form or fabricate them into products, or into components of larger products. Although there are no industry data on the number of industries that purchase PVC resins, there are over 11,000[22] manufacturers of miscellaneous plastics products in the United States, and it is estimated that over 3,000 produce products made of PVC.

[22] The 1987 *Census of Manufacturers* reports 11,639 manufacturers of miscellaneous plastics products.

Table 3
Major U.S. markets for polyvinyl chloride by fabrication type, 1992–93

(1,000 metric tons)

Type	1992	1993
Calendering		
Construction		
Flooring	97	102
Pond liners	32	34
Geomembranes	39	41
Other	37	37
Transportation	29	29
Sheet packaging	57	58
Consumer & institutional	177	186
Other calendering	10	11
Total	477	498
Coating		
Flooring	76	83
Textile and paper	42	41
Protective	23	24
Other coating	11	12
Total	152	161
Extrusion		
Pipe & conduit		
Wire & cable	187	174
Water	584	624
Irrigation	91	92
Drain/waste/vent	287	306
Conduit	247	249
Sewer	404	406
Other	73	73
Siding	440	513
Windows & doors		
All-vinyl	59	66
Composite	68	73
Accessories	54	57
Film and sheet		
Blood bags	36	37
Packaging	89	89
Non-packaging	24	24
Other	103	103
Total	2,744	2,886
Molding		
Bottles	87	82
Fittings	104	112
Other molding	42	44
Total	233	238
Compounders & resellers	178	200
Paste processes	89	91
All other	41	42
Total	308	333
Grand total	3,915	4,114

Note.—Because of rounding, columns may not add to the totals shown.
Source: "U.S. Resin Sales by Process and Market," *Modern Plastics*, Jan. 1993–94.

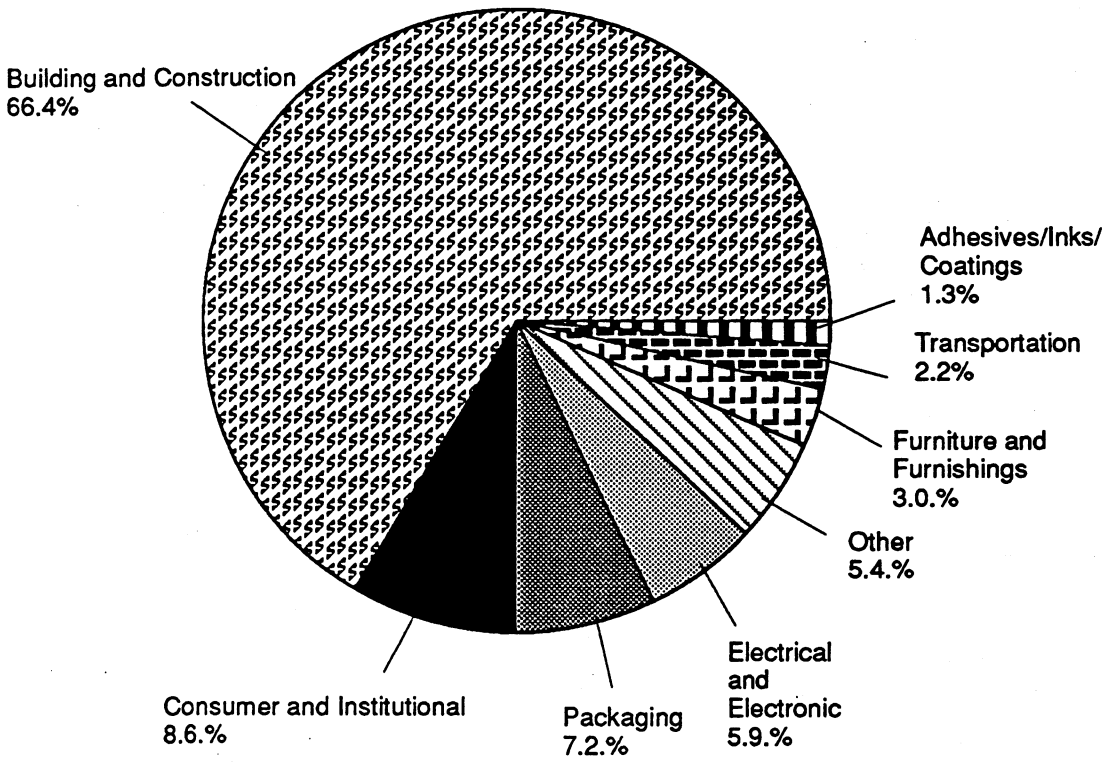
One of the most important determinants of PVC demand is the relative health of the U.S. economy. Since the majority of PVC is used in construction applications (figure 3), new housing starts and GDP are important determinants of the demand for PVC resins. PVC demand is also somewhat affected by seasonal trends because of construction usage. Demand is typically the greatest in April, while November, December, and January are traditionally slow months. The gradual recovery of the economy and strong export demand in 1993 has resulted in an increase in PVC production; prices also rose during the period. Domestically, earthquake and weather-related disasters in California, Florida, and the Midwest resulted in rebuilding which also contributed to increased PVC demand.

When PVC prices increase relative to those of competing materials such as polyethylene, cast iron, steel, aluminum, or wood, the relative price of products made from PVC materials, such as pipe, siding, doors, and windows, also tend to rise, causing some consumers of such products to shift to products made of other materials and also causing manufacturers of such products, when practical, to shift to alternative materials.

