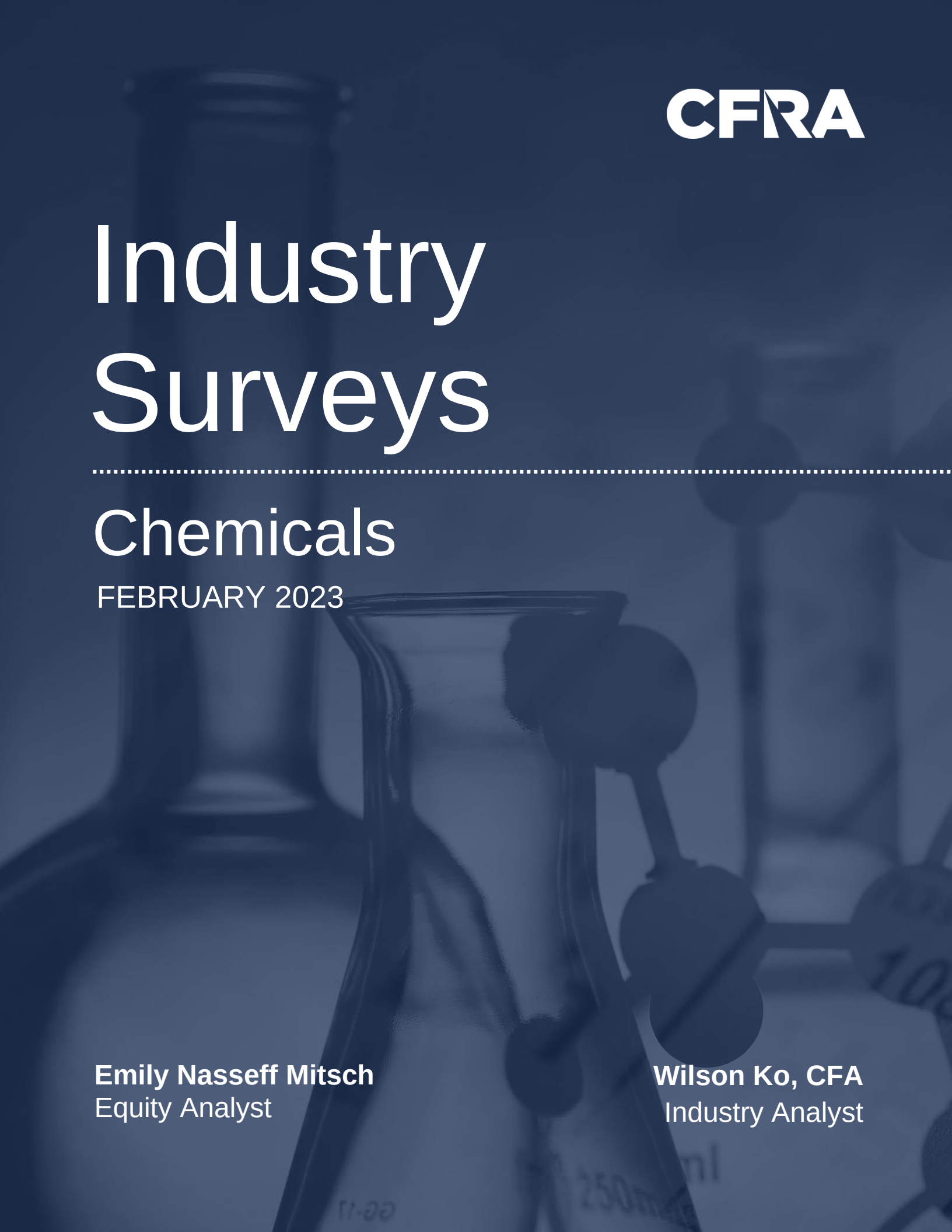

CFRA

Industry Surveys

Chemicals

FEBRUARY 2023

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CHARTS & FIGURES

NEW THEMES

What's Changed: We added a chart showing U.S. residential and non-residential construction spending in the Key Industry Drivers section. See page 7.

What's Changed: CFRA believes the auto end market will be a positive for the chemicals industry in 2023. For more on our market outlook, see pages 12-13.

EXECUTIVE SUMMARY

CFRA has a neutral outlook on the chemicals industry, which is made up of the following sub-industries: commodity chemicals, diversified chemicals, fertilizers & agricultural chemicals, industrial gases, and specialty chemicals. Below are some key themes informing our outlook.

