



2023

ECONOMIC REVIEW OF CHEMISTRY



Responsible Care[®]
Our commitment to sustainability.



**CHEMISTRY INDUSTRY
ASSOCIATION OF CANADA**



CHEMISTRY INDUSTRY ASSOCIATION OF CANADA

The Chemistry Industry Association of Canada (CIAC) is the voice of Canada's \$73 billion chemistry industry and represents more than 50 members and partners across the country. The industry employs 90,800 Canadians and supports an additional 454,000 jobs in Canada.

Members of CIAC are signatories to Responsible Care[®]— the association's U.N.— recognized sustainability initiative. Responsible Care[®] inspires its members to take actions that improve the sustainability of their operations and reduce harm throughout the entire life cycle of their products.



➤ Contents

President’s Message	3
Introduction.....	4
Chemistry Industry at a Glance	6
Manufacturing Shipments (Revenue).....	7
Value Added	8
Employment	9
Salaries and Wages	10
International Trade.....	12
Profits	14
Productivity	14
Price Index.....	15
Capacity Utilization	15
Other Chemical Manufacturing Subsectors	17
Provincial Statistics	20
a. Ontario	21
b. Alberta.....	26
c. Quebec	30
Industry Profiles.....	34
a. Petrochemicals and Other Organic Chemicals	34
b. Industrial Gases	37
c. Inorganic Chemicals.....	38
c. Synthetic Resins, Rubbers and Fibres.....	41
d. Specialty Chemicals	43

 **President's Message**

I am pleased to present to you the ***Chemistry Industry Association of Canada's (CIAC) 2023 Economic Review of Chemistry***. Canada's \$72.7 billion chemical manufacturing industry is a significant contributor to our country's economy. The sector is directly responsible for 90,800 jobs and pays approximately \$6.99 billion in salary and wages. Primarily concentrated in Alberta, Ontario and Quebec, the industry supports an additional 454,000 jobs across the country.

Canada's chemistry sector was a spot of calm in otherwise turbulent global seas in 2022. Demand for Canadian chemistry was near a record high, with shipments being the highest ever, as economies recovered from COVID-19 and consumer demand remained robust. 2022 also saw unprecedented interest in low-carbon pathways for chemistry investment with the U.S. passing the Inflation Reduction Act and Canada consulting on a multitude of investment tax credits for low-carbon chemistry. However, these tailwinds are not the only story; 2022 also saw the highest inflation in decades, a severe escalation of the war in Ukraine, Europe enter an energy crisis and the continued impacts of COVID-19 (particularly in China), all created significant uncertainty and volatility in chemistry markets. As these crosscurrents continue to impact economies, Canada's chemistry sector has several distinct advantages. Canada possesses low-cost, low-carbon resources for feedstock, and we have efficient and growing access to world markets for our products. Canada also has the resource base and innovative potential to realize all the low-carbon pathways for chemistry the world is increasingly demanding. Indeed, the last two years has seen over 20 low-carbon chemistry projects worth tens of billions, proposed in Canada. Canada has an amazing opportunity to realize these investments if the supporting investment conditions keep us competitive with global jurisdictions, especially the U.S. At CIAC, we are focused on working with all levels of government to ensure that investment conditions are strong enough to turn these proposals into built infrastructure producing for global markets and creating good paying jobs for Canadians.

This annual review provides readers with an economic profile of the industry as well as quantitative insight into the industry's importance to our country's economy, and to all Canadians.

Yours sincerely,

Bob Masterson
President and CEO
Chemistry Industry Association of Canada

➤ Introduction¹

Using data from Statistics Canada (unless otherwise stated), CIAC's 2023 Economic Review of Chemistry provides a statistical review of various key industry indicators including shipments, imports, exports, and employment from the year 2022. The report also includes a section on specialty chemicals, statistics for the key provinces of Quebec, Ontario and Alberta, and for the segments of the industry of primary interest to CIAC members.

This report is prepared by the Association's Business and Economics (B&E) team. The B&E team provides ongoing economic analysis of government policy initiatives, business trends and changing industry dynamics.

Industrial Classification

Industries in Canada are classified according to the 2012 North American Industrial Classification System (NAICS). This classification is maintained by Statistics Canada and its counterpart organizations in the United States and Mexico. The chemical manufacturing subsector is captured in NAICS 325 which comprises establishments primarily engaged in manufacturing chemicals and chemical products, from organic and inorganic raw materials.

NAICS 325 includes the following sub-industry groups:

- Basic chemicals (NAICS 3251)
- Synthetic resins, rubbers, and synthetic fibres (NAICS 3252)
- Pesticides and fertilizers (NAICS 3253)
- Pharmaceuticals (NAICS 3254)
- Paints, coatings and adhesives (NAICS 3255)
- Soaps, cleaning compounds and toilet preparations (NAICS 3256)
- Other chemical products (NAICS 3259)

This report focuses on statistics for the overall chemical industry (NAICS 325), and for the combination of NAICS 3251 and 3252 which are collectively referred to as industrial chemicals.

- NAICS 3251 Basic chemicals - comprises establishments primarily engaged in manufacturing organic and inorganic chemicals, using basic processes such as thermal cracking, distillation, and chemical reaction.
- NAICS 3252 Synthetic resins, rubbers, and fibres— comprises establishments primarily engaged in manufacturing polymers such as polyethylene, polypropylene, butyl rubbers, polyamides, and fibres made from these resins. Polymerization of monomers into polymers, for example, ethylene into polyethylene, is the basic process.

¹ This publication intends to provide the best information available. However, neither CIAC nor its employees make any warranty, expressed or implied, or assumes any liability or responsibility for any use, or the results of such use, of any information or data disclosed in this report.

For more information about this report:

David Cherniak

Policy Manager, Business, Economics and Transportation

dcherniak@canadianchemistry.ca

(613) 986-5484

► Chemistry Industry at a Glance

Chemical industry² shipments in Canada in 2022 were \$72.7 billion, exports were \$52.8 billion, and imports totaled \$89.6 billion.

The industry employed 90,800 workers in 2022 which constituted six per cent of all manufacturing jobs in Canada. In addition to the direct jobs, other jobs are supported by the purchasing activity of the chemistry industry and by the subsequent expenditure-induced activity. CIAC has estimated that for every job in the chemistry industry, another five indirect jobs are created in other parts of the economy, so in total the chemistry industry supports 454,000 jobs in Canada.

Industrial chemicals are a keystone industry within the Canadian economy. It converts and adds value to raw resources such as natural gas, crude oil, minerals, metals and biomass, creating intermediate products that are used as inputs by other parts of the chemistry industry, and by almost all other manufacturing segments. Major consumer industries include: plastic and rubber products (NAICS 326), forest products (NAICS 321 and 322), transportation equipment (NAICS 336), oil and gas extraction (NAICS 211), clothing (NAICS 315), construction (NAICS 23), and pharmaceuticals (NAICS 3254). For Industrial Chemicals, shipments in 2022 were \$34.2 billion, exports were \$24.8 billion, imports were \$31.3 billion, and employment was 17,100 indirectly supporting 85,600 jobs in the broader Canadian economy.

Table 1: Principal Statistics for the Chemical Industry

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Shipments, \$ billion	48.6	49.7	52.2	51.6	51.3	52.9	56.0	53.3	64.1	72.7
Employment, 000	83.9	84.3	86.4	84.3	86.6	85.8	86.4	81.8	78.5	90.8
Imports, \$ billion	46.4	50.3	53.7	53.3	55.8	59.8	61.9	62.5	72.9	89.6
Exports, \$ billion	32.0	35.5	36.2	35.9	36.8	39.8	39.6	38.7	45.9	52.8



Table 2: Principal Statistics for the Industrial Chemical Sector

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Shipments, \$ billion	25.5	26.1	25.4	24.1	26.2	28.9	26.0	22.4	29.3	34.2
Employment, 000	17.4	17.5	17.7	15.7	16.4	16.4	15.8	14.9	15.8	17.1
Imports, \$ billion	17.9	19.3	19.7	18.8	19.8	21.3	20.8	20.2	25.4	32.5
Exports, \$ billion	18.7	19.8	19.2	18.7	18.7	20.6	19.0	17.9	22.5	24.8

² Chemical industry and industrial chemicals are defined on page 1.

➤ Manufacturing Shipments (Revenue)

In 2022, Canada’s chemical industry manufactured \$72.7 billion worth of products an increase of 13.5 per cent compared to 2021.

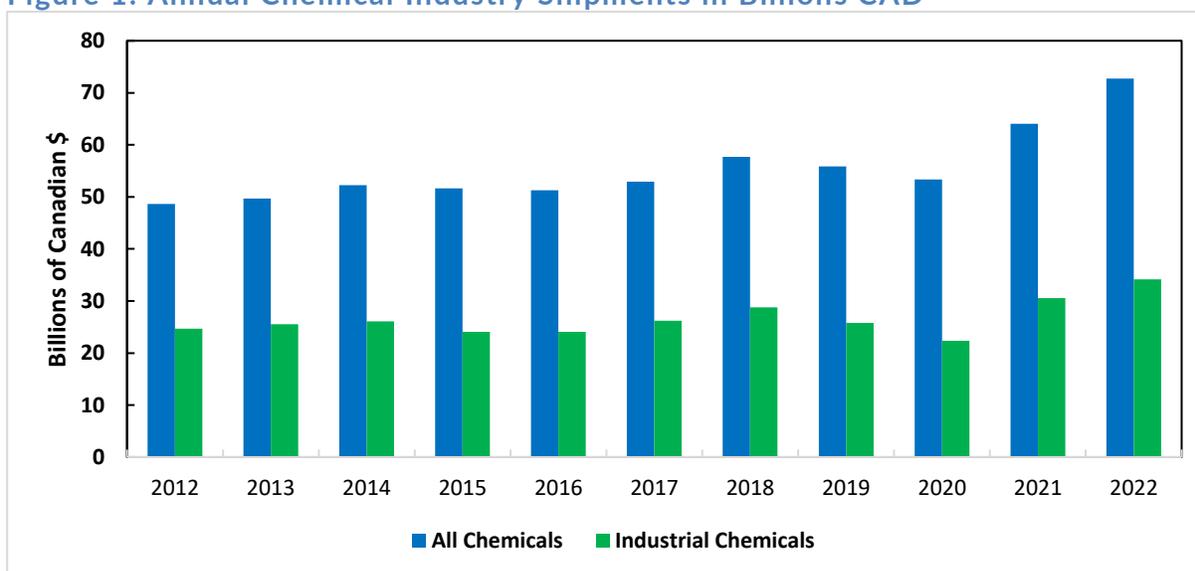
Shipments of industrial chemicals were \$34.2 billion in 2022, representing an increase of 11.2 per cent compared to 2021 (Table 3, Figure 1). The value of shipments for industrial chemicals increased rapidly last year owing to strong pricing and the ongoing recovery from COVID-19.

Table 3: Manufacturing Shipments



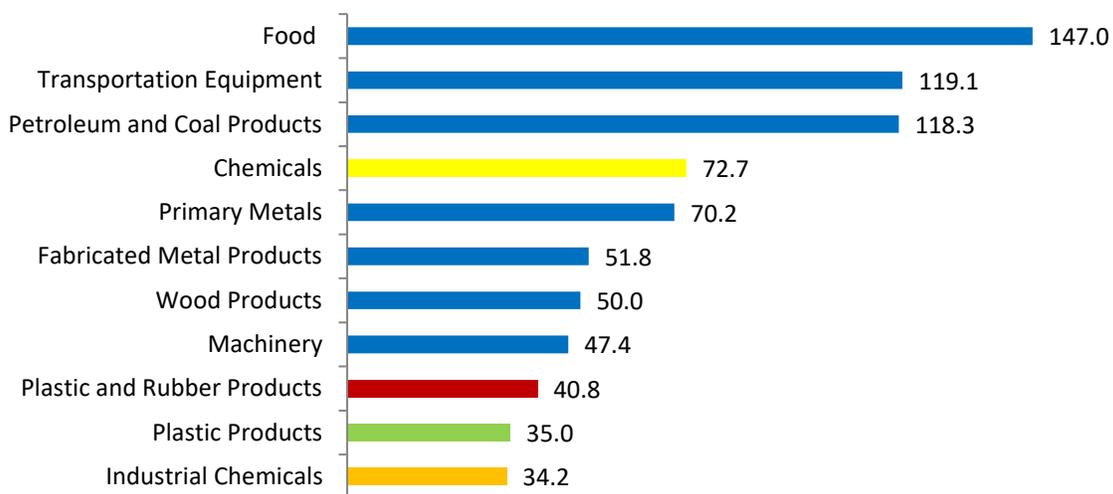
Manufacturing Shipments, \$ Billion	2021	2022	Change 2021-22
All chemicals	64.1	72.7	13.5%
Industrial chemicals	30.5	34.2	11.2%

Figure 1: Annual Chemical Industry Shipments in Billions CAD



Within the NAICS system, there are 21 manufacturing industries at the 3-digit level. Among these industries, chemicals (NAICS 325) ranks as the 4th largest based on value of shipments (Figure 2).

