

# Chemicals and Related Products

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## Change from 2017 to 2018:

- **U.S. total exports of chemicals and related products: increased by \$15.9 billion (7.0 percent) to \$243.4 billion.**
- **U.S. general imports of chemicals and related products: increased by \$43.1 billion (16.1 percent) to \$311.2 billion.**

Total trade in chemicals and related products increased in 2018, with U.S. imports increasing almost three times more than U.S. total exports.<sup>1</sup> U.S. exports of chemicals rose by \$14.3 billion (7.0 percent) in 2018. Mexico received the largest share, \$3.1 billion (up 9.8 percent) (table CH.1), due in part to increased demand for plastics and other petroleum-derived products (table CH.2). U.S. exports of plastics and other petroleum-derived products drove the growth in U.S. exports to Canada and South Korea as well, while U.S. exports of medicinal chemicals drove the growth in U.S. exports to Belgium, China, Germany, Japan, and the United Kingdom. On a product basis, the U.S. exports that grew the most were medicinal chemicals, certain organic chemicals, and polyethylene resins in primary forms (table CH.2). U.S. exports to Ireland registered the largest decline, owing to decreased exports of medicinal chemicals.

U.S. imports of chemicals increased by \$43.1 billion (16.1 percent) overall in 2018 (table CH.1). Increased imports from the United States' top four suppliers—China, Ireland, Germany, and Canada—accounted for almost half of the growth in imports in 2018. Increases in U.S. imports were driven by increases in imports of medicinal chemicals, miscellaneous plastic products, fertilizers, polypropylene resins in primary forms, and miscellaneous chemicals and specialties (table CH.2). Conversely, the value of U.S. imports of natural rubber experienced a decrease in 2017–18, mostly due to lower rubber prices.

Higher oil prices accounted for higher values in the trade of many product groups dependent on petroleum-derived chemicals as inputs. The United States managed to avoid the slowdown seen in other economies' chemical sectors; U.S. chemical manufacturing was aided by available energy and chemical feedstocks. Substantial investments in U.S. domestic production capital bolstered growth in the domestic chemical industry.

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<sup>1</sup> Unless otherwise noted, the export data used in this investigation are for domestic exports. For more information on trade terminology, please refer to USITC, "Special Topic: Trade Metrics," *Shifts in U.S. Merchandise Trade, 2014, 2015*, [https://www.usitc.gov/research\\_and\\_analysis/trade\\_shifts\\_2014/trade\\_metrics.htm](https://www.usitc.gov/research_and_analysis/trade_shifts_2014/trade_metrics.htm).

**Table CH.1** Chemicals and related products: U.S. exports and general imports, by selected trading partners, 2014–18

	Million \$						
	2014	2015	2016	2017	2018	Absolute change, 2017 to 2018	% change, 2017 to 2018
Country/item							
U.S. exports of domestic merchandise:							
Canada	37,130	34,093	32,649	34,398	35,114	716	2.1
China	14,133	13,566	13,782	15,928	16,624	695	4.4
Mexico	33,475	31,540	30,075	31,881	35,018	3,137	9.8
Ireland	2,753	3,237	3,270	4,602	3,676	-926	-20.1
Germany	7,444	7,399	7,495	8,294	9,153	858	10.3
Japan	10,957	10,464	10,710	11,151	11,731	581	5.2
Switzerland	3,040	2,970	2,735	2,841	2,673	-168	-5.9
Belgium	14,646	15,506	13,262	11,257	12,464	1,207	10.7
South Korea	7,215	6,686	6,379	7,003	7,918	915	13.1
United Kingdom	6,841	8,252	7,429	6,680	6,916	236	3.5
All other	83,741	79,581	75,555	78,169	85,196	7,028	9.0
<b>Total domestic exports</b>	221,376	213,293	203,340	212,203	226,482	14,279	6.7
Foreign exports	13,644	14,376	14,639	15,324	16,955	1,631	10.6
<b>Total U.S. exports (domestic     and foreign)</b>	235,020	227,669	217,979	227,526	243,436	15,910	7.0
U.S. general imports:							
Canada	33,518	32,212	29,682	29,435	32,436	3,000	10.2
China	31,892	31,132	29,844	33,554	40,078	6,524	19.4
Mexico	10,657	10,759	10,604	11,531	12,740	1,209	10.5
Ireland	24,380	28,746	32,307	34,594	41,076	6,482	18.7
Germany	25,186	24,862	23,296	22,961	26,843	3,882	16.9
Japan	12,644	11,713	11,493	11,948	13,425	1,477	12.4
Switzerland	12,107	11,940	14,327	16,617	19,311	2,694	16.2
Belgium	6,344	6,247	4,910	3,878	5,558	1,679	43.3
South Korea	5,858	6,225	8,512	7,822	10,002	2,180	27.9
United Kingdom	9,411	13,954	11,338	9,359	10,688	1,329	14.2
All other	79,531	82,655	83,581	86,435	99,057	12,622	14.6
<b>Total general imports</b>	251,529	260,444	259,893	268,134	311,213	43,079	16.1