GLOBAL ENVIRONMENTAL DEVELOPMENTS

Environmental groups have raised environmental and health concerns about the emission of dioxins in the production and disposal of PVC, and they have also raised concerns about recycling difficulties. Because the polymer PVC is essentially inert in its finished form, such groups generally have not expressed concern about PVC products per se. According to environmental groups, such as Greenpeace, the emission of dioxins during the production of vinyl chloride and PVC constitutes a threat to the environment. Environmental groups also have expressed concern about dioxin emissions during the burning of PVC, including during the disposal of PVC

Figure 3
Major U.S. markets for polyvinyl chloride, 1992



Source: The Society of the plastics Industry, *Facts & Figures of th U.S. Plastics Industry,* Aug. 1983, p. 81.

products by incineration. Environmental groups assert that PVC is difficult to recycle because PVC is made in various formulations with different additives and plasticizers; they assert that the various PVC formulations require separate recycling.[23]

Thus far, the strongest environmental concerns have been raised in the European Union (EU), where legislation restricting use of PVC in certain applications has been proposed. One of the major EU legislative issues is a proposed European Commission directive now before the European Parliament which would require a phaseout of PVC in packaging applications over a 10-year period.[24] However, restrictions on the use of PVC in packaging applications in the EU and other countries is not likely to have a major impact on PVC production because PVC is used mainly in durable applications. In contrast, other materials, including other plastics (e.g. polyethylene) are used more extensively in packaging applications. According to one source, packaging accounts for approximately 15 percent of PVC applications in Western Europe; in the United States, the rate is about 7 percent.[25] Additionally, some West European countries have proposed eco-taxes on PVC, stringent recycling targets that would curb PVC use, and measures that would ban the use of PVC in some applications.[26] Because of the concerns over PVC disposal, PVC is expected to be replaced in packaging applications by other plastics, such as polyethylene, polypropylene, and polyethylene terephthalate.

U.S. TRADE MEASURES[27]

Tariff Measures

Current U.S. tariffs for imported PVC resins in primary forms range from 5.3 (copolymers) to 10.1 (homopolymers) percent ad valorem for countries that have most-favored-nation status (table 4). The 1993 aggregate trade-weighted rate of duty for all PVC products was 9.8 percent. These resins are eligible for duty-free entry under the Generalized System of Preferences (GSP), the North American Free Trade Agreement, the Caribbean Basin Economic Recovery Act (CBERA), the United States-Israel Free Trade Area, and the Andean Trade Preference Act. Under the recently completed GATT Uruguay Round Agreement, the United States has agreed to reduce the tariff rate on homopolymer PVC resins to 6.5 percent ad valorem over a 10-year period; copolymer PVC tariffs would remain unchanged. Also, the United States agreed to eliminate duties on vinyl acetate-vinyl chloride-ethylene terpolymers that meet certain criteria. There are no known significant domestic nontariff import barriers that restrict the importation of PVC resins.

U.S. Government Trade-Related Investigations

The U.S. International Trade Commission has not conducted any trade-related investigations on PVC resins during the most recent 5-year period. However, in recent years U.S. PVC exports have been the subject of a number of antidumping investigations conducted by other countries against the United States. These investigations are discussed in the following section on Foreign Trade Measures.

FOREIGN TRADE MEASURES

Tariff Measures

Major U.S. trading partners of PVC resins in primary forms include Canada, Taiwan, Hong Kong, and Japan. Most developed countries impose tariffs at rates similar to U.S. rates, while those of developing countries generally impose higher rates. The tabulation below lists the corresponding duty rates for major U.S. trading partners (in percent ad valorem):[28]

Nation/Area	Average rate of duty on polyvinyl chloride resins in primary forms	
Canada	10	(MFN)
	0	(U.S. 1994 rate, 5-year duty elimination)
Japan	5.8	(homopolymer)
	4.1-4.6	(copolymer)
European Union	12.5	
Mexico	10-15	(various duty eliminations for U.S. products under NAFTA)
China	28	(MFN)
Taiwan	2.5	
Hong Kong	Duty free	

[23] Bette Hileman, "Concerns Broaden Over Chlorine and Chlorinated Hydrocarbons," *Chemical & Engineering News*, Apr. 19, 1993, pp. 11–18.

[24] "Proposal for a Council Directive on Packaging and Packaging Waste," *Commission of the European Communities*, COM(92) 278 final, July 15, 1992.

[25] Majorie Walker, "PVC Demand Set to Outpace Capacity," *European Chemical News*, Apr. 26, 1993, p. 43.

[26] "Industry Pressure Pays Off for PVC Sector," *European Chemical News*, July 26, 1993, p. 20; "Swedish Bill to Target PVC," *European Chemical News*, Feb. 1, 1993, p. 22; and "Belgium Orders Review of PVC Tax," *European Chemical News*, Jan. 25, 1993, p. 29.

[27] See app. B for explanation of tariff and trade agreement terms.

[28] Information obtained from country tariff schedules and the U.S. Department of Commerce.

Table 4
Polyvinyl chloride resins in primary forms: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1994; U.S. exports, 1993; and U.S. imports, 1993

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1994		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				Million dollars	
3904.10.00	Polyvinyl chloride, not mixed with any other substances	10.1%	Free (A,CA,E,IL,J,MX)	330	87
	Other polyvinyl chloride:				
3904.21.00	Nonplasticized	10.1%	Free (A[2],CA,E,IL,J,MX)	66	10
3904.22.00	Plasticized	10.1%	Free (A,CA,E,IL,J,MX)	49	13
3904.30.00	Vinyl chloride–vinyl acetate copolymers	5.3%	Free (A,CA,E,IL,J,MX)	45	1
3904.40.00	Other vinyl chloride copolymers	5.3%	Free (A,CA,E,IL,J,MX)	10	8

[1] Programs under which special tariff treatment may be provided, and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn, are as follows: Generalized System of Preferences (A); Goods of Canada under the terms of the North American Free Trade Agreement (CA); Caribbean Basin Economic Recovery Act (E); United States–Israel Free Trade Area (IL); Andean Trade Preference Act (J); and Goods of Mexico under the terms of the North American Free Trade Agreement (MX).