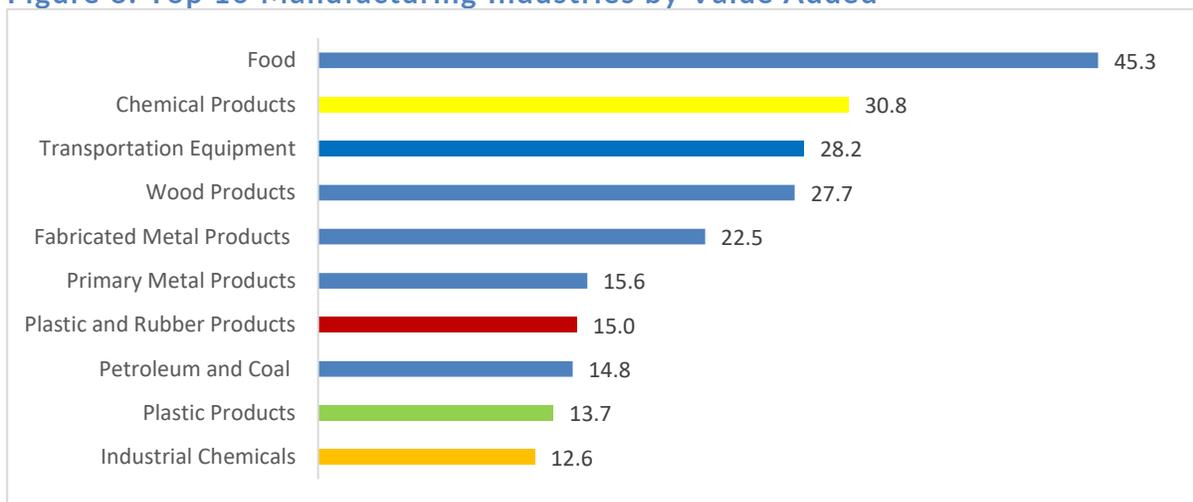
Figure 2: Top 10 Manufacturing Industries by Value of Shipments, \$ Billions³



Value Added

Value added measures the value of output of an industry less the value of intermediate inputs required in the production process. Compared to all manufacturing industries, chemicals ranked 3rd based on value added in 2021 (latest available, Figure 3).

Figure 3: Top 10 Manufacturing Industries by Value Added



³ Both Industrial Chemicals and Plastic Products are sub-sectors of larger manufacturing industries, so they are not counted specifically in manufacturing sector rankings. These two sub-sectors contain the core of CIAC and CIAC Plastic Division membership so it's important to show their economic impact.

➤ Employment

The chemical industry employed 90,800 workers in 2022. For industrial chemicals, the figure was 17,200. For both groupings, employment peaked in 2003 and has tended to decline since, although levels have been mostly flat since 2017 with slight growth as new facilities and expansions come online (Table 4 and Figure 4).

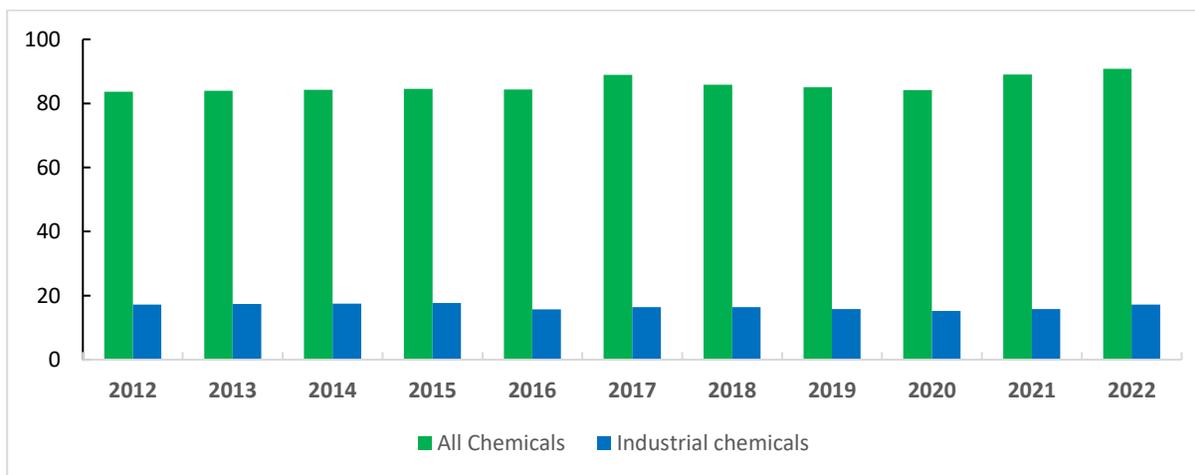
In addition to the direct jobs, additional jobs are supported by the purchasing activity of the chemical industry and by the subsequent expenditure-induced activity. For every job in the chemical industry, it is estimated that another five jobs in other sectors are indirectly linked to the industry. On this basis, the chemical industry supports about 454,000 jobs— industrial chemicals about 85,600 - in the overall Canadian economy.

Table 4: Employment in the Canadian Chemical Industry



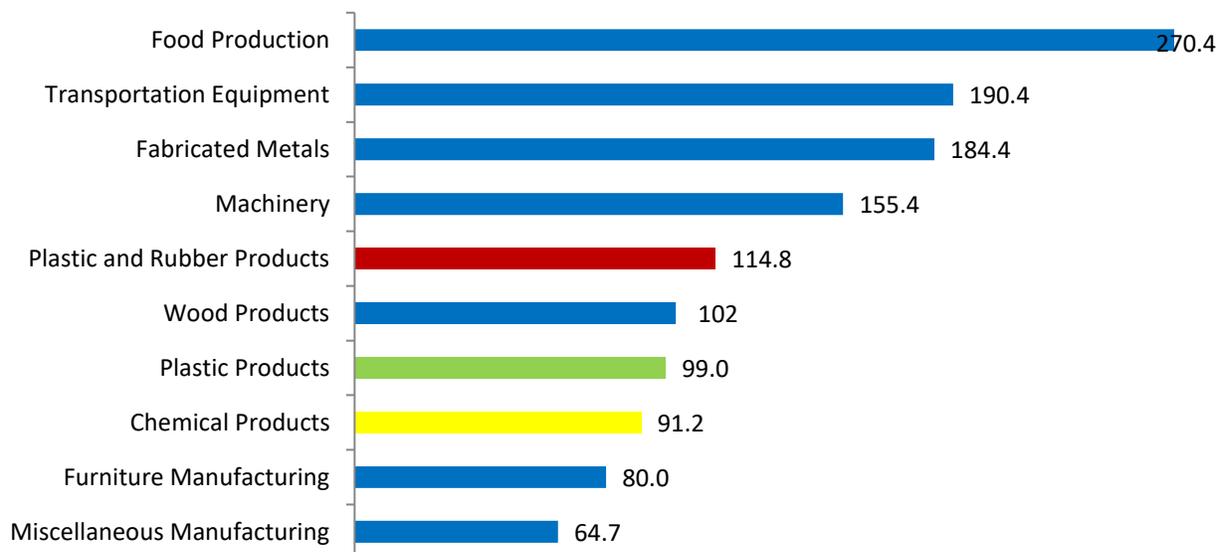
Total Employment, Thousands	2021	2022	Change 2021-2022
All Chemicals	89.0	90.8	2.2%
Industrial Chemicals	15.8	17.2	8.1%

Figure 4: Chemical Industry Employment



On the basis of employment, chemicals rank 8th among all manufacturing industries (Figure 5). Plastic Product manufacturing employed 99,000 Canadians and ranked 5th among manufacturing industries.

Figure 5: Top 10 Manufacturing Industries by Employment (in Thousands of People)



Salaries and Wages

Total salaries and wages paid to employees in the chemical industry in 2022 were \$6.99 billion, with \$1.69 billion paid in the industrial chemical segment (Table 5). 2022 saw gains in wages and salaries paid in both the overall chemical sector and the Industrial Chemicals sub-sector.

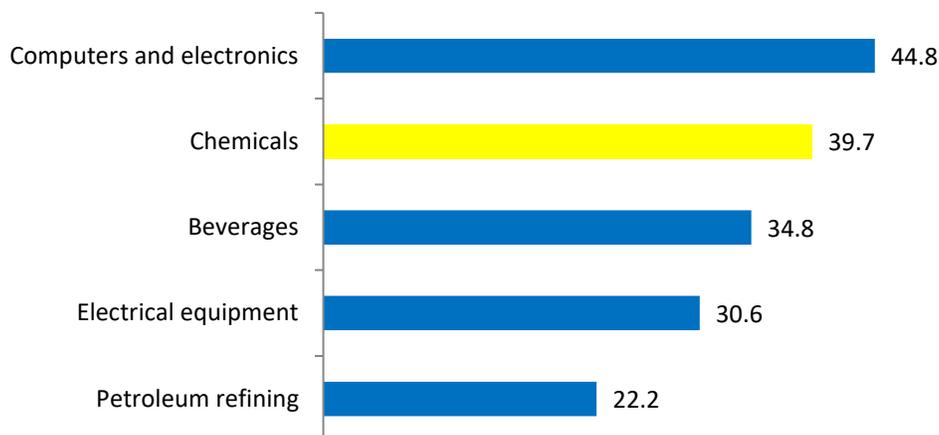
Table 5: Total Salary and Wages Paid by the Chemical Industry



Total Salaries and Wages, \$ Billion	2021	2022	Change 2021-22
All Chemicals	6.80	6.99	2.8%
Industrial Chemicals	1.61	1.69	5.3%

Chemical companies operate a variety of types of complex equipment and processes using sophisticated computer control technologies. Employees require specialized education and training to operate these processes safely and efficiently. As a result, the chemical industry's proportion of employees with a university degree (39 per cent) is second only to the computer and electronic products industry (Figure 6), and chemicals has the highest proportion of employees with post-graduate degrees.

Figure 6: Top 5 Manufacturing Industry by Proportion of Employees with a University Degree



Chemicals ranked 5th among all manufacturing industries with an average salary of \$76,600 (Figure 7). For Industrial Chemicals the average salary was higher at \$98,760. For overall manufacturing, the average salary in 2022 was \$60,460.

Figure 7: Top 10 Manufacturing Industries Based on Average Earnings Per Employee in Thousands of CAD

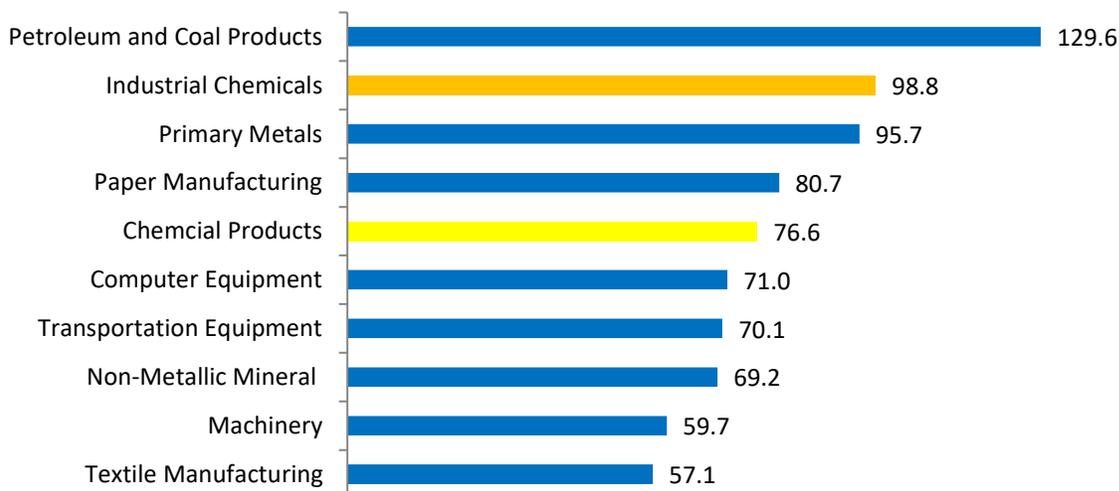


Table 6: Average Salaries in the Chemical Industry



Average Salaries and Wages, \$ Thousand	2021	2022	Change 2021-22
All Chemicals	76.3	76.6	Flat
Industrial Chemicals	101.1	98.7	-2.6%

International Trade

Canada exported \$52.8 billion worth of chemicals and chemical products to the world in 2022, a 14.8 per cent increase compared to 2021. Imports increased by 22.8 per cent to \$89.6 billion (Table 7 and Figure 8). The United States represents Canada's dominant trade partner with 76 per cent of exports, worth \$40.1 billion and 55 per cent of imports worth \$48.6 billion flowing across the border. The next largest export markets are China \$1.86 billion (3.6 per cent), followed by the Netherlands 1.7 billion (3.2 per cent) and the United Kingdom \$1.1 billion (2.1 per cent). The next largest sources of imports were China \$6.3 billion (6.7 per cent), Germany 4.6 billion (5 per cent), and Switzerland (4.5 per cent).