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

Note: Import values are based on U.S. customs value; export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data. The countries are sorted by those with the largest total U.S. trade (U.S. general imports plus U.S. domestic exports) in these products in the most recent year.

## U.S. Exports

U.S. exports increased in most chemical subsectors (table CH.2), with the largest growth occurring in medicinal chemicals (up \$3.3 billion, or 6.5 percent), certain organic chemicals (\$2.6 billion, 14.7 percent), and polyethylene resins in primary forms (\$2.2 billion, 27.9 percent). Mexico and Canada remained the largest markets for U.S. exports; in both cases, increases in trade values were generally attributable to increasing oil prices and the downstream effect on plastics prices (table CH.1).<sup>2</sup> Increases in exports to other top trading partners mostly stemmed from higher U.S. exports of medicinal chemicals, including to China (\$570 million, 18 percent), Japan (\$188 million, 5 percent), and the United Kingdom (\$388 million, 11 percent).<sup>3</sup>

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<sup>2</sup> Increases in exports of plastics products included value growth of \$615 million (5 percent) to Canada and of \$1.2 billion (7 percent) to Mexico in 2017–18. These products included product groups CH025 (polyethylene resins in primary forms), CH026 (polypropylene resins in primary forms), CH027 (polyvinyl chloride resins in primary forms), CH028 (styrene polymers in primary forms), CH029 (saturated polyester resins), CH030 (other plastics in primary forms), and CH033 (miscellaneous plastic products).

<sup>3</sup> Percent values are relative to U.S. exports to that country in product group CH019 in 2017.

**Table CH.2** Chemicals and related products: Leading changes in U.S. exports and imports, 2014–18

Industry/commodity group (USITC code)	Million \$					Absolute change, 2017 to 2018	% change, 2017 to 2018
	2014	2015	2016	2017	2018		
U.S. domestic exports:							
Increases:							
Medicinal chemicals (CH019)	50,326	53,988	51,829	50,596	53,886	3,289	6.5
Certain organic chemicals (CH006)	18,624	16,002	14,679	17,248	19,790	2,542	14.7
Polyethylene resins in primary forms (CH025)	7,880	7,697	7,320	7,819	10,003	2,184	27.9
Miscellaneous plastic products (CH033)	26,003	25,761	25,361	26,152	27,058	906	3.5
Primary aromatics (CH003)	628	346	391	369	867	498	135.0
Chlor-alkali chemicals (CH009)	2,267	2,255	2,353	3,123	3,467	344	11.0
Major primary olefins (CH001)	415	531	704	937	1,200	263	28.0
All other	115,232	106,713	100,700	105,958	110,211	4,253	4.0
Total	221,376	213,293	203,340	212,203	226,482	14,279	6.7
U.S. general imports:							
Increases:							
Medicinal chemicals (CH019)	93,436	109,778	113,195	112,215	136,200	23,985	21.4
Miscellaneous plastic products (CH033)	31,199	32,473	33,063	35,810	40,371	4,560	12.7
Fertilizers (CH010)	11,335	10,932	7,206	7,198	8,209	1,010	14.0
Polypropylene resins in primary forms (CH026)	522	556	760	605	951	346	57.2
Miscellaneous chemicals and specialties (CH023)	5,753	5,956	7,148	6,739	6,907	168	2.5
Decreases:							
Natural rubber (CH036)	1,955	1,499	1,308	1,768	1,538	-230	-13.0
All other	107,330	99,250	97,213	103,799	117,037	13,238	12.8
Total	251,529	260,444	259,893	268,134	311,213	43,079	16.1

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

Note: Import values are based on U.S. customs value; export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data.