[2] Brazil is not eligible for duty–free treatment under the Generalized System of Preferences for this subheading.

Source: U.S. exports and imports compiled from official statistics of the U.S. Department of Commerce, and tariff information was obtained from the *Harmonized Tariff Schedule of the United States (1994)*, supplement 1.

Other Barriers to Trade

During the past 5 years several countries have instituted antidumping investigations on PVC resins, and others have threatened to institute investigations. Some of these investigations resulted in the assessment of additional duties. Others that did not result in assessment of additional duties reportedly caused market disruptions resulting in price increases. There were three cases of alleged dumping filed with local governments during 1989-93, as follows:

Australia—During 1991-92, Australia instituted two antidumping investigations involving imports of PVC from 18 countries, including the United States. The Australian Customs Service made an affirmative finding.[29]

Brazil—In 1993, Brazil imposed antidumping duties of 16-18 percent on PVC imports from the United States and Mexico.[30]

India—In 1993, India alleged dumping of PVC by Argentina, Brazil, Mexico, the Republic of Korea, and the United States. In early 1994, the government imposed duties of 504 rupees (about $16) per mt on U.S.-produced material, 2,036 rupees per mt on Brazilian PVC, 1,619 rupees per mt on Mexican PVC, and 1,253 rupees per mt on Republic of Korea PVC.[31]

In addition to the antidumping actions described above, two other trade-related actions were initiated in Europe with respect to PVC. In 1993, Finland instituted a minimum price setting mechanism to combat low-priced Russian imports, and in the EU, producers considered filing an antidumping investigation on PVC imports from Central European countries.[32] Reportedly, neither of these two cases resulted in official antidumping investigations.

[29] Ian Young and Andrew Wood, "PVC Dumping Down Under," *Chemical Week,* July 8, 1992.

[30] "EC Players Take Dumping Cue from India/Brazil," *European Chemical News,* Feb. 8, 1993, p. 11.

[31] Ibid., and "India Slaps Dumping Duties on PVC Resins," *The Journal of Commerce,* Jan. 20, 1994.

[32] "Cefic Investigates PVC/Soda Imports," *European Chemical News,* Apr. 26, 1993, p. 11.

U.S. MARKET

Consumption

During 1989-93, U.S. consumption of PVC resins increased by 20 percent (in terms of quantity) or by approximately 4 percent per year. However, consumption levels, when measured in terms of value, declined slightly during 1989-93 because of generally falling prices during the period (table 5). Import penetration increased during the period, from 1.4 percent to 3.7 percent (in terms of value and quantity) of consumption, but PVC exports, as measured in actual dollars, grew faster than imports. The increase in U.S. consumption (as measured in terms of quantity) was a reflection of increased demand for products made of PVC such as siding, windows, and doors.

Production

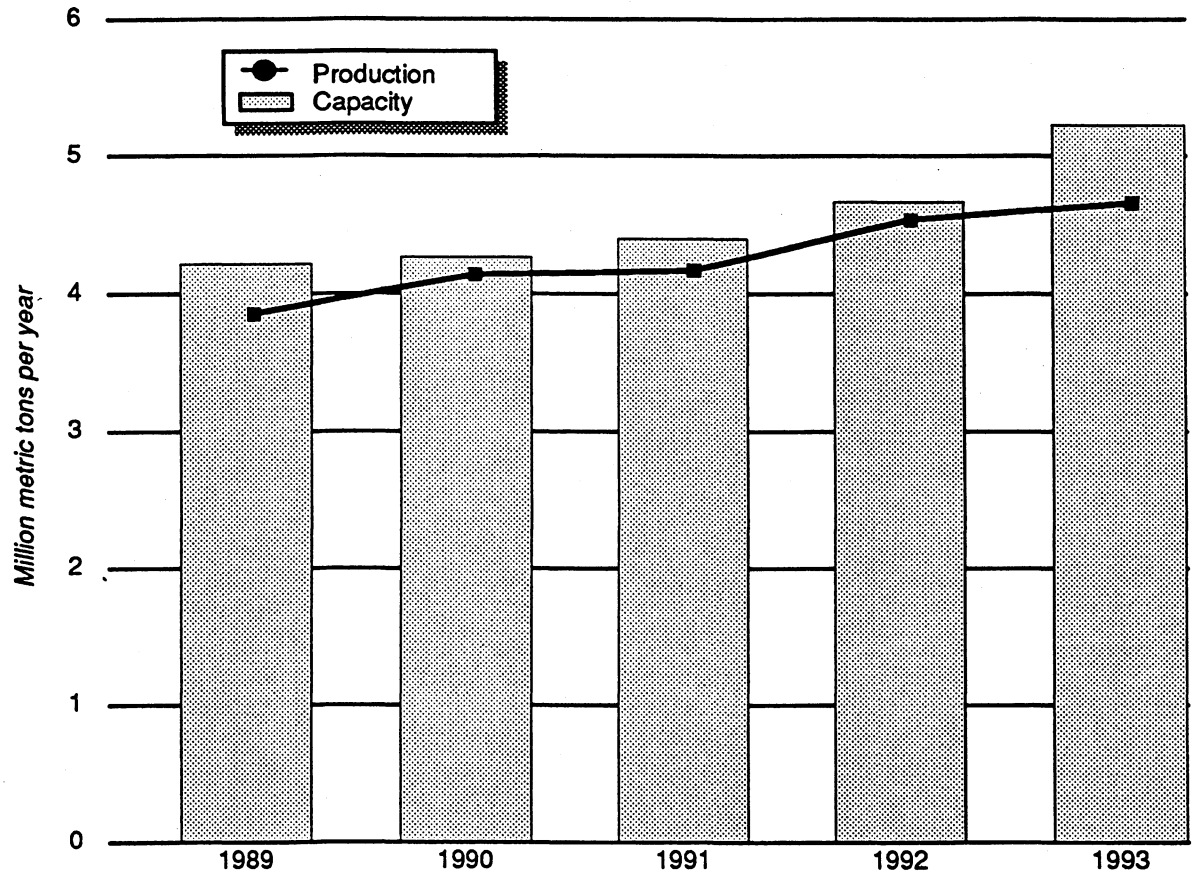
U.S. PVC production increased steadily during 1989-93 increasing by 21 percent over the period. Annual U.S. PVC production levels totaled a record 4.7 million mt in 1993. The U.S. industry gradually added capacity during the period to meet expanding demand. The recent economic recession notwithstanding, capacity utilization in the domestic industry averaged 94 percent during the period. Figure 4 depicts the production and capacity utilization levels during the period. Modernizations and expansions of current facilities projected to be implemented in 1994-95 are expected to increase domestic PVC production to new record levels.