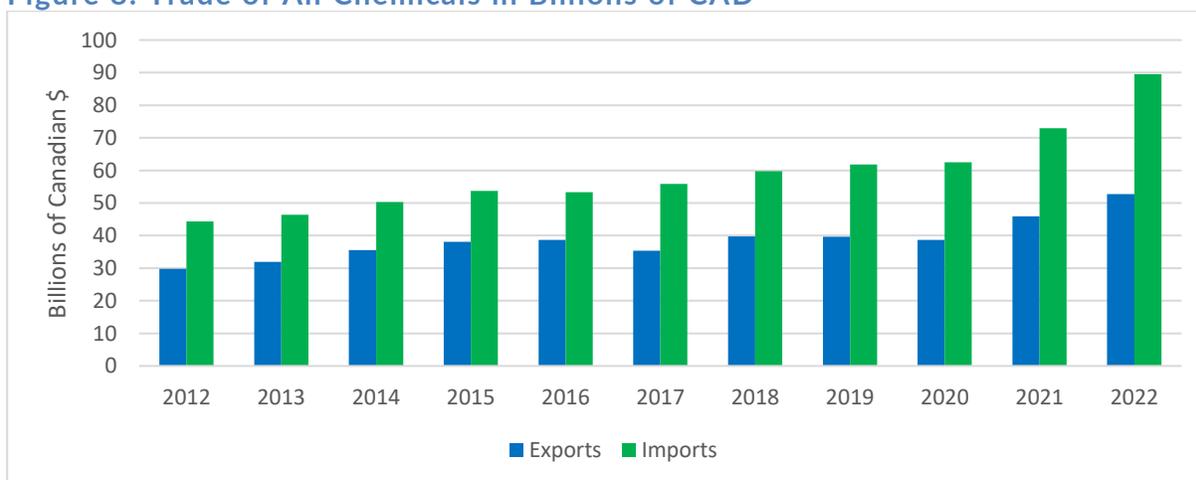
For industrial chemicals, Canadian exports increased by 11.5 per cent to \$24.8 billion in 2022. Imports also increased, by 27.8 per cent to \$32.5 billion (Table 7 and Figure 9). Both imports and exports of industrial chemicals are dominated by bulk commodities like polyethylene, ethylene glycol and styrene.⁴ Again the United States is the primary trading partner with 81 per cent of exports worth \$19.2 billion and 60 per cent of imports worth \$19.6 billion. The next largest export markets were China \$1.4 billion (5.7 per cent), the United Kingdom \$838 million (3 per cent) and the Netherlands (3.3 per cent). The next largest import partners were China \$3.2 billion (9.7 per cent) and Germany \$846 million (2.6 per cent).

Table 7: Trade in the Chemistry Industry



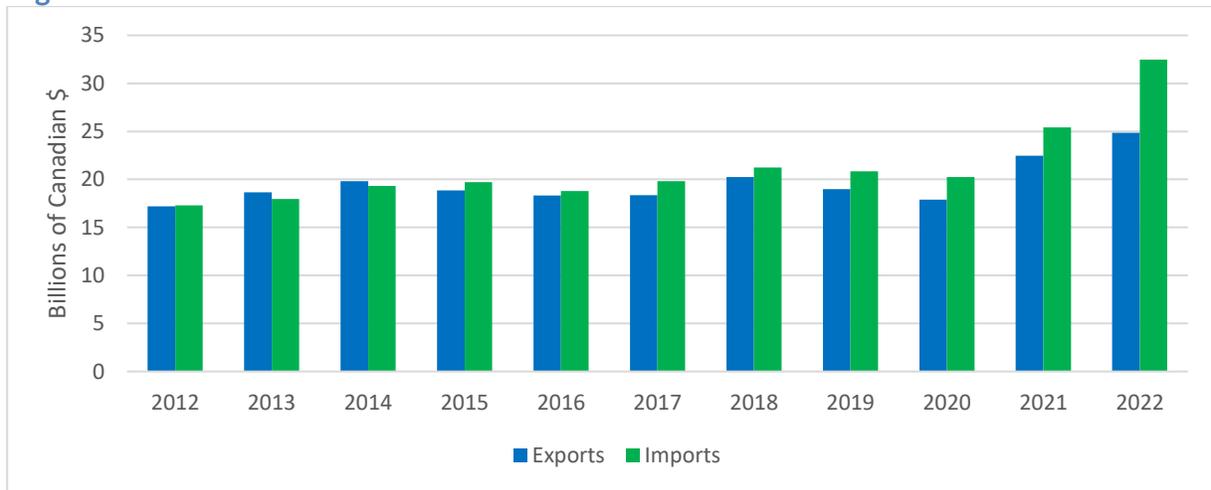
Value of Trade, \$ Billion		2021	2022	Change 2021-22
All Chemicals	Imports	72.9	89.6	22.8%
	Exports	45.9	52.8	14.8%
Industrial Chemicals	Imports	25.4	32.5	27.8%
	Exports	22.5	24.8	11.5%

Figure 8: Trade of All Chemicals in Billions of CAD



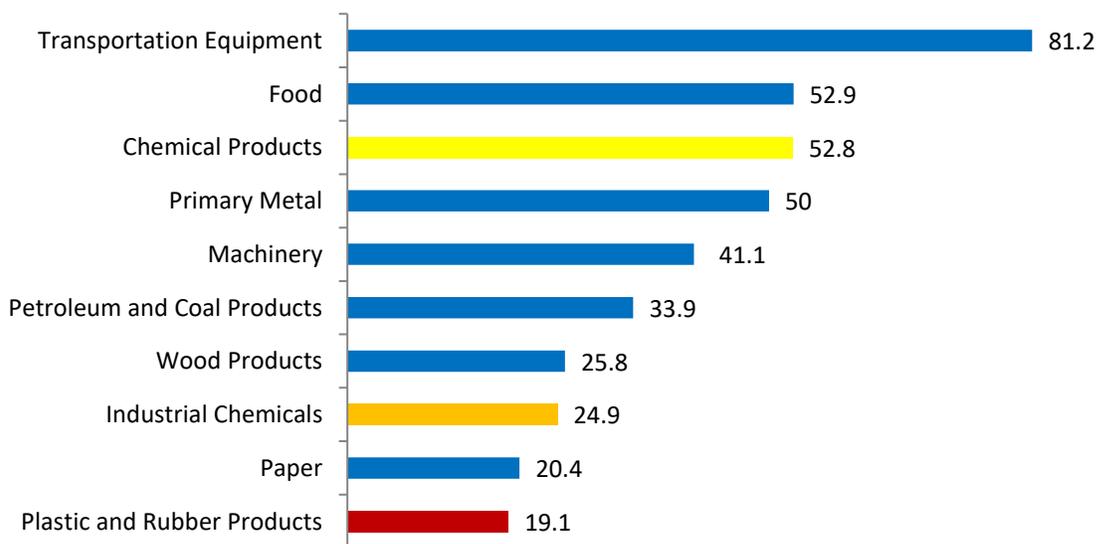
⁴ For further analysis of the trade of specific industrial chemicals see the Industry Profiles section beginning on page 37 of this report.

Figure 9: Trade of Industrial Chemicals in Billions of CAD



The chemistry industry was the 4th largest exporter among all manufacturing industries in 2022. (Figure 10)

Figure 10: Top 10 Manufacturing Industries by Exports in Billions of CAD



➤ Profits

Profits for the chemical sector depend on factors such as capacity utilization, energy and raw material costs, supply-demand balance and competition with foreign producers. Operating profits in 2022 for the chemical industry were \$8.7 billion and \$2.4 billion for industrial chemicals (Table 8).

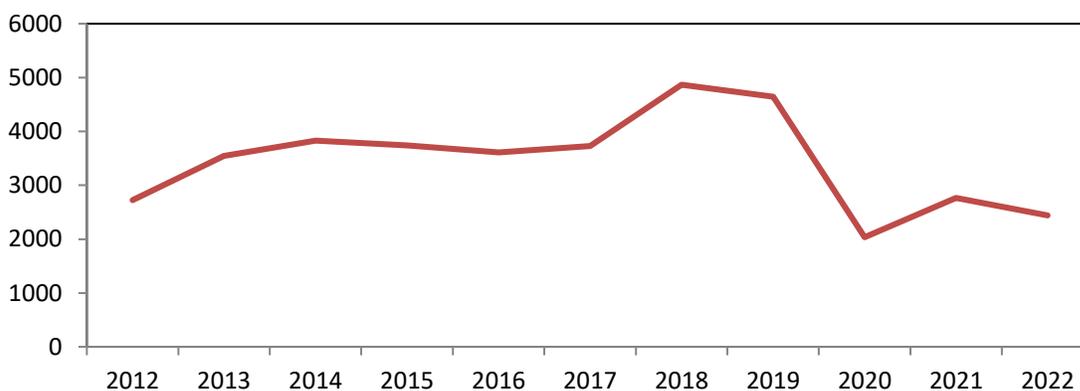
Table 8: Operating Profits in the Chemical Industry



Operating profit, \$ billion	2021	2022	Change 2021-22
All Chemicals	6.05	8.7	43.9%
Industrial chemicals	2.77	2.44	-11.8%

Operating profits for industrial chemicals have shown a resilience following the Great Financial Crisis however, the multi-year impacts of the COVID-19 pandemic have hit profitability in the sector.

Figure 11: Operating Profits for Industrial Chemicals, in Millions of CAD



➤ Productivity

One measure of manufacturing productivity is the value of revenue per employee. For all chemicals, output per employee in 2022 was \$801,000. For industrial chemicals, it rises to \$2.00 million. Output per employee is much higher for industrial chemicals reflecting the capital-intensive nature of the industry compared to chemicals overall. Both numbers have remained largely flat over the past decade but have increased during COVID-19 as shipment have been volatile.

Table 9: Productivity

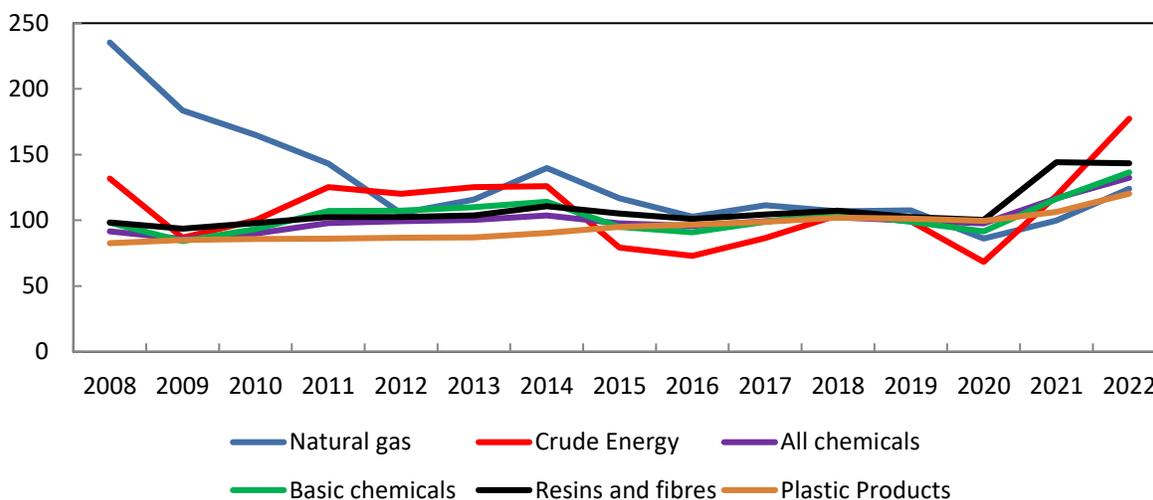


Output per employee, \$ thousand	2021	2022
All Chemicals	815	801
Industrial chemicals	1,854	2,000

► Price Index

The Industrial Product Price Index (IPPI) reflects the prices that producers in Canada receive as the goods leave the plant. Natural gas and crude oil are two important sources of feedstocks for the chemical industry (see Figure 12). Natural gas is the dominant feedstock in North America and prices have trended mostly downward since 2008 as supply from domestic and U.S. shale production overwhelmed demand. Recent additions of LNG export capacity in the U.S. have increased North American exposure to world prices, similar to crude oil. Crude oil prices fell in 2014 and have remained largely rangebound since. The COVID-19 pandemic saw crude oil and natural gas prices decline significantly in 2020. Energy prices increased dramatically in 2022 as the war in Ukraine began. Europe looked worldwide to secure natural gas, causing huge price increases and global crude oil prices spiked as fears of a supply shortage from Russia emerged.