U.S. exports of medicinal chemicals recovered from a decline in 2016–17, gaining \$3.3 billion (6.5 percent) in 2017–18 (table CH.2). Within this sector, the largest increase in U.S. exports (\$2.39 billion, 12 percent) occurred in HTS 4-digit heading 3002—a group of products that includes blood fractions, immunological products, and vaccines.<sup>4</sup> Part of that increase reflected a return to the status quo after a decline in 2016–17.<sup>5</sup> U.S. exports substantially increased from 2017 to 2018 to other destinations such as Italy (\$1.5 billion, 52 percent), Germany (\$1.8 billion, 48 percent), and China (\$1.4 billion, 56 percent). U.S. medicinal exports to Belgium, however, declined by about \$3 billion (40 percent).<sup>6</sup> U.S. medicinal exports to Ireland were also substantially down (\$1.1 billion, 22 percent) during the 2017–18 period, reflecting an expansion in Irish production capacity.<sup>7</sup>

An increase in exports of certain organic chemicals (CH006 in table CH.2), the value of which rose by \$2.5 billion (14.7 percent) between 2017 and 2018, can largely be attributed to increased exports of acrylonitrile and methanol to South Korea.<sup>8</sup> Growth in South Korean imports of U.S. acrylonitrile was driven in part by increased South Korean demand for downstream products and a reduction in South Korean domestic supply caused by the retirement of some production capacity there.<sup>9</sup> About 67 percent of the \$529 million (150 percent) increase in U.S. methanol exports in 2017–18 was due to increased demand in South Korea, which has no domestic production of methanol.<sup>10</sup>

Of all the plastics products and precursors exported by the United States, polyethylene experienced the largest overall increase in exports, seeing a \$2.2 billion (27.9 percent) increase in U.S. export value from 2017 to 2018.<sup>11</sup> This growth was the result of steady year-over-year increases of U.S. polyethylene

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<sup>4</sup> See medicinal chemicals (product group CH019) in table CH.2; USITC DataWeb/USDOC, HTS heading 3002 (accessed May 23, 2019).

<sup>5</sup> For example, in 2015, U.S. vaccine exports to Belgium peaked as a result of regional shortages of primary vaccines and boosters due to reduced capacity for producing acellular pertussis antigen. U.S. vaccine exports have since returned to previous levels, with the United States ranking third by value. U.S. exports to Belgium were still 245 mt (45 percent), which was \$503 million (40 percent) below the previous high in 2015. USITC DataWeb/USDOC, HTS subheading 3002.20 (accessed May 23, 2019); IHS Markit, Global Trade Atlas database (accessed June 10, 2019).

<sup>6</sup> See medicinal chemicals (product group CH019) in table CH.2; USITC DataWeb/USDOC (accessed May 23, 2019).

<sup>7</sup> Burke, “Ireland Is a Home for 24,” May 29, 2017.

<sup>8</sup> Acrylonitrile (C<sub>3</sub>H<sub>3.5</sub>N) is polymer feedstock derived from propylene. USITC DataWeb/USDOC, HTS subheadings 2926.10 (acrylonitrile) and 2905.11 (methanol) (accessed May 23, 2019).

<sup>9</sup> Acrylonitrile is a feedstock used to produce polymers like polyacrylonitrile, which offers high heat and impact resistance, and nitrile rubber, which is used in seals and gaskets for its thermal and chemical stability. U.S. export quantities of acrylonitrile to South Korea increased by 60 kilotons (33 percent). Bescond and Garmston, “Acrylonitrile,” April 15, 2019, 23–26, 95–99; Tremblay, “Asahi Expands Korean Acrylonitrile,” January 31, 2011, 29.

<sup>10</sup> See certain organic chemicals (product group CH006) in table CH.2. South Korea primarily uses methanol for producing small molecules like formaldehyde or dimethyl terephthalate (a polymer precursor), although it is increasingly using methanol in fuels, especially for maritime transportation. From 2017 to 2018, the quantity of U.S. exports of methanol to all trading partners rose by 864 kilotons (58 percent). The mass of methanol exported was calculated from volumes reported by U.S. Customs, assuming a density of 792 grams per liter. Sriram et al., “Methanol,” December 8, 2017, 117–21; Methanol Institute, “Milestones 2018: Methanol Industry in Focus” (accessed June 14, 2019); Methanex, “Korea and Japan Welcome,” April 22, 2016; USITC DataWeb/USDOC, HTS subheading 2905.11 (accessed May 16, 2019).