Table 5
Polyvinyl chloride resins in primary forms: U.S. production, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1989–93

Year	Production	Exports	Imports	Apparent consumption	Ratio of imports to consumption
	Million dollars				*Percent*
1989	3,653	388	45	3,310	1.4
1990	3,425	419	67	3,073	2.2
1991	3,118	549	54	2,623	2.1
1992	3,398	488	82	2,992	2.7
1993	3,583	500	117	3,200	3.7

Source: Production data obtained from The Society of the Plastics Industry Committee on Resin Statistics as compiled by Ernst & Young, and from U.S. International Trade Commission publications, *Synthetic Organic Chemicals, U.S. Production and Sales* for the years 1989–92. Import and export data obtained from official statistics of the U.S. Department of Commerce.

Figure 4
Polyvinyl chloride: U.S. capacity and production, 1989-93



Source: The Society of the Plastics Industry, *Facts & Figures of the U.S. Plastics Industry,* Aug. 1993, p. 80; "Major U.S. Resin Cpacities," *Modern Plastics,* Jan. 1994, p. 80; and The Society of the Plastics Industry Committee on Resin Statistics as compiled by Ernst & Young, *Monthly Statistical Report-Resins,* various issues.

Imports

U.S. PVC imports are small relative to U.S. consumption and U.S. exports (tables 5 and 6). During 1989-93, import levels averaged 2 percent of U.S. production and consumption. However, it should be noted that imports (in terms of value) more than doubled during the 5-year period. Imports from Canada are the principal source of foreign supply, accounting for an average of 46 percent of imports during the period. U.S. imports from Canada have fluctuated during the period, but generally have increased. Changes in imports from Canada are most likely the result of internal company decisions regarding North American supply patterns because the largest Canadian producer, Geon[33], is also a major U.S. producer. Since the United States-Canada Free-Trade Agreement was implemented in 1989, tariff barriers have been gradually reduced to duty free, and there are no known nontariff barriers affecting PVC trade between the two countries.

Imports from Brazil and Mexico also increased during 1989-93. PVC imports from Brazil increased from $6 million (8,521 mt) in 1989 to $15 million (36,503 mt) in 1993, while those from Mexico increased from $1 million (959 mt) in 1989 to $4 million (5,079 mt) in 1993. Most imports from Brazil and Mexico entered duty-free during the period under GSP.[34]

FOREIGN MARKETS

Foreign Market Profile

Prior to 1993, Western Europe was the world's top consuming area of PVC resins in primary forms. However, significant growth rates in Far East markets have propelled that area into the world's top

[33] In 1993 B.F. Goodrich divested its Geon Vinyls Division; the PVC operations now are conducted under the Geon name.

[34] PVC imports from Brazil are eligible for duty-free treatment with the exception of imports under HTS 3904.21.00, nonplasticized polyvinyl chloride.

Table 6
Polyvinyl chloride resins in primary forms: U.S. imports for consumption, by principal sources, 1989–93