Figure 12: Price Index, 2020=100

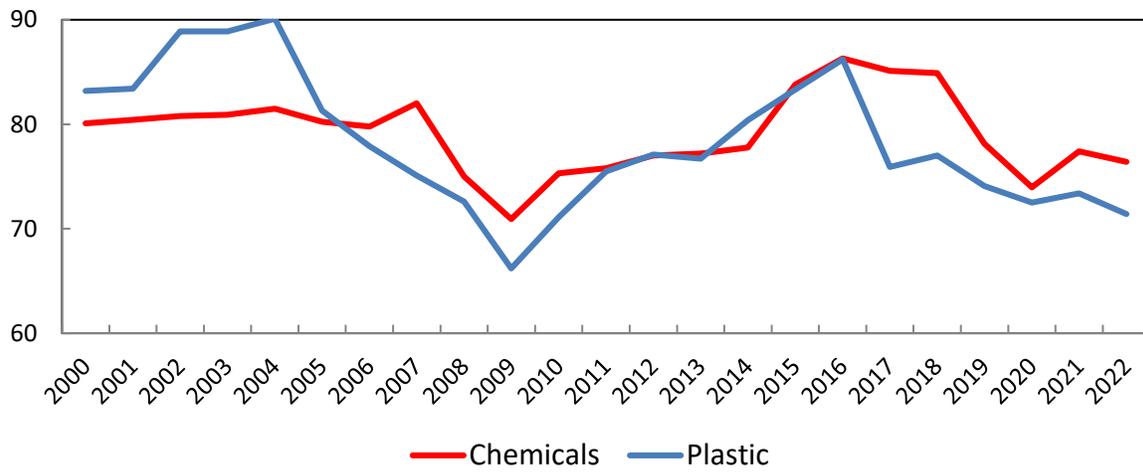


► Capacity Utilization

Capacity utilization refers to the extent to which an industry uses its installed productive capacity (Figure 13). Thus, it compares actual output with the maximum potential output that could be achieved if all capacity was fully used.

Capacity utilization for the overall chemical industry hit an all-time low of 68 per cent in the 1st quarter of 2009. Since 2009 capacity utilization has trended upward and averaged 85 per cent in 2017-2019. The COVID-19 pandemic caused a sharp drop in utilization that has been seen output recover only to 2010-2015 averages. While separate data is not available for industrial chemicals, it would be expected to have utilization rates higher than the industry average since continuous production processes are employed, whereas the segment of the industry producing formulated products relies on batch processes.

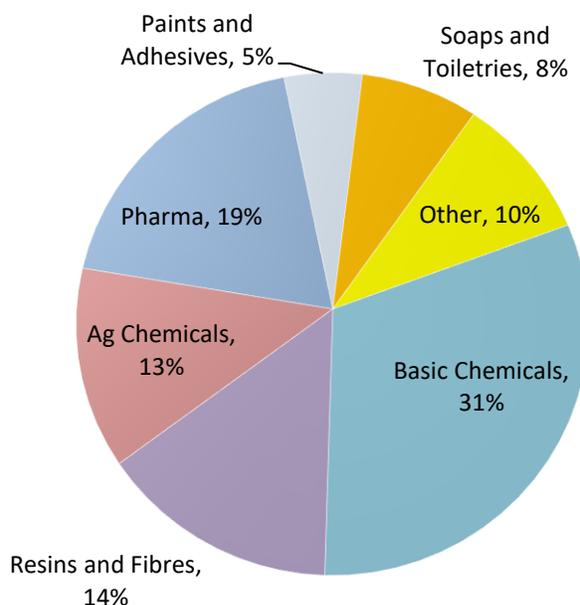
Figure 13: Capacity Utilization in the Chemical and Plastic Product Sectors, %



Other Chemical Manufacturing Subsectors

As mentioned previously, the Canadian chemical industry is comprised of seven sub-industries. Figure 14 shows the relative size of these industries by shipment value in 2021. Industrial chemicals accounted for 46 per cent of the total industry.

Figure 14: Distribution by Chemical Sub-Industries Based on Shipments



While NAICS 3251 and 3252 are the focus of this report, the following tables provide some data on the other sub-industries.

Table 10: Principal Statistics for Pesticides, Fertilizers and Other Agricultural Chemicals (NAICS 3253)

	Shipments, \$ million	Employment	Imports, \$ million	Exports, \$ million
2014	5,279	5,259	3,358	1,715
2015	5,406	5,271	3,576	2,057
2016	5,413	5,722	3,398	1,891
2017	6,181	5,722	3,991	1,485
2018	5,536	5,914	3,969	1,327
2019	6,099	5,598	4,034	1,393
2020	6,272	4,882	4,013	1,424
2021	7,750	5,090	5,076	1,997
2022	9,958	6,089	7,205	3,020

Table 11: Principal Statistics for Pharmaceuticals (NAICS 3254)

	Shipments, \$ million	Employment	Imports, \$ million	Exports, \$ million
2014	10,055	30,833	15,387	8,301
2015	9,834	30,356	16,852	10,468
2016	11,670	29,917	17,228	11,759
2017	12,068	31,788	17,630	8,890
2018	12,255	31,124	19,502	10,995
2019	12,911	31,310	19,502	12,166
2020	13,796	31,748	22,592	12,319
2021	13,020	33,391	26,703	13,248
2022	14,897	34,023	30,205	15,172

Table 12:
Principal Statistics for Paints, Coatings and Adhesives (NAICS 3255)

	Shipments, \$ million	Employment	Imports, \$ million	Exports, \$ million
2014	2,778	8,196	2,055	596
2015	2,619	8,593	2,322	694
2016	3,342	8,216	2,434	763
2017	3,203	7,773	2,373	769
2018	3,122	6,725	2,459	871
2019	3,185	7,502	2,563	902
2020	3,057	7,296	2,442	817
2021	2,982	7,437	2,599	903
2022	4,068	7,237	3,090	1,092

Table 13: Principal Statistics for Soaps, Cleaning Compounds and Toilet Preparations (NAICS 3256)

	Shipments, \$ million	Employment	Imports, \$ million	Exports, \$ million
2014	4,200	11,503	5,312	2,907
2015	4,433	11,769	6,072	3,334
2016	4,911	13,946	6,400	3,063
2017	4,821	14,018	6,581	3,065
2018	5,149	15,384	6,818	3,848
2019	4,911	14,437	7,025	3,829
2020	4,673	13,113	7,815	3,721
2021	4,706	12,536	7,069	3,943
2022	6,122	13,665	8,364	4,370

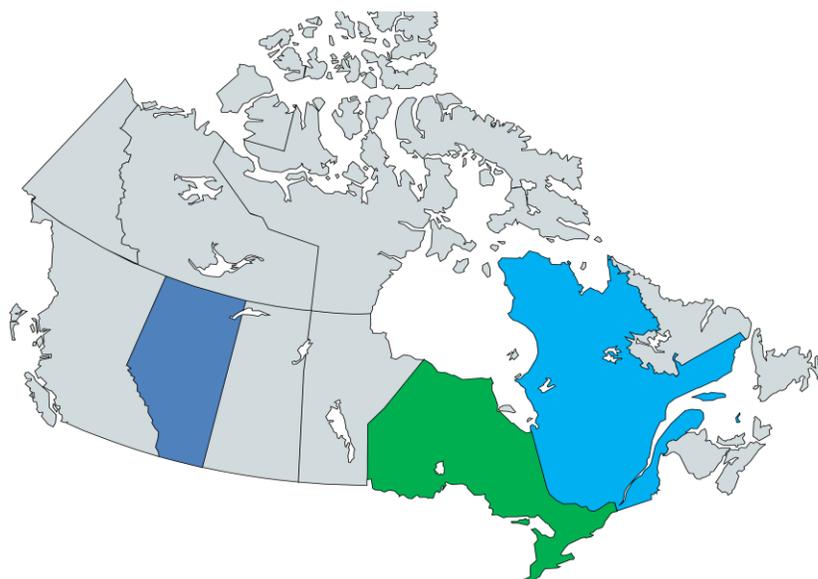
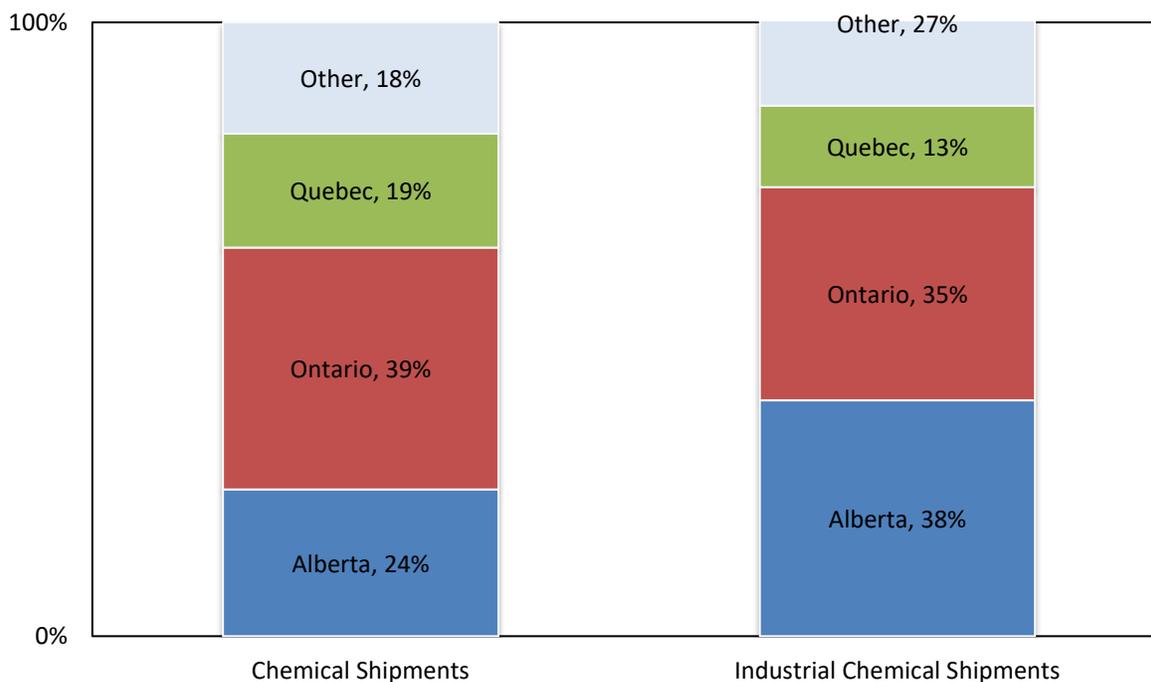
Table 14: Principal Statistics for Other Chemical Products (NAICS 3259)

	Shipments, \$ million	Employment	Imports, \$ million	Exports, \$ million
2014	4,813	10,854	4,889	2,179
2015	4,932	10,905	5,147	2,161
2016	5,622	10,837	5,016	1,983
2017	5,284	10,660	5,410	1,965
2018	5,922	10,587	5,710	2,198
2019	6,140	11,355	5,894	2,267
2020	5,543	10,710	5,467	2,457
2021	5,488	12,267	6,117	3,285
2022	7,495	12,901	8,232	4,285

► Provincial Statistics

Both the overall chemical industry and the industrial chemicals segment are concentrated in the provinces of Ontario, Alberta and Quebec (Figure 15). Further information about these three main provinces is contained in the following portions of the analysis.

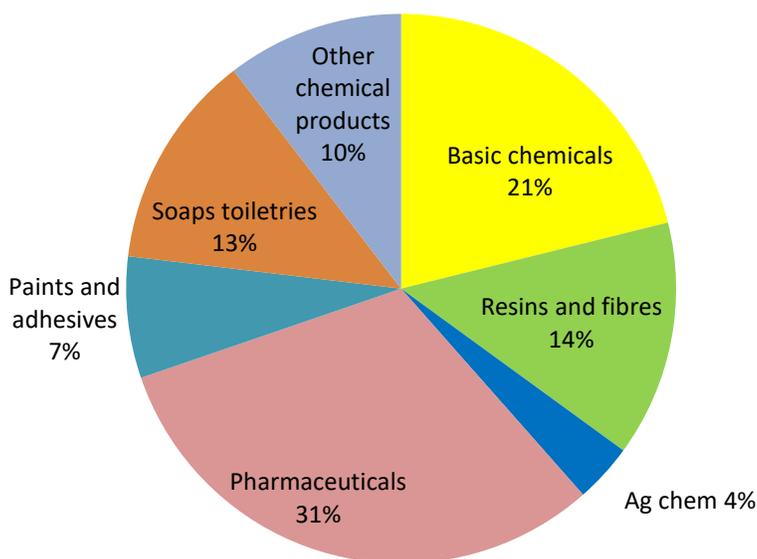
Figure 15: Provincial Distribution of the Chemical Industry, by Value of Shipments



a. Ontario

In 2022, Ontario's chemical industry had shipments of \$29.2 billion an increase of 5.5 per cent from 2021. Industrial chemical shipments totaled \$11.6 billion in 2022 an increase of 2.2 per cent from 2021 (Figure 16).

Figure 16: Composition of the Ontario Chemical Industry



The largest cluster for the industrial chemical industry is in the Sarnia region, with the next largest concentrations in the Golden Horseshoe and along the St. Lawrence Seaway.