<sup>11</sup> See polyethylene resins in primary forms (product group CH025) in table CH.2. USITC DataWeb/USDOC, HTS subheading 3901 (accessed May 21, 2019).

exports to China and a spike of 406 kilotons (kt) (148 percent) to Belgium in 2018, which corresponds to a decline in European production and imports of ethene.<sup>12</sup>

U.S. exports of certain plastic products and resins (miscellaneous plastic products CH033 in table CH.2) increased by value in 2017–18. While U.S. exports of miscellaneous plastic products in 2018 were \$906 million (3.5 percent) higher in value than in 2017, only a subset of U.S. exports of resins increased by volume over the period. The rest of the resins product group only rose by value, an increase that was driven by higher petrochemical prices in 2018.<sup>13</sup>

The largest relative export shift in a chemicals digest occurred for primary aromatics (CH003), which increased by \$498 million (135.0 percent) from 2017 to 2018 (table CH.2). Of the three commodities exported under this group, U.S. exports of toluene accounted for the largest increase with \$417 million (252 percent), due principally to increased exports to Mexico (\$411 million or 395 percent).<sup>14</sup> Mexico has imported increasing amounts of toluene in recent years due to falling production by domestic firms.<sup>15</sup>

The value of U.S. chlor-alkali chemical exports continued to increase into 2017–18.<sup>16</sup> While the quantity of product exported by the United States within this category declined in 2018, the price per metric ton (mt) generally increased. For example, exports of aqueous sodium hydroxide, a product within this category, fell by 600 kt (9 percent), but the price per mt increased from \$233 to \$299 (28 percent), causing an increase in export value of \$256 million (17 percent).<sup>17</sup> These increases in trade value continue in response to global regulatory changes initiated in 2017 in both the European Union (EU) and China—changes which curtailed production in those regions.<sup>18</sup> Shifts in prices and production had ripple

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<sup>12</sup> Ethene is the chemical feedstock used to manufacture polyethene. Bescond and Lewandowski, “Ethylene,” February 15, 2019, 95.

<sup>13</sup> The chemicals used to produce these resins are derived—wholly or in part—from petroleum, and thus the price increases for them and for the resulting plastic products reflect overall upward trends in prices for petroleum. These plastics have a wide range of applications and uses throughout the market as industrial and consumer goods. USITC DataWeb/USDOC, HTS subheadings 3902 (polypropylene, product group CH026), 3903 (polystyrene, product group CH028), 3904 (polyvinylchloride, product group CH027), 3907.40 (polycarbonates, product group CH030), and 3908.10 (polyamides, product group CH030) (accessed May 21, 2019); for a visualization of how petroleum and natural gas connect to these products, see figure CH.2 in USITC, *Trade Shifts 2017, 2018* ([https://www.usitc.gov/research\\_and\\_analysis/trade\\_shifts\\_2017/chemicals.htm](https://www.usitc.gov/research_and_analysis/trade_shifts_2017/chemicals.htm)). See also Macrotrends, “Crude Oil Prices—70 Year Historical Chart” (accessed May 21, 2019).

<sup>14</sup> Toluene, or methyl benzene (C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub>), is a petroleum-derived chemical commonly used as a solvent or feedstock. Toluene finds uses in multiple industries, ranging from chemicals production to gasoline formulation. Smith and Feng, “Toluene,” May 15, 2018, 9; USITC DataWeb/USDOC, HTS subheadings 2902.30 (toluene), 2902.44 (mixed xylenes), and 2902.20 (benzene) (accessed May 13, 2019).

<sup>15</sup> Smith and Feng, “Toluene,” May 15, 2018, 45–47.

<sup>16</sup> See chlor-alkali chemicals (product group CH009) in table CH.2. Chlor-alkali chemicals are derived using the chlor-alkali process, which manufactures chlorine and sodium hydroxide (caustic soda) from salt (sodium chloride) and water. Their exports from the U.S. increased in value by \$767 million (25 percent) from 2016 to 2017. USITC, “Chemicals and Related Products,” 2017.