Source	1989	1990	1991	1992	1993
	Quantity (1,000 kilograms)				
Canada	12,311	43,954	25,753	60,647	88,906
Brazil	8,521	8,059	4,710	21,503	36,503
Japan	5,675	5,448	4,452	5,322	5,872
Germany	4,860	4,366	3,865	4,104	4,737
Mexico	959	5,321	5,832	2,837	5,079
Italy	2,198	2,567	2,330	11,067	3,068
Sweden	873	999	1,077	1,585	1,555
France	981	1,000	797	1,328	778
Israel	1,239	1,544	789	669	1,172
Netherlands	[1]16	40	0	36	164
All other	3,398	1,928	1,667	1,907	995
Total	41,032	75,228	51,272	111,005	148,828
	Value (1,000 dollars)				
Canada	11,034	30,174	17,54	38,433	70,880
Brazil	5,528	7,109	7,153	8,856	15,257
Japan	12,279	11,219	8,543	11,148	13,399
Germany	5,994	5,794	5,218	4,920	5,137
Mexico	887	3,057	6,660	2,310	4,032
Italy	2,161	2,499	2,397	7,473	3,084
Sweden	1,303	1,373	1,389	1,490	1,498
France	1,499	1,713	1,327	3,867	1,458
Israel	1,283	1,625	923	757	1,191
Netherlands	[1]223	44	0	85	419
All other	2,524	2,796	2,465	2,396	1,079
Total	44,715	67,403	53,624	81,734	117,435
	Unit value (dollars per kilogram)				
Canada	0.90	0.69	0.68	0.63	0.80
Brazil	0.65	0.88	1.52	0.41	0.42
Japan	2.16	2.06	1.92	2.09	2.28
Germany	1.23	1.33	1.35	1.20	1.08
Mexico	0.93	0.57	1.14	0.81	0.79
Italy	0.98	0.97	1.03	0.68	1.01
Sweden	1.49	1.37	1.29	0.94	0.96
France	1.53	1.71	1.67	2.91	1.87
Israel	1.04	1.05	1.17	1.13	1.02
Netherlands	[2]13.96	1.11	([3])	2.35	2.56
All other	0.74	1.45	1.48	1.26	1.08
Average	1.09	0.90	1.05	0.74	0.79

[1] Although this figure is reported in official statistics, it is believed misreported.
[2] Not meaningful.
[3] Not applicable.

Note.—Because of rounding, figures may not add to the totals shown.

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

consuming area. Total consumption of PVC by countries located in the Far East was reported at 6.6 million mt in 1993.[35] The Far East market has gradually become an important market for U.S. PVC. The United States relies on foreign markets for approximately 14 percent of annual sales and is the world's largest exporter. The world market for PVC resins, as measured by world resin sales, reportedly totaled 18.6 million mt in 1992.[36]

The market for PVC in Asia and the Far East is projected to continue to increase at a rapid rate at least through 1997; leading the growth in this area are India (15.4 percent annual growth rate), Indonesia (14.6

[35] Eric Culp, "PVC," *Modern Plastics*, Jan. 1994, pp. 47–48.

[36] Richard H. Roman, "Polyvinyl Chloride," *CMRA Review & Forecast*, Feb. 1993, p. 5

percent), and Thailand (14.1 percent).[37] This growth will keep the Far East as a net importer of PVC resins for the near future, and thus should provide a continued and growing market for U.S. exports. According to one consulting organization, worldwide growth of the PVC industry will be 5 percent per year through 1998.[38]

Western Europe

In recent years, the Western European PVC industry has experienced falling production levels and low profit margins and prices. In addition, it has faced increased levels of lower priced imports. Consumption reportedly fell for the fourth year in a row in 1993.[39] As a result, PVC producers have announced a 230,000 mt reduction in capacity in the near future.[40] However, Western European producers benefitted in 1993 by the surge in demand from Asian countries, which resulted in increased exports to that region. The increased exports also helped to reduce inventories, permit price increases, and provide a market for Central European material that otherwise may have been sold in Western Europe.

Japan

In contrast to Western Europe, the PVC production in Japan remained relatively constant during 1989-93. Production climbed from 1.9 million mt in 1989 to 2.0 million mt in 1991, before declining slightly by 70,000 mt in 1992. Production in 1993 was almost equal to 1992 production levels. Japan's PVC industry has also benefited significantly from the increase in demand from developing countries in East Asia. Japanese exports increased by 242 percent between 1989 and 1993, and they now account for 11 percent of total Japanese sales. Approximately 50 percent of Japanese consumption is of rigid PVC, 30 percent is flexible PVC, and the remaining 20 percent is coating and paste-type resins.

U.S. Exports

Composition, Levels, and Trends

U.S. exports of PVC resins in primary forms consisted mainly of pure (not mixed with any other substance) PVC (66 percent of 1993 imports), followed by nonplasticized PVC (13 percent), copolymer PVC (11 percent), and plasticized PVC (10 percent). Exports of PVC resins were a growing and important market for U.S. producers during 1989-93 as they averaged 14 percent of total production. U.S. exports climbed to the highest level of the period in 1991 at $549 million (757,370 mt), fell by 11 percent to $488 million (716,874 mt) in 1992, and then rebounded (in terms of value) to $500 million (676,580 mt) in 1993 (table 7).

Export Markets and Participants

The single largest export market during the period was Canada, which accounted for an average of 24 percent of total exports. Growth in U.S. exports to Canada was also substantial, climbing from $60 million in 1989 to $142 million in 1993, or by 138 percent. U.S. exports to Far East markets were also substantial and increased during the period. In 1993, approximately 60 percent of U.S. PVC exports went to the Far East.[41] However, a significant amount of U.S. exports of PVC resins to the Far East return to the United States in the form of finished goods.

Polymer producers, resellers, and compounders are the principal exporters of PVC resins. Transactions directly from the U.S. producer to the foreign purchaser are the norm, with little participation by middlemen. Alternatively, smaller shipments are typically handled by distributors or middlemen.

U.S. TRADE BALANCE

The United States maintained a substantial trade surplus of PVC resins in primary forms during 1989-93 (table 8). The peak ($496 million) occurred in 1991 when exports reached a record level of $549 million (figure 5). The largest trade single-country surplus during the period was with Canada, the principal U.S. trading partner of PVC. However, in 1993, the U.S. trade surplus with Canada fell by 21 percent as a result of a substantial increase in imports from that country. The United States had a positive trade balance with all countries with which it had significant trade in PVC resins during 1989-93 with the exception of Brazil; the trade deficit with Brazil averaged a relatively small $3 million during the period.