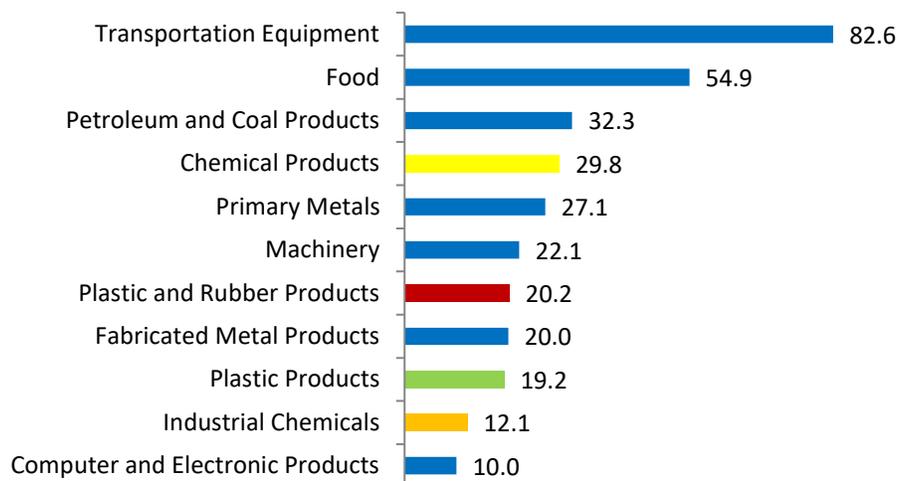
Table 15: Ontario Chemical Industry Shipments



Shipments, \$ billion	2021	2022	Change 2021-22
All chemicals	29.2	29.8	5.5%
Industrial chemicals	11.6	12.1	2.2%

On the basis of shipments, Chemicals was the 4th largest of all manufacturing industries in the province in 2022 (Figure 17).

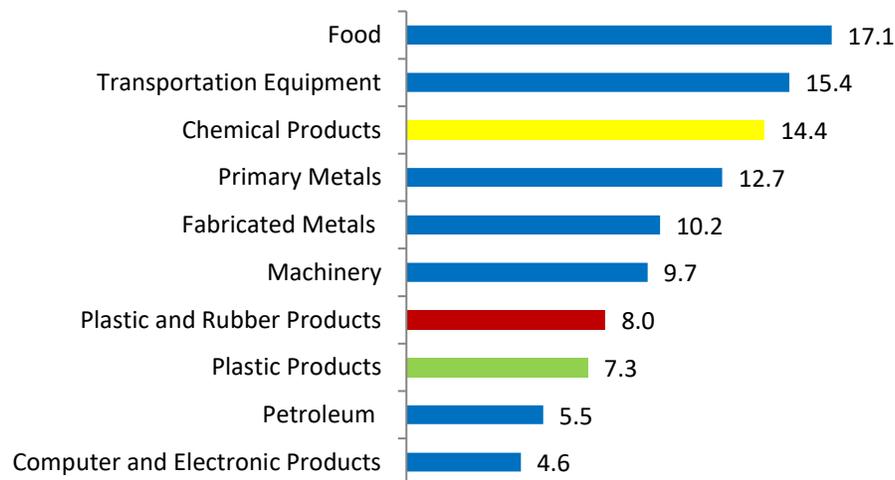
Figure 17: Top 10 Manufacturing Industries in Ontario by Value of Shipments, \$ Billion



- **Value Added**

On the basis of value added, chemicals also ranked 3rd among all manufacturing industries in 2021 (latest data available) (Figure 18).

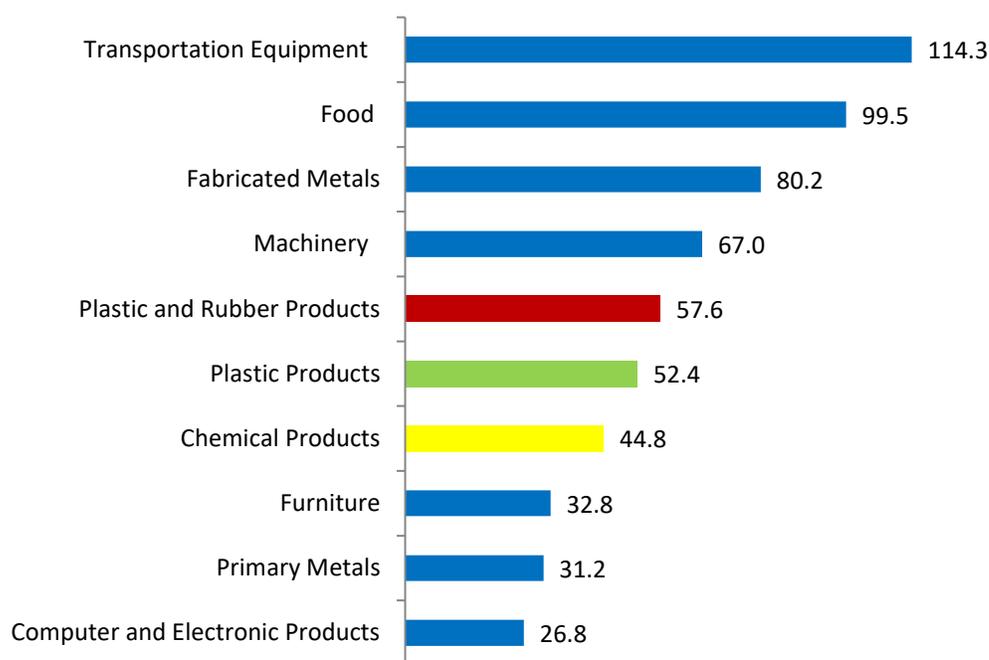
Figure 18: Top 10 Industries by Value Added in Ontario, \$ Billions.



• Employment Ranking

The chemical industry directly employed 44,800 people in Ontario in 2022, a decline of 2.8 per cent from 2021. When indirect employment is included, it is estimated that the chemical industry supports almost 224,000 jobs in the province. The number of employees working in industrial chemicals was 8,304 a 1.6 per cent decrease from 2021. The industrial chemical sector supports over 41,500 jobs in the province. When compared to other manufacturing industries, chemicals ranked 6th on the basis of employment (Figure 19).

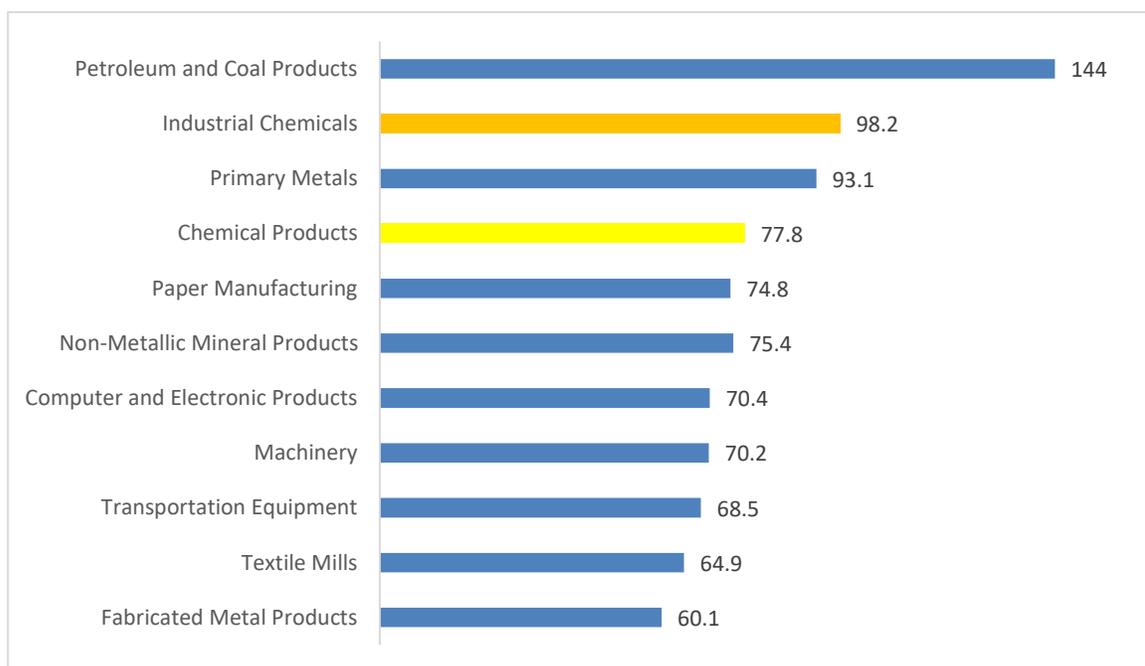
Figure 19: Top 10 Manufacturing Industries by Number of Employees in Ontario in Thousands



- **Salaries and Wages**

The chemical industry paid a total of \$3.49 billion in salaries and wages in the province in 2022. With an average annual salary of \$77,800, the industry ranked 3rd among all manufacturing industries in Ontario (Figure 20). The Industrial Chemical sub-sector paid \$834 million in wages and had an average salary of \$98,200. The average salary across all manufacturing industries in Ontario was \$60,800.

Figure 20: Top 10 Manufacturing Industries by Average Salary in Ontario in \$ Thousands



• Trade

The value of exports by the chemical industry from Ontario in 2022 was \$27.7 billion, while imports were \$60.5 billion (Table 16). The United States was the destination for 71 per cent of exports, followed by Netherlands (5.2 per cent), United Kingdom (3 per cent) and Japan (2.9 per cent). The United States was also the source for most imports (54 per cent), followed by Switzerland (6.1 per cent); German (5.5 per cent) and China (5.5 per cent.)

For industrial chemicals, exports from Ontario were \$10.2 billion, while imports were \$49.5 billion (Table 16) in 2022. The United States was the destination for 75 per cent of exports, followed by United Kingdom (5.8 per cent), Netherlands (5.7 per cent) and Germany (2.7 per cent). The United States was also the source of most imports (78 per cent), followed by China (5.5 per cent).

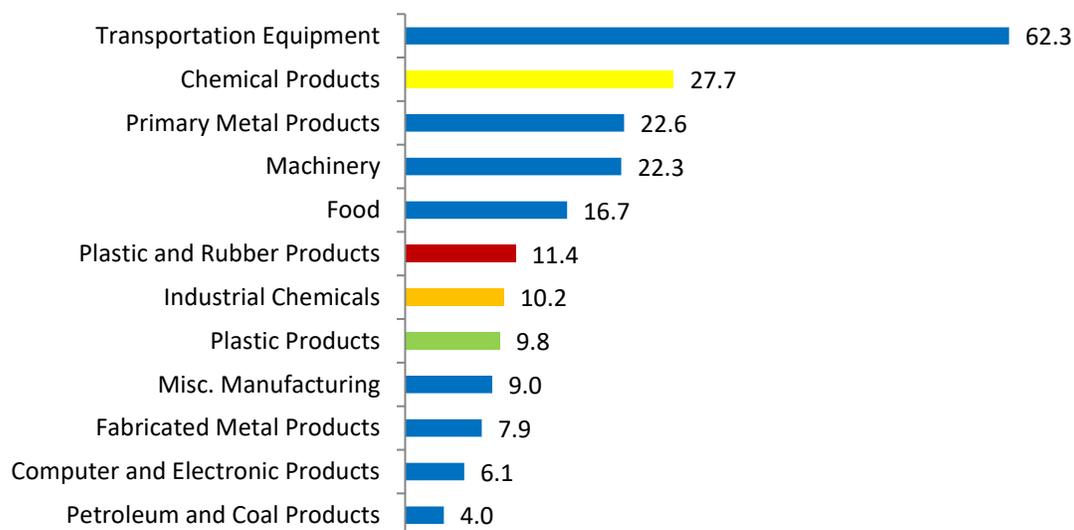
Table 16: Trade by the Chemical Industry in Ontario



Value of trade, \$ billion		2021	2022	Change 2021-22
All chemicals	Imports	49.5	60.5	22.2%
	Exports	20.6	27.7	12.6%
Industrial chemicals	Imports	16.2	20.5	26.8%
	Exports	9.9	10.2	3.3%

Chemicals is the 2nd largest exporter among all manufacturing industries (Figure 21).

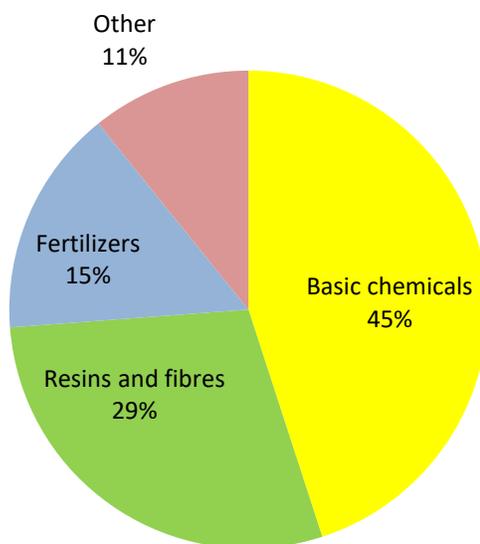
Figure 21: Top 10 Manufacturing Industries by Value of Exports from Ontario, \$Billions



b. Alberta

In 2022, Alberta's chemical industry had shipments of \$18.9 billion (Table 17). Industrial Chemicals represent 74 per cent of the total (Figure 22), with \$14.0 billion in shipments in 2022.