<sup>17</sup> USITC DataWeb/USDOC, HTS subheadings 2801.10 (chlorine), 2815.11 (solid sodium hydroxide), 2815.12 (aqueous sodium hydroxide), 2815.20 (potassium hydroxide), 2836.20 (sodium carbonate), 2836.30 (sodium hydrogen carbonate), and 2836.40 (potassium carbonate) (accessed May 21, 2019).

<sup>18</sup> EU regulations have caused supply decreases, as they now prohibit the use of mercury in cell manufacturing processes. Chinese regulatory actions involve more inspections for environmental compliance; this has also

effects on the downstream users of these chemicals, especially for aluminum refining firms in Jamaica, Brazil, and Australia. These three countries are major U.S. trading partners in chlor-alkali products and imported \$1.3 billion of U.S. chlor-alkali chemicals in 2018, an increase of \$126 million (11 percent) from 2017.<sup>19</sup>

Major primary olefins (CH001, table CH.2) are a group of chemicals that often serve as inputs for manufacturing plastics; their prices often correlate with those of petroleum and natural gas. While exports of ethene, the precursor for polyethylene, have remained stable, from 2017 to 2018 there was a substantial increase in propene exports (\$185 million, or 35 percent).<sup>20</sup> Propene is a product of petroleum and natural gas processing, whose U.S. refinery production has been stable since the increase in shale gas extraction over a decade ago.<sup>21</sup> Over half of the increase in U.S. propene exports was due to increased demand from Mexico; these exports rose by \$98 million (40 percent) in 2017–18, continuing a period of strong year-over-year growth since 2014.<sup>22</sup> Mexican demand for U.S. propene is driven by demand from downstream manufacturers of chemicals and polymers, notably polypropylene. Mexico's demand for propene exceeds the production capacity of Mexican refineries.<sup>23</sup>

## U.S. Imports

U.S. imports increased in nearly all chemical categories in 2018. Only in one category, natural rubber, was there a substantial decline in the value of U.S. imports.<sup>24</sup> U.S. imports of medicinal chemicals grew by an order of magnitude greater than any other category, rising \$24.0 billion (21.4 percent) in 2017–18. This increase represented 55 percent of the total increase in U.S. imports of chemicals in that period (table CH.2). Medicinal chemicals accounted for the highest growth in import value in this sector for Canada (up \$1.1 billion, or 27 percent), Ireland (\$5.5 billion, 18 percent), and Germany (\$3.1 billion, 25 percent).<sup>25</sup> Six other groups of imported products experienced billion-dollar growth in 2018, although

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decreased exports, along with increased domestic demand. ICIS, "Outlook '18: US Caustic Soda," January 3, 2018; ICIS, "China Chemical Closures Send Ripples," January 11, 2018.

<sup>19</sup> Aluminum production is one of the top uses for sodium hydroxide, and the listed countries accounted for 27 percent of increased U.S. chlor-alkali export value. Prices began to stabilize in Europe during 2018. USITC DataWeb/USDOC (accessed May 16, 2019); ICIS News, "Outlook '19: European Caustic Soda Markets," January 3, 2019.

<sup>20</sup> The quantity of U.S. propene exports to Mexico increased by 46 kt (17 percent). USITC DataWeb/USDOC, HTS subheadings 2901.21 (ethylene) and 2901.22 (propylene) (accessed May 23, 2019).

<sup>21</sup> U.S. Energy Information Administration, "U.S. Refinery net Production of Propylene" (accessed May 21, 2019).

<sup>22</sup> USITC DataWeb/USDOC, HTS subheadings 2901.22 (accessed May 23, 2019).

<sup>23</sup> Polypropylene is a plastic that is used in a wide range of applications from auto parts to textile fibers. Between 2013 and 2018, U.S. exports of propene to Mexico increased by 313 kt (27,298 percent), with a rise in value of \$339 million (16,796 percent), while polypropylene exports fluctuated between 800 and 900 kt in the same period. Increases in U.S. exports of those downstream products track with overall increases in petrochemical prices. See polypropylene resins in primary forms (product group CH026) in table CH.2; Bescond and Dina, "Propylene," October 9, 2017, 28, 59–63; USITC DataWeb/USDOC, HTS subheadings 2901.22 (propene), 3902.10 (polypropylene), and 3917.22 (tubes, pipes, and hoses, rigid, of polymers of propylene) (accessed May 23, 2019).