[37] Majorie Walker, "PVC Demand Set to Outpace Capacity," *European Chemical News,* Apr. 26, 1993, p. 42.

[38] Gregory D.L. Morris, "Strong PVC Demand Drives Prices and Expansion," *Chemical Week,* Mar. 30, 1994, p. 10.

[39] Culp, "PVC," *Modern Plastics,* pp. 47–48.

[40] Ibid.

[41] "VCM Gets Tighter," *Chemical Marketing Reporter,* pp. 3–12.

Table 7
Polyvinyl chloride resins in primary forms: U.S. exports of domestic merchandise, by principal markets, 1989–93

Market	1989	1990	1991	1992	1993
	Quantity (1,000 kilograms)				
Canada	59,500	142,169	125,798	149,401	152,496
Taiwan	63,953	30,721	82,063	64,622	89,375
Hong Kong	21,358	18,801	53,805	33,260	66,694
Mexico	16,946	13,860	14,187	17,610	13,110
Belgium	20,200	18,284	22,992	16,822	14,361
Republic of Korea	24,236	34,232	58,186	39,591	19,845
China	9,725	2,933	6,509	21,229	24,632
Netherlands	5,681	18,448	37,861	61,411	25,700
Japan	12,561	8,309	21,605	7,943	6,972
Costa Rica	10,657	13,473	12,685	17,149	17,273
All other	205,948	190,352	321,678	287,836	246,121
Total	450,765	491,582	757,370	716,874	676,580
	Value (1,000 dollars)				
Canada	59,578	124,268	114,021	128,498	141,927
Taiwan	49,512	21,428	46,745	32,420	48,218
Hong Kong	16,207	18,083	32,657	18,281	38,276
Mexico	24,393	18,865	19,223	22,705	19,994
Belgium	17,174	19,025	19,404	16,480	18,497
Republic of Korea	20,674	26,613	36,918	23,245	16,512
China	6,098	2,479	5,418	10,654	14,648
Netherlands	4,669	12,508	20,236	28,320	14,049
Japan	16,798	15,293	22,438	23,130	13,736
Costa Rica	7,768	8,643	6,888	8,689	10,381
All other	164,711	151,452	225,389	175,919	164,008
Total	387,582	418,658	549,336	488,342	500,247
	Unit value (dollars per kilogram)				
Canada	1.00	0.87	0.91	0.86	0.93
Taiwan	0.77	0.70	0.57	0.50	0.54
Hong Kong	0.76	0.96	0.61	0.55	0.57
Mexico	1.44	1.36	1.35	1.29	1.53
Belgium	0.85	1.04	0.84	0.98	1.29
Republic of Korea	0.85	0.78	0.63	0.59	0.83
China	0.63	0.85	0.83	0.50	0.59
Netherlands	0.82	0.68	0.53	0.46	0.55
Japan	1.34	1.84	1.04	2.91	1.97
Costa Rica	0.73	0.64	0.54	0.51	0.60
All other	0.80	0.80	0.70	0.61	0.67
Average	0.86	0.85	0.73	0.68	0.74

Note.—Because of rounding, figures may not add to the totals shown.

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

Table 8
Polyvinyl chloride resins in primary forms: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected countries and country groups, 1989–93[1]

(Million dollars)