Figure 22: Composition of the Alberta Chemical Industry



The industrial chemical industry in Alberta is located in the Industrial Heartland region northeast of Edmonton, in central Alberta, near Red Deer, in Medicine Hat, and growing in size and scope near Grande Prairie.

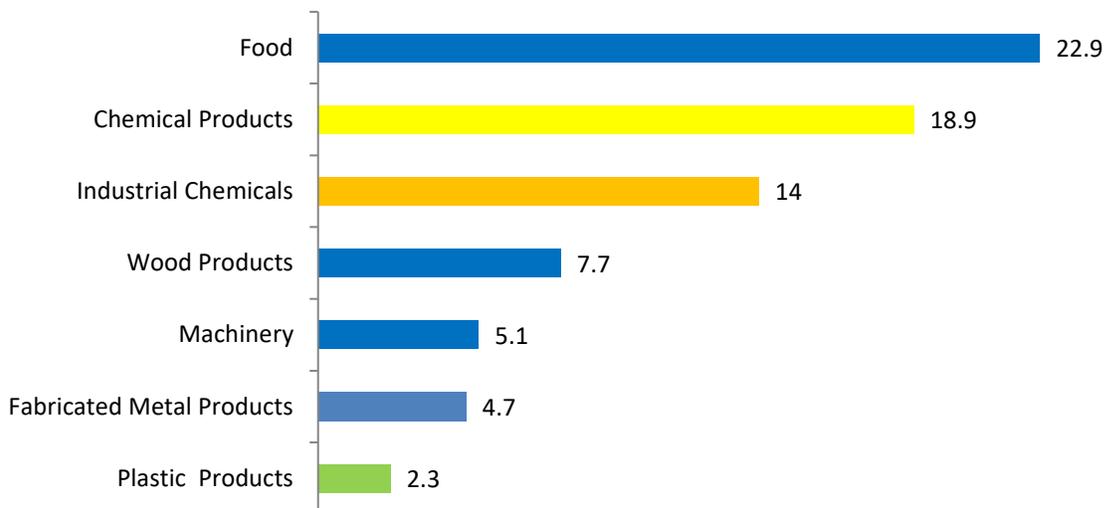
Table 17: Alberta Chemical Industry Shipments



Shipments, \$billion	2021	2022	Change 2021-22
All chemicals	17.1	18.9	10.7%
Industrial chemicals	13.2	14.0	6.3%

Based on value of shipments Chemicals ranked 2nd among all manufacturing industries in the province in 2022 (Figure 23).

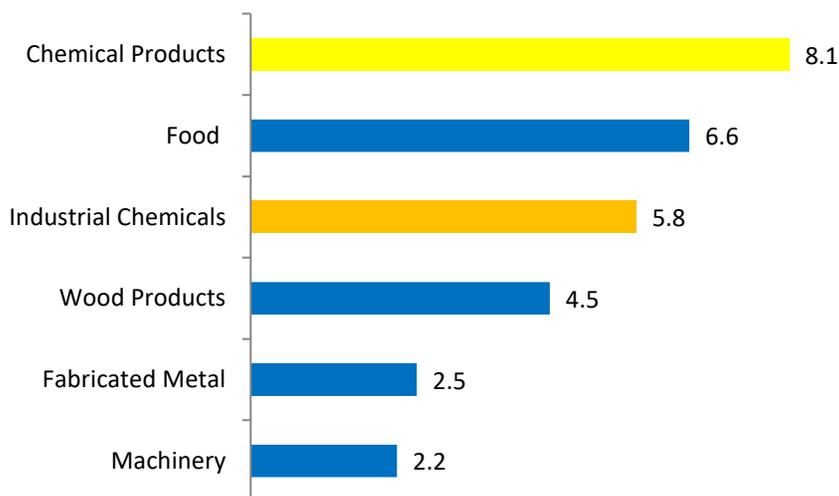
Figure 23: Top 5 Manufacturing Industries in Alberta by Value of Shipments, \$Billion ⁵



- **Value Added**

Based on value added, chemicals ranked 1st among all manufacturing industries (Figure 24) based on 2021 data (latest available).

Figure 24: Top 5 Industries by Value Added in Alberta, \$ Billion

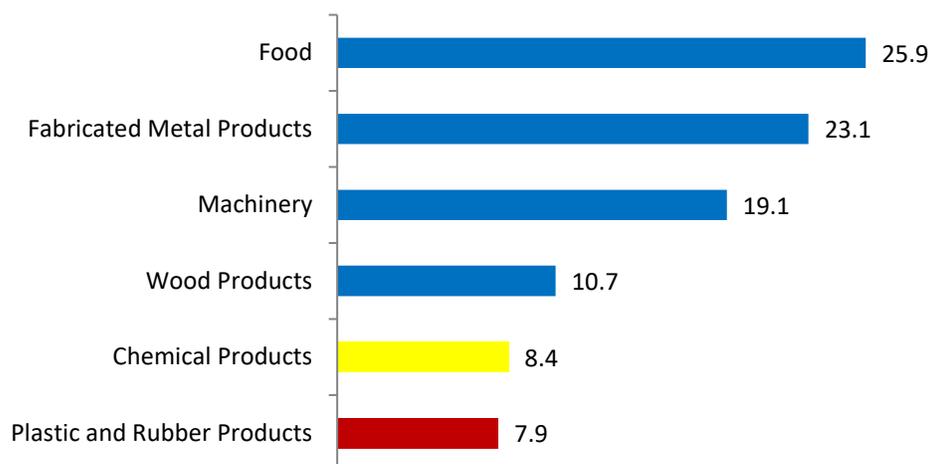


⁵ The top 10 industries cannot be ranked because data for many industries has been suppressed by Statistics Canada.

• Employment Ranking

The chemical industry employed 8,421 people in Alberta in 2022, an increase of 8.1 per cent compared to 2021. When indirect employment is included, it is estimated that the chemical industry supports about 42,105 jobs in the province. The number of employees working in industrial chemicals in 2022 was 4,518 indirectly supporting over 22,590 jobs in the province. When compared to other manufacturing industries in the province, chemicals ranked 5th (Figure 25).

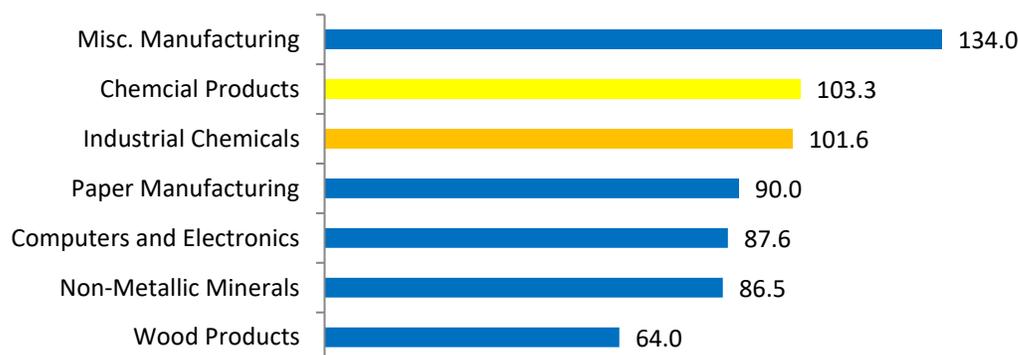
Figure 25: Top 5 Manufacturing Industries by Employment in Alberta



• Salaries and Wages

The chemical industry paid a total of \$870 million in salaries and wages in the province in 2022. The average salary paid to employees in the chemical industry was \$103,310, which ranked 2nd among all manufacturing industries (Figure 26). **The average salary within industrial chemicals was \$101,630.**

Figure 26: Top 5 Manufacturing Industries by Average Salary in Alberta, \$ Thousands



• Trade

The value of exports by the chemical industry from Alberta in 2022 was \$11.1 billion, while imports were \$4.4 billion (Table 18). The United States was the destination for 87 per cent of exports, followed by China (8 per cent) and Singapore (1 per cent). The United States was also the source of most imports (76 per cent), followed by China (8 per cent), South Korea (2 per cent) and Australia (2 per cent).

For industrial chemicals, exports from the province in 2021 were \$8.1 billion, while imports were \$1.9 billion. The United States was the destination for 85 per cent of exports, followed by China (10 per cent) and Mexico (1 per cent). The United States was also the source of most imports (78 per cent), followed by China (8 per cent), Australia (5 per cent) and Finland (2 per cent).

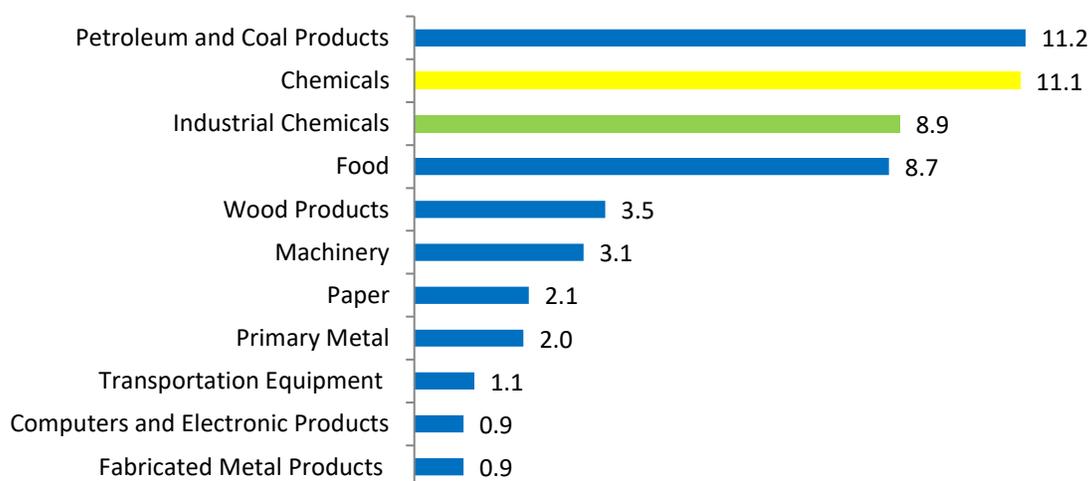
Table 18: Trade by the Chemical Industry in Alberta



Value of trade, \$ billion		2021	2022	Change 2021-22
All chemicals	Imports	3.6	4.4	22.2%
	Exports	9.7	11.1	14.4%
Industrial chemicals	Imports	1.9	2.5	31.6%
	Exports	8.1	8.9	11.1%

Chemicals ranks 2nd among manufacturing industries in terms of exports from Alberta (Figure 27).

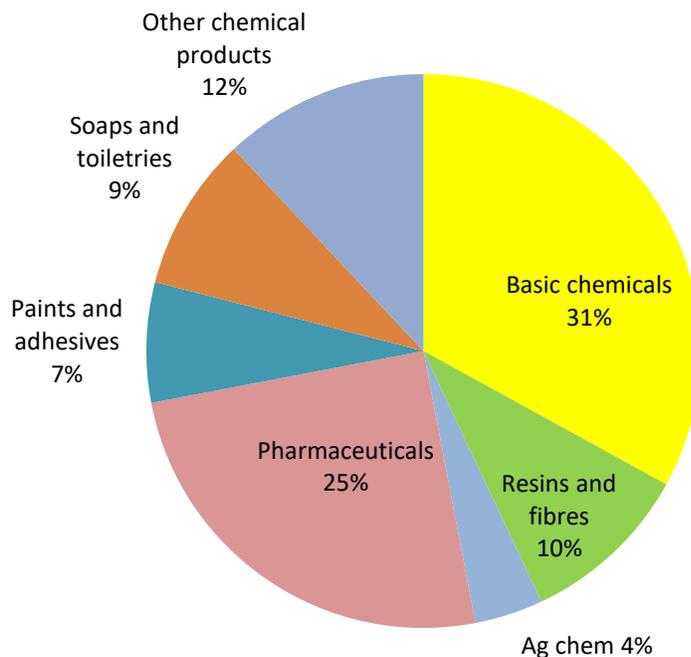
Figure 27: Top Manufacturing Industries by Value of Exports from Alberta, \$ Billion



c. Quebec

In 2022, Quebec's chemical industry had shipments of \$13.2 billion an increase of 22.1 per cent from 2021. Industrial chemicals accounted for 40 per cent of the total (Figure 28).

Figure 28: Composition of the Quebec Chemical Industry



In 2022, shipments of industrial chemicals were \$5.7 billion an 34.7 per cent increase from 2021 (Table 19). The industrial chemical industry in Quebec is concentrated in the eastern end of Montreal and along the south shore of the St. Lawrence River.