<sup>24</sup> Two other product categories had import decreases in the 2017–18 period: photographic chemicals and preparations (down \$4 million or 1 percent, product group CH016) and synthetic tanning agents (down \$3 million or 23 percent, product group CH014).

<sup>25</sup> Percentage values are relative to U.S. imports from that country in product group CH019 in 2017.

substantial changes were confined to a subset of goods within each group.<sup>26</sup> Higher oil prices drove the increase in the value of U.S. imports of plastic resins and plastic products from top supplying countries such as China (up \$2.8 billion, or 18 percent) and Mexico (\$602 million, 12 percent).<sup>27</sup>

Shifts in U.S. imports of medicinal chemicals involved many of the same countries as U.S. exports. Ireland, Germany, and Switzerland were the largest suppliers of medicinal chemicals to the United States and were the sources of the greatest increases in imports of these goods in 2018. The increased value of U.S. medicinal imports was due to both increased import quantities and higher drug prices, which rose 6 percent, on average, during 2018.<sup>28</sup> For example, the \$1.1 billion (78 percent) increase in U.S. imports of sulfonamides from Ireland stemmed from an increase in volume (up 35 mt or 58 percent) combined with a price increase of \$3 million (13 percent) per mt.<sup>29</sup> Additionally, imports from Ireland of immunological products, a subgroup of medicinal chemicals, decreased by \$1.7 billion (55 percent), while the value of U.S. imports of these products from Singapore increased by \$1.9 billion (1,573 percent) from 2017 to 2018.<sup>30</sup> The overall increase in U.S. imports of medicinal chemicals tracks with higher rates of new drug approvals granted by the U.S. Food and Drug Administration in 2018 compared to 2017.<sup>31</sup> A combination of more products on the market, higher per unit costs, and increased manufacturing capacity in foreign markets contributed to the shift in imports of medicinal chemicals.

Within the medicinal chemicals group, insulin and heterocyclic drugs experienced a 10 percent decrease in import quantity, even though there has not been a reduction in the U.S. demand for those medications.<sup>32</sup> U.S. imports of insulin fell by \$658 million (26 percent), primarily due to declines in imports from France and Germany, which more than offset increased imports from Denmark.<sup>33</sup> Some of the decrease in U.S. imports of insulin can be attributed to increased investment in U.S. production

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<sup>26</sup> Billion-dollar increases in U.S. imports were seen for miscellaneous plastic products (up \$4.6 billion or 13 percent, product group CH033), miscellaneous inorganic chemicals (\$2.5 billion, 26 percent, product group CH007), organic specialty chemicals (\$2.3 billion, 16 percent, product group CH005), certain organic chemicals (\$1.3 billion, 13 percent, product group CH006), tires and tubes (\$1.1 billion, 8 percent, product group CH032), and fertilizers (\$1.0 billion, 14 percent, product group CH 010).

<sup>27</sup> See product groups CH025 (polyethylene resins in primary forms), CH026 (polypropylene resins in primary forms), CH027 (polyvinyl chloride resins in primary forms), CH028 (styrene polymers in primary forms), CH029 (saturated polyester resins), CH030 (other plastics in primary forms), and CH033 (miscellaneous plastic products).

<sup>28</sup> Pharmaceutical Technology, "Pricing Concerns Will Be the Leading Roadblock" (accessed May 20, 2019).

<sup>29</sup> Sulfonamides are a class of drugs that include common antibiotics. USITC DataWeb/USDOC, HTS subheading 2935.90.60 (accessed May 16, 2019).

<sup>30</sup> USITC DataWeb/USDOC, HTS subheading 3002.13 (accessed May 16, 2019).

<sup>31</sup> U.S. Food and Drug Administration, "Novel Drug Approvals for 2018," September 27, 2018.

<sup>32</sup> NIMH, "Major Depression" (accessed May 16, 2019); CDC, "Long-term Trends in Diabetes," April 2017.