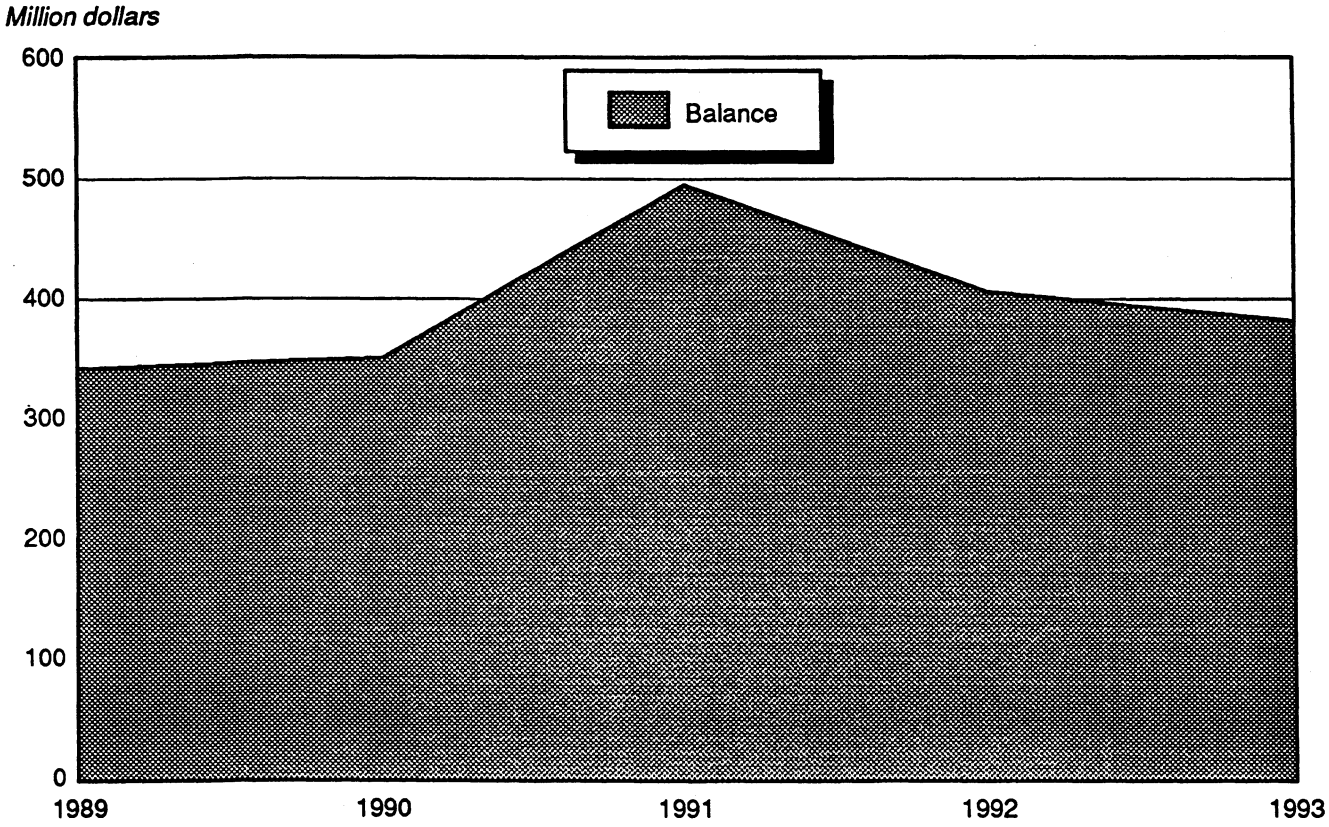
Item	1989	1990	1991	1992	1993
U.S. exports of domestic merchandise:					
Canada	60	124	114	128	142
Taiwan	50	21	47	32	48
Hong Kong	16	18	33	18	38
Japan	17	15	22	23	14
Mexico	24	19	19	23	20
Belgium	17	19	19	16	18
Brazil	3	2	12	7	3
Republic of Korea	21	27	37	23	17
China	6	2	5	11	15
Netherlands	5	13	20	28	14
All other	169	158	220	178	171
Total	388	419	549	488	500
EU–12	44	59	74	70	54
OPEC	23	19	46	41	35
ASEAN	20	16	34	19	22
CBERA	33	32	26	30	36
Central Europe	3	(2)	1	(2)	(2)
U.S. imports for consumption:					
Canada	11	30	18	38	71
Taiwan	(2)	1	1	2	(2)
Hong Kong	0	0	0	(2)	(2)
Japan	12	11	9	11	13
Mexico	1	3	7	2	4
Belgium	(2)	(2)	(2)	(2)	(2)
Brazil	6	7	7	9	15
Republic of Korea	0	(2)	0	(2)	(2)
China	0	0	0	(2)	0
Netherlands	(2)	(2)	0	(2)	(2)
All other	15	15	13	19	13
Total	45	67	54	82	117
EU–12	10	10	9	17	10
OPEC	(2)	(2)	(2)	(2)	(2)
ASEAN	(2)	(2)	(2)	(2)	(2)
CBERA	0	(2)	0	0	0
Central Europe	(2)	(2)	0	0	0
U.S. merchandise trade balance:					
Canada	49	94	96	90	71
Taiwan	49	20	46	31	48
Hong Kong	16	18	33	18	38
Japan	5	4	14	12	(2)
Mexico	24	16	13	20	16
Belgium	17	19	19	16	18
Brazil	–3	–5	5	–2	–12
Republic of Korea	21	27	37	23	16
China	6	2	5	11	15
Netherlands	4	12	20	28	14
All other	155	143	208	158	158
Total	343	351	496	407	383
EU–12	34	49	64	53	43
OPEC	23	18	46	41	34
ASEAN	20	16	34	19	22
CBERA	33	32	26	30	36
Central Europe	3	(2)	1	(2)	(2)

[1] Import values are based on customs value; export values are based on f.a.s. value, U.S. port of export.
[2] Less than 500,000 dollars.

Note.—Because of rounding, figures may not add to the totals shown.

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

Figure 5
Polyvinyl chloride resins in primary forms: U.S. trade balance, 1989-93



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

APPENDIX A
GLOSSARY OF INDUSTRY TERMS

GLOSSARY OF INDUSTRY TERMS

Copolymer	This term denotes a polymer of two chemically distinct monomers.
Cure	To change the properties of a resin by chemical reaction.
Homopolymer	The polymer resulting from the polymerization of a single monomer; a polymer consisting substantially of a single type of repeating unit.
Micelle	A colloidal particle formed by the reversible aggregation of dissolved molecules.
Monomer	A compound, usually containing carbon and of low molecular weight, that can react to form a polymer by combination with itself or with other similar molecules or compounds.
Organosol	A dispersion of a finely divided resin in a liquid plasticizer. In contrast to plastisols, organosols have a volatile liquid in the mixture that accounts for a least 5 percent of the total weight.
Plastisol	A dispersion of a finely divided resin in a liquid plasticizer that has little tendency to dissolve the resin at normal temperatures but becomes a solvent for the resin when heated.
Polyethylene	A family of resins obtained by polymerizing ethylene gas. Those polymers with densities greater than 0.94 (g/cc) are considered high density, whereas those with densities 0.94 and below are low density.
Polymer	The product of a polymerization reaction.
Polymerization	A chemical reaction in which the molecules of a chemical compound (monomer) are linked together to form large molecules whose molecular weight is a multiple of that of the monomer or monomers.
Polyvinyl chloride	A polymer made by the polymerization of vinyl chloride with catalysts.
Terpolymer	The product of polymerization of three chemically distinct monomers.
Thermoplastics	A class of plastic resins that in their final states are capable of being repeatedly resoftened by increases in temperature and hardened by cooling.
Thermosets	A class of plastic resins that, in their final state as finished articles, are substantially infusible and insoluble.
Vinyl acetate	A colorless liquid obtained from the reaction of ethylene and acetic acid, or the reaction of acetylene and acetic acid. It serves as a monomer for polyvinyl acetate and as a comonomer for many other polymers.
Vinyl chloride	A colorless gas obtained from the reaction of ethylene with chlorine or hydrogen chloride to produce ethylene dichloride, which is cracked to form vinyl chloride. It is the monomer for polyvinyl chloride.