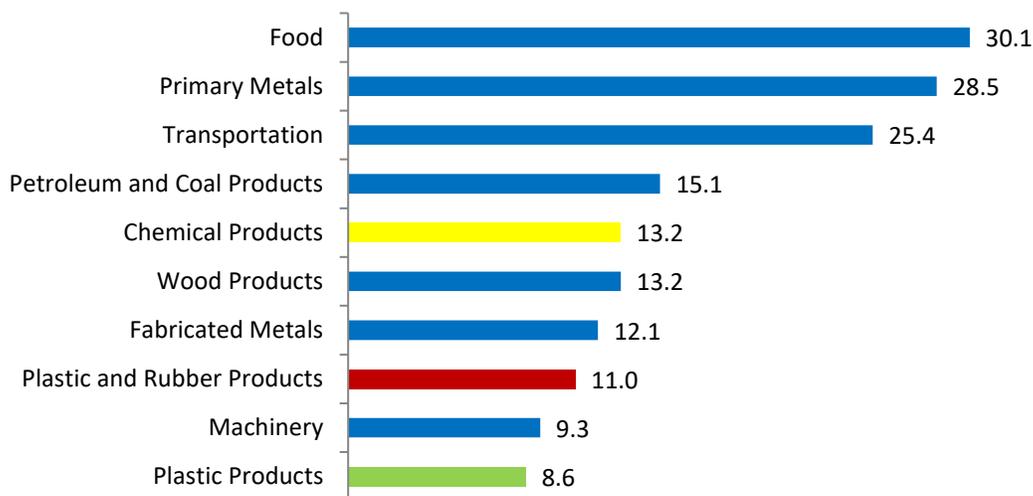
Table 19: Quebec Chemical Industry Shipments



Shipments, \$billion	2021	2022	Change 2021-22
All chemicals	10.9	13.2	22.1%
Industrial chemicals	4.3	5.7	34.7%

Based on shipments Chemicals was the 5th largest manufacturing industry (Figure 29).

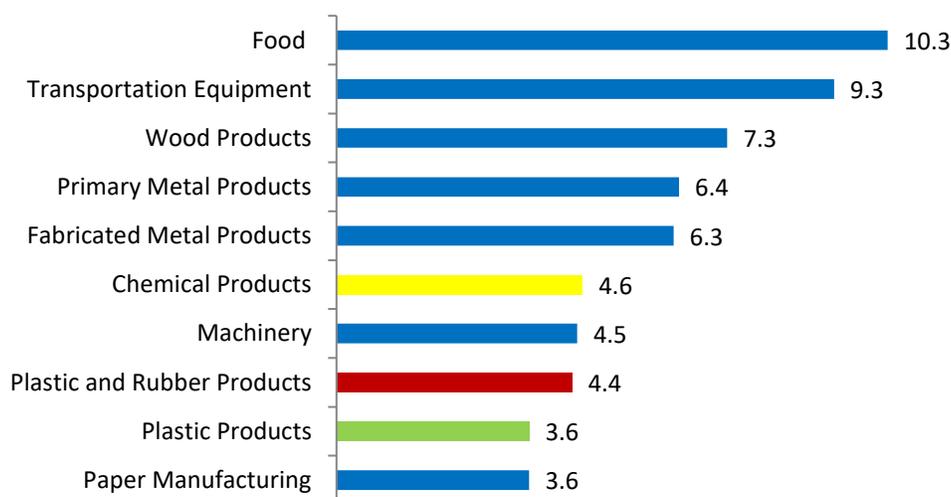
Figure 29: Top 10 Manufacturing Industries in Quebec by Value of Shipments, \$ Billion



- Value Added**

Based on value added, chemicals ranked 6th among all manufacturing industries in Quebec in 2021 (Figure 30).

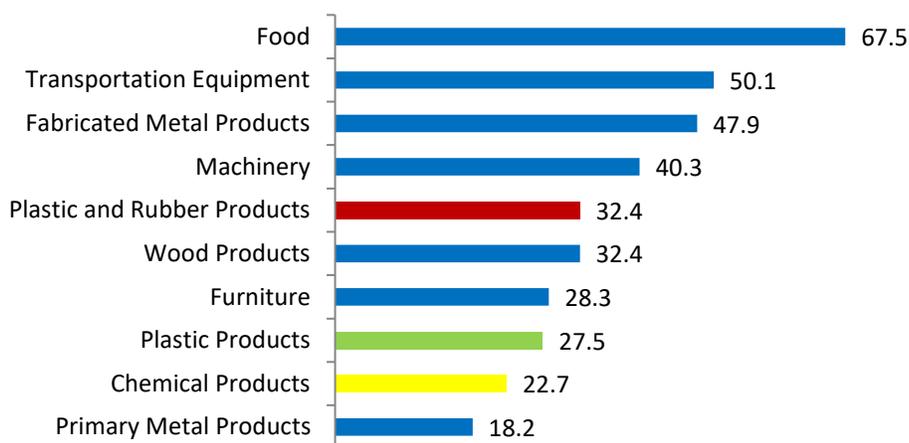
Figure 30: Top 10 Manufacturing Industries by Value Added in Quebec



• Employment Ranking

The chemical industry employed 22,700 people in Quebec in 2022. When indirect employment is included, it is estimated that the chemical industry supports 113,500 additional jobs in the province. The industrial chemical industry employs 3,480 and supports an additional 17,400 jobs in the province. When compared to all manufacturing industries in the province, chemicals ranked 8th (Figure 31).

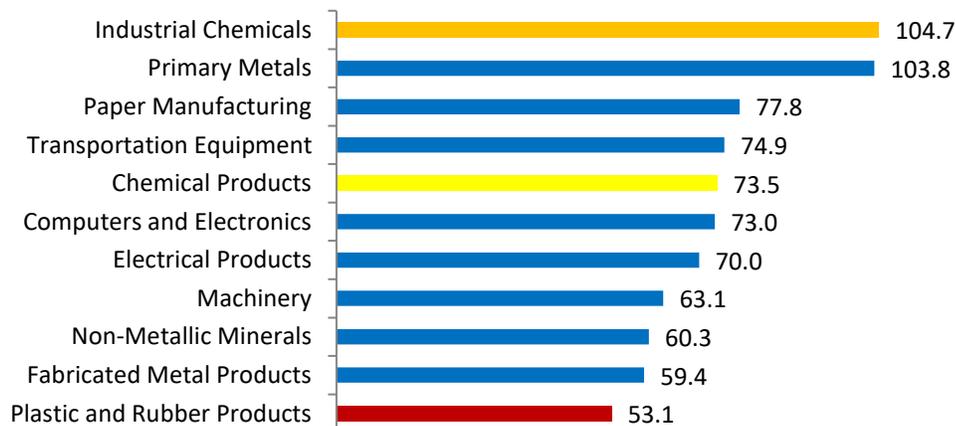
Figure 31: Top Manufacturing Industries by Employment in Quebec



• Salaries and Wages

The chemical industry paid a total of \$1.67 billion in salaries and wages in the province in 2022, corresponding to an average annual salary of \$73,540, which placed the industry 4th in Quebec (Figure 32). **For Industrial Chemicals the average salary is 104,700 and for all manufacturing, the average salary in the province was \$53,950.**

Figure 32: Top Manufacturing Industries by Average Salary in Quebec, \$ Thousands



• Trade

The value of exports by the chemical industry from Quebec in 2022 was \$7.7 billion and imports were \$11.7 billion (Table 20). The United States was the destination for 87 per cent of exports, followed by Mexico (2.5 per cent) and Belgium (2.3 per cent). Quebec is different from the other provinces in that a much lower proportion of its imports come from the United States (29 per cent), followed by Germany (8 per cent), China (7 per cent), France (7 per cent) and Belgium (7 per cent).

For industrial chemicals, exports from the province in 2022 were \$3.7 billion, and imports were \$4.4 billion. The United States was the destination for 83 per cent of exports, followed by Mexico (5 per cent) and the Netherlands (3 per cent). The United States was the source of 33 per cent of imports, followed by China (15 per cent), Belgium (8 per cent) and Kazakhstan (6 per cent).

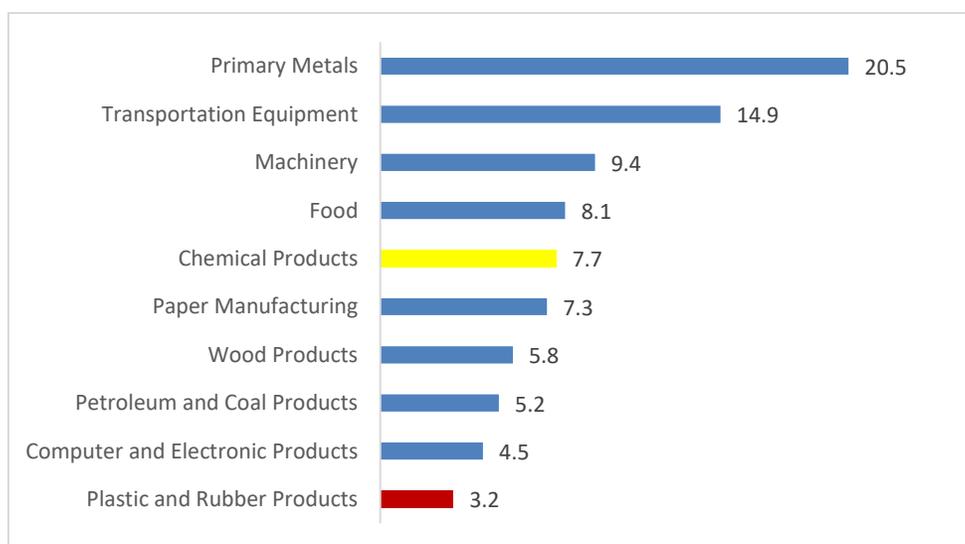
Table 20: Trade by the Chemical Industry in Quebec



Value of trade, \$ billion		2021	2022	Change 2021-22
All chemicals	Imports	9.9	11.7	18.3%
	Exports	6.9	7.7	11.5%
Industrial chemicals	Imports	3.4	4.4	29.3%
	Exports	3.2	3.7	16.1%

Compared to all other manufacturing industries, chemicals were the 5th largest export industry (Figure 33).

Figure 33: Top 10 industries by Value of Exports from Quebec, \$ Billion



Industry Profiles

The segments of the chemical industry of primary interest to CIAC members are profiled according to the following categories:



- Petrochemicals and other organic chemicals
- Inorganic chemicals
- Synthetic resins, rubbers and fibres
- Specialty chemicals

a. Petrochemicals and Other Organic Chemicals

Statistics Canada reports data on organic chemicals in two industry groups:

- NAICS 32511 – Petrochemicals
- NAICS 32519 – Other organic chemicals.

The petrochemicals industry only includes hydrocarbons. The main petrochemicals produced by CIAC members in Canada are ethylene, propylene, butylenes, butadiene, higher olefins, alkanes, benzene, toluene, xylenes, and styrene. Ethylene is the largest-volume petrochemical; it is always consumed very close to the point of production so almost none is traded.

Organic chemicals that contain atoms other than hydrogen and carbon are captured in the other organic chemicals industry. CIAC members are producers of all of the largest-volume chemicals in this category in Canada: methanol, isopropyl alcohol, and ethylene glycol.

Table 21: Principal Statistics for Petrochemicals and Other Organic Chemicals

	2018	2019	2020	2021	2022
Establishments					
Petrochemicals	16	29	29	27	X
Other organic chemicals	92	145	134	136	X
Shipments \$M					
Petrochemicals	7,008	5,945	5,138	6,876	8,092
Other organic chemicals	6,181	5,601	4,716	5,635	7,881
Employment					
Petrochemicals	1,963	1,884	1,820	1,933	2,175
Other organic chemicals	3,555	3,137	2,917	2,852	3,464
Exports \$M					
Petrochemicals	2,489	2,061	1,617	2,269	2,504
Other organic chemicals	4,240	3,866	4,057	4,396	5,226
Imports \$M					
Petrochemicals	1,067	846	629	1,088	1,418
Other organic chemicals	6,613	6,537	6,497	8,152	11,806

• Commodity Data

Statistics Canada reports production data for a limited number of organic chemicals (Table 22).

Table 22: Canadian Production of Specific Organic Chemicals, Kilotonnes

	2018	2019	2020	2021	2022
Benzene	807	826	727	610	724
Toluene	477	397	395	112	157
Xylenes	646	583	584	584	654
Butadiene	235	235	228	241	220
Propylene	562	535	542	485	475
Formaldehyde	154	151	138	121	141

More data exists for imports and exports than for domestic production. Table 23 shows the exports for a select range of organic chemicals, in both tonnage and dollar value terms.