<sup>33</sup> U.S. imports from France and Germany decreased by \$51 million (46 percent) and \$709 million (31 percent), respectively, while U.S. imports from Denmark increased by \$97 million (111 percent). Denmark hosts the majority of Novo Nordisk's production locations. While insulin experienced a \$111,189 (19 percent) decrease in value per mt across all countries, imports from Denmark increased in price by \$319,187 per mt (94.4 percent) from 2017 to 2018. USITC DataWeb/USDOC, HTS subheading 3004.31 (accessed May 16, 2019); Novo Nordisk, "Production" (accessed May 20, 2019).



capacity and to more domestic production coming online.<sup>34</sup> Additionally, an increase of diabetes cases in other markets indicates that there is greater competition for existing supplies, correlating with decreasing global surpluses.<sup>35</sup> The fall in imports may also reflect insulin's consistently increasing price, which is driving lower consumption among some users.<sup>36</sup> Similarly, U.S. imports of heterocyclic drugs, a class of chemicals that includes commonly prescribed antidepressants, decreased by \$396 million (13 percent) in 2017–18. Imports from Belgium fell by \$210 million (44 percent) and from Spain by \$266 million (65 percent), although imports from the United Kingdom increased \$202 million (77 percent).<sup>37</sup>

Trends in demand for different nitrogen fertilizers continued as they have since the 1990s.<sup>38</sup> U.S. imports of water-free ammonia—a type of nitrogen fertilizer—are now below \$1 billion, down \$124 million (11 percent) in 2018. The value of these imports has dropped from over \$3.4 billion in 2013 (a 71 percent decrease).<sup>39</sup> Ammonia has been steadily losing domestic market share to urea ammonium nitrate solution—another nitrogen-containing liquid fertilizer that is less volatile—due to changing preferences within the agricultural market.<sup>40</sup> Additionally, although total U.S. imports of urea were of greater value than in 2017, the total quantity has declined from 8.1 to 5.5 million mt since 2015 (a 32 percent decrease) due to increased U.S. manufacturing capacity and more plentiful domestic natural gas, a feedstock for urea.<sup>41</sup> Imports of potassium (potash) and phosphate fertilizers account for the overall increase reported in table CH.2 for this product group. Imports of ammonium phosphates from Russia and Morocco increased by \$205 million and \$249 million, respectively, likely to compensate for the temporary closure of a phosphate plant in Florida.<sup>42</sup> Potassium chloride imports continued to be dominated by Canada, whose exports to the United States rose by \$247 million (12 percent).<sup>43</sup>

The largest relative import shift in a chemicals product group occurred for U.S. imports of polypropylene resins in primary forms (CH026), which increased by \$346 million (57.2 percent) in 2018 (table CH.2). While Mexico is the largest destination for U.S. exports of propene—a polymer that is the feedstock for polypropylene—the sources for U.S. imports of the polymer are geographically dispersed. The top three increases in imports by source country were South Korea (up \$78 million or 79 percent), Brazil

<sup>34</sup> Pharma's Almanac, "Eli Lilly Expands Insulin Production Capacity in Indiana," November 10, 2017.

<sup>35</sup> Hirschler, "Millions Left Behind," November 20, 2018; Wirtz, "Insulin Market Profile," April 2016.

<sup>36</sup> NPR, "Insulin's High Cost Leads to Lethal Rationing," September 1, 2018; Reuters, "US Insulin Costs per Patient Nearly Doubled," January 22, 2019.

<sup>37</sup> USITC DataWeb/USDOC, HTS subheading 2934.99.30 (accessed May 16, 2019).

<sup>38</sup> See fertilizers (product group CH010) in table Ch.2. Fluid Fertilizer Foundation, "Why UAN Solution?" August 2016.

<sup>39</sup> USITC DataWeb/USDOC, HTS subheading 2814.10 (accessed May 16, 2019).

<sup>40</sup> "Less volatile" in this context means that less of the applied fertilizer evaporates from the soil and more is available for the crops to use. USITC DataWeb/USDOC, HTS subheading 3102.80 (accessed May 16, 2019).

<sup>41</sup> USITC DataWeb/USDOC, HTS subheading 3102.10 (accessed May 16, 2019); Mitchell, "New US Ammonia and Urea Capacity," September 2, 2018.

<sup>42</sup> USGS, "Phosphate Rock," February 2019; USITC DataWeb/USDOC, HTS subheadings 3105.30 (diammonium hydrogenorthophosphate) and 3105.40 (ammonium dihydrogenorthophosphate) (accessed May 16, 2019).

<sup>43</sup> U.S. potash mines have too little capacity to meet domestic fertilizer demand, and potash has been listed as a critical material by the U.S. Department of the Interior. USGS, "Potash," February 2019; 82 Fed. Reg. 60835; USITC DataWeb/USDOC, HTS subheadings 3104.20 (accessed May 16, 2019).