Source: *Wittington's Dictionary of Plastics, Modern Plastics Encyclopedia,* and *The Condensed Chemical Dictionary*

APPENDIX B
TARIFF AND TRADE AGREEMENT TERMS

The *Harmonized Tariff Schedule of the United States* (HTS) replaced the *Tariff Schedules of the United States* (TSUS) effective January 1, 1989. Chapters 1 through 97 are based upon the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product description, with additional U.S. product subdivisions at the 8-digit level. Chapters 98 and 99 contain special U.S. classification provisions and temporary rate provisions, respectively.

Rates of duty in the ***general*** subcolumn of HTS column 1 are most-favored-nation (MFN) rates; for the most part, they represent the final concession rate from the Tokyo Round of Multilateral Trade Negotiations. Column 1-general duty rates are applicable to imported goods from all nonembargoed countries except those enumerated in general note 3(b) to the HTS—Afghanistan, Azerbaijan, Cuba, Kampuchea, Laos, North Korea, and Vietnam—whose goods are dutiable at the rates set forth in ***column 2***. Goods from Albania, Armenia, Belarus, Bosnia, Bulgaria, the People's Republic of China, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan are now eligible for MFN treatment. Among goods dutiable at column 1-general rates, particular products of enumerated countries may be eligible for reduced rates of duty or for duty-free entry under one or more preferential tariff programs. Such tariff treatment is set forth in the **special** subcolumn of HTS column 1. Where eligibility for special tariff treatment is not claimed or established, goods are dutiable at column 1-general rates.

The ***Generalized System of Preferences*** (GSP) affords nonreciprocal tariff preferences to developing countries to aid their economic development and to diversify and expand their production and exports. The U.S. GSP, enacted in title V of the Trade Act of 1974 and renewed in the Trade and Tariff Act of 1984, applies to merchandise imported on or after January 1, 1976 and before September 30, 1994. Indicated by the symbol "A" or "A*" in the special subcolumn of column 1, the GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries, as set forth in general note 4 to the HTS.

The ***Caribbean Basin Economic Recovery Act*** (CBERA) affords nonreciprocal tariff preferences to developing countries in the Caribbean Basin area to aid their economic development and to diversify and expand their production and exports. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation 5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to merchandise entered, or withdrawn from warehouse for consumption, on or after January 1, 1984; this tariff preference program has no expiration date. Indicated by the symbol "E" or "E*" in the special subcolumn of column 1, the CBERA provides duty-free entry to eligible articles, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries, as set forth in general note 7 to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "IL" are applicable to products of Israel under the ***United States-Israel Free Trade Area Implementation Act*** of 1985 (IFTA), as provided in general note 8 to the HTS. Where no rate of duty is provided for products of Israel in the special subcolumn for a particular provision, the rate of duty in the general subcolumn of column 1 applies.

Preferential nonreciprocal duty-free or reduced-duty treatment in the special subcolumn of column 1 followed by the symbol "J" or "J*" in parentheses is afforded to eligible articles the product of designated beneficiary countries under the ***Andean Trade Preference Act*** (ATPA), enacted in title II of Public Law 102-182 and implemented by Presidential Proclamation 6455 of July 2, 1992 (effective July 22, 1992), as set forth in general note 11 to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "CA" are applicable to eligible goods of Canada, and those followed by the symbol "MX" are applicable to eligible goods of Mexico, under the **North American Free Trade Agreement**, as provided in general note 12 to the HTS, effective January 1, 1994.

Other special tariff treatment applies to particular ***products of insular possessions*** (general note 3(a)(iv)), goods covered by the ***Automotive Products Trade Act*** (APTA) (general note 5) and the ***Agreement on Trade in Civil Aircraft*** (ATCA) (general note 6), and ***articles imported from freely associated states*** (general note 10).

The ***General Agreement on Tariffs and Trade*** (GATT) (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) is a multilateral agreement setting forth basic principles governing international trade among its signatories. The GATT's main obligations relate to most-favored-nation treatment, the maintenance of scheduled concession rates of duty, and national (nondiscriminatory) treatment for imported products; the GATT also provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, antidumping and countervailing duties, and other measures. Results of GATT-sponsored multilateral tariff negotiations are set forth by way of separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as Schedule XX.

Officially known as "The Arrangement Regarding International Trade in Textiles," the ***Multifiber Arrangement*** (MFA) provides a framework for the negotiation of bilateral agreements between importing and producing countries, or for unilateral action by importing countries in the absence of an agreement. These bilateral agreements establish quantitative limits on imports of textiles and apparel, of cotton and other vegetable fibers, wool, man-made fibers and silk blends, in order to prevent market disruption in the importing countries—restrictions that would otherwise be a departure from GATT provisions. The United States has bilateral agreements with many supplying countries, including the four largest suppliers: China, Hong Kong, the Republic of Korea, and Taiwan.