Table 23: Canadian Exports of Select Organic Chemicals, Kilotonnes

	Value, \$M	Quantity, kt	Top Markets
Benzene	204	127	USA 90% Belgium 10%
Butadiene	39	44	USA 99%
Ethylene glycol	1,246	943	China 59% USA 40%
Higher olefins	245	132	USA 97% China 1%
Isopropyl alcohol	101	68	USA 99%
Methanol	321	217	USA 99%
Propylene	109	72	USA 99%
Styrene	771	401	USA 100%

Table 24: Canadian Imports of Select Organic Chemicals, Kilotonnes

	Value, \$M	Quantity, kt	Top Markets
Benzene	47.7	15	USA 99%
Butadiene	5.8	4.9	South Korea 55% USA 42%
Ethylene glycol	15.8	13.8	USA 98%
Higher olefins	4.8	1.4	Saudi Arabia 59% USA 35%
Isopropyl alcohol	29	18	USA 68% China 7%

Methanol	198	430	Trinidad and Tobago 75% USA 15%
Propylene	6.2	0.696	USA 96%
Styrene	16	7.98	USA 99%

• CIAC Members Producing Petrochemicals and Organic Chemicals in Canada

- › ARLANXEO Canada Inc.
- › BASF Canada
- › Canada-Kuwait Petrochemical Corporation⁶
- › Dow Chemical Canada ULC
- › Evonik Oil Additives Canada Inc.
- › H.L. Blachford Ltd.
- › Imperial Oil
- › INEOS Canada Partnership
- › Inter-Pipeline Ltd.⁷
- › Lanxess Canada Co./Cie
- › Jungbunzlauer Canada Inc.
- › MEGlobal Canada ULC
- › Methanex Corporation
- › Nouryon
- › NOVA Chemicals Corporation
- › SEQENS
- › Shell Chemicals Canada Ltd.
- › Stepan Canada Inc.
- › W.R. Grace Canada Corp

⁶ Currently pre-production facility is under construction

⁷ Currently pre-production facility is under construction

b. Industrial Gases

Statistics Canada reports data on Industrial gases as part of basic chemicals within NAICS 32512. Under this category there is a single sub-category – Industrial Gas Manufacturing

Industrial Gas manufacturers produce organic and inorganic gases in compressed - liquid and solid forms. Some of the most used industrial gases include: acetylene, carbon dioxide, helium, hydrogen, nitrogen, dry ice and oxygen. Manufacturing processes also include industrial gas separation and air separation configurations.

Often Industrial Gas manufacturers will co-locate on larger manufacturing sites utilize feedstock streams produced as co-products from the larger facility. However, this is not a hard rule, with diverse customer markets and a relatively small physical footprint industrial gas manufacturers can also locate closer to demand in light industrial areas.

Table 25: Principal Statistics for Industrial Gases

	2018	2019	2020	2021	2022
Establishments	145	145	101	115	115
Shipments \$M	1,196	1,311	1,180	1,525	1,525
Employment	1,173	1,049	1,074	1,146	1,146
Exports \$M⁸	138	120	125	138	138
Imports \$M	217	186	176	180	262

● CIAC Members Producing Industrial Gases

- Air Products

⁸ Exports and Imports sometimes exceed shipments due to different databases used to collect the two sets of data.

c. Inorganic Chemicals

Statistics Canada reports data on inorganic chemicals as part of basic chemicals within NAICS 32518. Under this category there are two sub-industry classifications:

- NAICS 325811 – Alkali and chlorine
- NAICS 325819 – Other inorganic chemicals.

Since 2010, shipment and employment data have been suppressed at the 6-digit NAICS level and only reported at the 5-digit level.

The main inorganic chemicals produced by CIAC members in Canada are: chlorine, sodium hydroxide, hydrochloric acid, hydrogen peroxide, sodium chlorate, sodium silicates, sulphuric acid, and titanium dioxide.

Table 26: Principal Statistics for Inorganic Chemicals

	2018	2019	2020	2021	2022
Establishments					
Chlor-alkali	5	5	5	5	5
Other inorganic chemicals	104	104	104	104	104
Shipments \$M	4,581	4,310	3,484	3,568	3,568
Employment	3,693	3,420	3,340	3,569	3,569
Exports \$M⁹					
Chlor-alkali	69	77	78	135	230
Other inorganic chemicals	3,724	3,703	2,730	4,108	4,996
Imports \$M					
Chlor-alkali	522	456	458	411	619
Other inorganic chemicals	2,186	2,847	3,333	3,285	4,217

• Commodity Data

Statistics Canada reports production data for a limited number of inorganic chemicals (Table 25).

Table 27: Canadian Production of Specific Inorganic Chemicals, Kilotonnes

	2018	2019	2020	2021	2022
Carbon black	241	243	237	188	228
Chlorine	894	269	x	367	448
Hydrogen peroxide	239	243	237	234	235
Sodium hydroxide*	453	445	450	445	460

*estimated

More data exists for imports and exports than for domestic production.

⁹ Ibid.

Table 28: Canadian Exports of Select Inorganic Chemicals, Kilotonnes

	Value, \$M	Quantity, kt	Top markets
Carbon black	355	208	USA 80% China 4% Belgium 4%
Chlorine	166	826	USA 100%
Hydrochloric Acid	56	293	USA 99%
Hydrogen Peroxide	40	83	USA 99%
Sodium Chlorate	311	454	USA 84% Japan 9%
Sodium Hydroxide	57	56	USA 99%
Sodium Silicate	22	33	USA 99%
Sulphuric Acid	274	1,819	USA 99%
Titanium Dioxide	6.4	6.4	Germany 67% India 10% Brazil 8% USA 6%

Table 29: Canadian Imports of Select Inorganic Chemicals

	Value, \$M	Quantity, kt	Top Markets
Carbon black	167	68	USA 79% China 12%
Chlorine	5.98	2.8	USA 98%
Hydrochloric Acid	12.3	39	USA 99%
Hydrogen Peroxide	11	4.7	USA 94% Switzerland 3%
Sodium Chlorate	1.6	0.68	USA 96%
Sodium Hydroxide	15.7	15.4	USA 75% China 20%
Sodium Silicates	13.6	21	USA 95%
Sulphuric Acid	29.9	134	USA 99%
Titanium Dioxide	61	12	China 62% France 18% USA 7% Germany 3%

- **CIAC Members Producing Inorganic Chemicals in Canada**

- › Arkema Canada Inc.
- › CCC Sulphur Products
- › Chemtrade
- › ERCO Worldwide
- › Evonik Canada Inc.
- › KRONOS Canada Inc.
- › National Silicates Limited
- › Cabot Canada Ltd.
- › NorFalco Sales Inc., GLENCORE Canada Corporation
- › Nouryon
- › Praxair Canada Inc.
- › Solvay Canada Inc.
- › W.R. Grace Canada Corp
- › United Initiators Canada Ltd

c. Synthetic Resins, Rubbers and Fibres

There are two industry sub-groups within this classification:

- NAICS 32521 – Synthetic resins and rubbers
- NAICS 32522 – Synthetic fibres.

Since 2013, shipment and employment data have been suppressed at the 5-digit NAICS level and only reported at the 4-digit level.

The main synthetic resins and rubbers produced in Canada are polyethylene, ethylene vinyl acetate, polystyrene, PVC, polyacrylamides, PET, nylons, urea and phenol formaldehydes, latex emulsions, unsaturated polyesters, silicones, and butyl and halobutyl rubbers. Synthetic fibres are produced in Canada using a variety of domestically-produced and imported resins.

Table 30: Principal Statistics for Synthetic Resins Rubbers and Fibres

	2018	2019	2020	2021	2022
Establishments					
Synthetic resins and rubbers	91	112	108	105	X
Synthetic fibres	17	32	30	23	X
Shipments \$M					
	10,571	9,597	8,333	11,268	10,898
Employment, 000					
	5,215	5,009	4,313	4,747	5,539
Exports \$M					
Synthetic resins and rubbers	8,514	7,712	7,028	10,943	10,044
Synthetic fibres	273	283	232	291	260
Imports \$M					
Synthetic resins and rubbers	9,249	8,620	7,735	10,941	12,492
Synthetic fibres	597	528	430	485	537

• **Commodity Data**

Within these industries, Statistics Canada reports production data only for polyethylene (Table 28).

Table 31: Canadian Production of Synthetic Resins, Kilotonnes

	2018	2019	2020	2021	2022
Polyethylene	3,854	3,599	3,871	4,052	3,820

Table 32: Canadian Exports of Select Synthetic Resins and Rubbers

	Value, \$M	Quantity, kt	Top Markets
Butyl and halobutyl rubbers	255	54	USA 35% China 27% Belgium 8%
Polyethylene	6.018	3,028	USA 86% Mexico 4%

Table 33: Canadian Imports of Select Synthetic Resins and Rubbers

	Value, \$M	Quantity, kt	Top Markets
Butyl and Halobutyl Rubbers	13.2	2.6	Belgium 40% USA 45%
Polyethylene	2,033	870	USA 96%

• **CIAC Members Producing Synthetic Resins, Rubbers and Fibres in Canada**

- › ARLANXEO Canada Inc.
- › BASF Canada
- › Dow Chemical Canada ULC
- › DuPont Canada Company
- › Imperial Oil
- › NOVA Chemicals Corporation

d. Specialty Chemicals

This profile is different from the others in the series. There is no Statistics Canada aggregation that provides data for an industry called specialty chemicals. Therefore, a number of assumptions have been made to derive an approximation for the size of this industry grouping.

Examples of the types of specialty chemicals produced by CIAC members include: fatty acids, maleic anhydride, plasticizers, citric acid, photochemicals, and additives for lubricants, plastics and rubber.

- Assumption #1: Specialty chemicals are a subset of NAICS 32519 – Other organic chemicals. Very little, if any, specialty chemicals fall within the petrochemical industry as it is comprised primarily of commodity products. For this analysis it is assumed that inorganic chemicals and synthetic resins and rubbers can also be excluded.
- Assumption #2: The ratio of specialty chemical to commodity chemical exports can be used to estimate the value of shipments and employment attributable to specialty chemicals. This assumption allows the use of relatively-detailed trade data to gain a measure of the level of specialty chemical production in Canada. However, deciding which products are commodity versus which are specialty remains subjective.

There are about 15 facilities in Canada producing ethanol that are captured within the other organic chemical industry. Since ethanol is primarily used for fuel, these facilities are not considered part of specialty chemicals.

Estimated statistics for the total other organic chemicals industry and the specialty component are shown in Table 30. The data for the other organic chemicals industry includes both commodity and specialty chemicals, and is repeated from the Petrochemicals profile. It is presented again to provide an indication of the relative size of the commodity versus specialty element of the industry.

Table 34: Estimated Principal Statistics for Specialty Chemicals

	2018	2019	2020	2021	2022
Establishments					
Other organic chemicals	92	145	145	145	X
Specialty chemicals	72	113	113	113	X
Shipments \$M					
Other organic chemicals	6,181	5,601	4,716	5,635	7,881
Specialty chemicals	2,660	2,660	2,660	2,660	2,600
Employment, 000					
Other organic chemicals	3,537	3,137	2,917	2,852	3,464
Specialty chemicals	1,880	1,880	1,880	1,880	2,335
Exports \$M					
Other organic chemicals	4,240	3,866	4,057	4,396	5,837
Specialty chemicals	1,850	1,620	1,620	1,620	1,620
Imports \$M					
Other organic chemicals	6,613	6,534	6,497	8,152	11,806
Specialty chemicals	2,770	2,720	2,720	2,720	4,840

• Commodity Data

Table 34 shows the exports for a select range of specialty chemicals, in both tonnage and dollar value terms in 2014.

Table 35: Canadian Exports of Select Specialty Chemicals, Tonnes

	Value, \$M	Quantity, kt	Top Markets
Palmitates and stearates	16.3	4.4	USA 83% Hong Kong 4% China 3%
Dinonyl or didecyl orthophthalates	5.3	1.52	USA 99%
Azo compounds	4.3	0.60	USA 83% Japan 10%
Cyanine dyes	44.5	2.62	USA 100%
Azo dyes	4.7	0.18	USA 92% Spain 2% China 2%
Other fatty acids	9.6	6.5	USA 85% Germany 10%

Table 36: Canadian Imports of Select Specialty Chemicals. Kilotonnes

	Value, \$M	Quantity, kt	Top Markets
Palmitates and stearates	74.6	19.7	USA 42% Malaysia 42% India 4% Indonesia 2%
Dinonyl or didecyl orthophthalates	7.3	5.06	Germany 37% Sweden 32% USA 25%
Azo compounds	0.63	0.40	Mexico 89% USA 4% Japan 3%
Cyanine dyes	4.78	0.235	USA 50% China 19% Germany 12% India 9%
Azo dyes	41	2.62	USA 42% China 24% Germany 15% India 15%
Other fatty acids	38	33.9	Malaysia 66% USA 21% India 9%

- **CIAC Members Producing Specialty Chemicals in Canada**

- › BASF Canada
- › Evonik Oil Additives Canada Inc.
- › H.L. Blachford Ltd.
- › Imperial Oil
- › Jungbunzlauer Canada Inc.
- › Lanxess Canada Co./Cie
- › Nouryon
- › Procter and Gamble, Inc.
- › SEQENS
- › Stepan Canada Inc.
- › W.R. Grace Canada Corp

1240 - 45 O'Connor Street, Ottawa, ON K1P 1A4 | 613-237-6215
canadianchemistry.ca | @ChemistryCanada
info@canadianchemistry.ca