(\$43 million, 80 percent), and the Netherlands (\$34 million, 343 percent).<sup>44</sup> However, the quantity imported by the United States is minor compared to its own production, and the United States is the largest exporter of polypropylene in North America.<sup>45</sup>

Within the miscellaneous chemicals and specialties group, imports of biodiesel substantially decreased in 2017–18.<sup>46</sup> One of the largest decreases in U.S. imports at the product level was a drop in U.S. imports of biodiesel from Argentina, which fell from \$737 million in 2017 to zero in 2018—the result of the United States imposing an antidumping duty on the product.<sup>47</sup> The reduction in U.S. imports of biodiesel from Argentina was partially offset by a rise in imports from Germany. German biodiesel shipments to the United States increased by \$137 million (273 percent) from 2017 to 2018, although at a cost of \$135 (18 percent) more per mt than product imported from Argentina in 2017.<sup>48</sup>

The largest value decrease in U.S. imports in 2018, by product group, was in natural rubber, for which import value declined \$230 million (13.0 percent; table CH.2).<sup>49</sup> The quantity of the product imported in 2018 actually rose by 25 kt (3 percent), but this was more than offset by a price decrease of \$276 per mt (15 percent).<sup>50</sup> The largest declines in U.S. imports of natural rubber, by source and value, were seen in imports from Indonesia (down \$176 million or 16 percent) and Thailand (\$44 million or 13 percent).<sup>51</sup> Lower demand in China, the largest global market for rubber, depressed rubber prices despite efforts by Thailand, Indonesia, and Malaysia—the largest, second-largest, and sixth-largest producers, respectively—to curb exports and maintain stable prices.<sup>52</sup>

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<sup>44</sup> USITC DataWeb/USDOC, HTS subheadings 3902.10 and 3902.30 (accessed May 16, 2019).

<sup>45</sup> Smith, Morales, and Waters, “Polypropylene Resins,” December 22, 2017, 6, 48.

<sup>46</sup> See miscellaneous chemicals and specialties (product group CH023), which had increased U.S. imports (\$159 million or 2.4 percent) as a whole. USITC DataWeb/USDOC, HTS subheading 3826.00.10 (accessed May 16, 2019).

<sup>47</sup> In late 2017, the United States imposed antidumping duties on biodiesel originating from Argentina and Indonesia, though there were no Indonesian biodiesel imports in 2017. The last biodiesel imports from Indonesia occurred in 2016, valued at \$268 million. The case was reviewed in 2019, and the U.S. Department of Commerce lowered the countervailing duty cash deposit rates. 82 Fed. Reg. 53477; 82 Fed. Reg. 61585; 83 Fed. Reg. 56300; 84 Fed. Reg. 32714; Heath, “Argentina Biodiesel Chamber: U.S. Review of Tariffs,” November 8, 2018; USITC DataWeb/USDOC, HTS subheading 3826.00.10 (accessed May 16, 2019).

<sup>48</sup> The change to sourcing from Germany occurred precipitously between August and October 2017, following the imposition of the U.S. antidumping duty. Germany itself saw falling production as the EU removed duties on Argentinian and Indonesian biodiesel in 2018. USITC DataWeb/USDOC, HTS subheading 3826.00.10 (accessed May 16, 2019); Reuters, “German Biodiesel Company Cuts Output,” April 9, 2018.

<sup>49</sup> See natural rubber (product group CH036). Imports were valued at \$230 million (13 percent) less in 2018. USITC DataWeb/USDOC, HTS subheadings 4001.10, 4001.21, 4001.22, 4001.29, and 4001.30 (accessed May 16, 2019).

<sup>50</sup> USITC DataWeb/USDOC, HTS subheadings 4001.10, 4001.21, 4001.22, 4001.29, and 4001.30 (accessed May 16, 2019).

<sup>51</sup> USITC DataWeb/USDOC, HTS subheadings 4001.10, 4001.21, 4001.22, 4001.29, and 4001.30 (accessed May 16, 2019).

<sup>52</sup> Indonesia Investments, “Rubber (Natural),” April 5, 2018; USITC DataWeb/USDOC, HTS subheadings 4001.10, 4001.21, 4001.22, 4001.29, and 4001.30 (accessed May 16, 2019); Nakay, Song, and Hyde, “Rubber, Natural,” November 15, 2018, 9.

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