Chemicals: Downgrading to Neutral Amid Recessionary Fears

In 2022, the Federal Reserve continually hiked rates to combat the highest inflation in over 40 years. Because of this, many industries, such as residential construction and housing starts, have taken a hit, especially in the latter half of 2022. With high interest and mortgage rates that are expected to remain elevated in 2023 (and likely increase), we believe industry participants that produce products heavily used in construction, such as sealants, adhesives, paints and coatings, will see a negative impact on demand as residential construction spending slows. We also believe with a potential recession looming, adverse demand trends will not only affect the construction market, but will also affect the wide range of end markets in the chemicals industry. That said, we have a positive view on auto sales, especially electric vehicles, in 2023.

Commodity Chemical Prices to Moderate in 2023 but Remain Elevated

In 2022, petrochemical prices remained relatively high after a surge in 2021 due to tight supply and strong global demand. However, as of January 2023, the petrochemical manufacturing Producer Price Index dropped 24% from one year ago. We expect petrochemical prices to remain elevated in 2023 compared to historical levels, but believe prices will continue to moderate, and slightly drop, in 2023 as production normalizes and inventories rebuild amid falling economic sentiment. We also believe U.S. petrochemical producers, who generally rely on natural gas liquids, maintain a cost advantage over international peers, particularly in Europe, who depend on heavier liquids tied to oil. As a result, we think 2023 will mark recovering margins in most of the U.S. petrochemical producers in CFRA's coverage and acknowledge that prices will likely remain elevated compared to historical levels.

Outlook for Agricultural Chemicals and Fertilizers Remains Positive for 2023

U.S. agriculture stocks, including fertilizers and agricultural chemicals, have been a bright spot in 2022, far outperforming the materials sector and market at large. Fertilizer prices remained high in 2022 given tight global supply coupled with the ongoing Russia-Ukraine war that led to higher energy prices and economic sanctions. In addition, China, the world's largest phosphate producer, has recently reduced output likely due to the country's environmental crackdown on the mining industry and impacts from continued Covid-19 lockdowns. We expect the fertilizer market to remain tight throughout the medium term. We also expect higher crop prices and high demand will bode well for farmers in 2023 and will drive increased spending on crop protection inputs to achieve maximum yields.

Increased Infrastructure and Sustainability Spending to be a Bright Spot in 2023

The secular shift toward environmental sustainability, including decarbonization, bans on plastic, and consumer preferences, will eventually be an issue for underprepared companies within the chemicals industry. Chemical companies will likely continue to invest in technologies that will position them to benefit or take market share amid the shift to a greener market, in CFRA's view. This includes investments in recycling technologies and renewable feedstocks. Additionally, we believe greener initiatives surrounding electric mobility through battery power electric vehicles and hydrogen fuel cells bode well for lithium and industrial gases companies. Lastly, we acknowledge increased federal infrastructure spending, highlighted by the $1.2 trillion infrastructure deal signed into law in November 2021, will benefit the chemicals industry at large, notably coatings and industrial construction materials.

CHEMICALS

Outlook: Neutral

MARKET CAP BREAKDOWN*

RANK NO.	COMPANY NAME	MARKET CAP ($ billion)
1	Linde	163.0
2	Air Products and Chemicals	71.1
3	Sherwin-Williams	60.9
4	BASF	50.9
5	Corteva	46.0
6	Ecolab	44.1
7	Sika	43.4
8	Nutrien	43.0
9	Dow	41.8
10	LG Chem	41.2
	Others	480.7

Source: CFRA, S&P Global Market Intelligence.
*Data as of January 31, 2023.
†Refer to the "Comparative Company Analysis" section of this survey for the list of companies.

ETF FOCUS

XLB Materials Select Sector SPDR Fund	AUM ($M) 6,156.5	Expense Ratio 0.10
LIT Global X Lithium & Battery Tech	AUM ($M) 3,767.7	Expense Ratio 0.75
IYM iShares U.S. Basic Materials	AUM ($M) 810.4	Expense Ratio 0.39

BY THE NUMBERS

2.8% 2022 U.S. total residential construction spending versus 6.1% in 2021

+5.1% U.S. domestic auto production Y/Y growth in November 2022

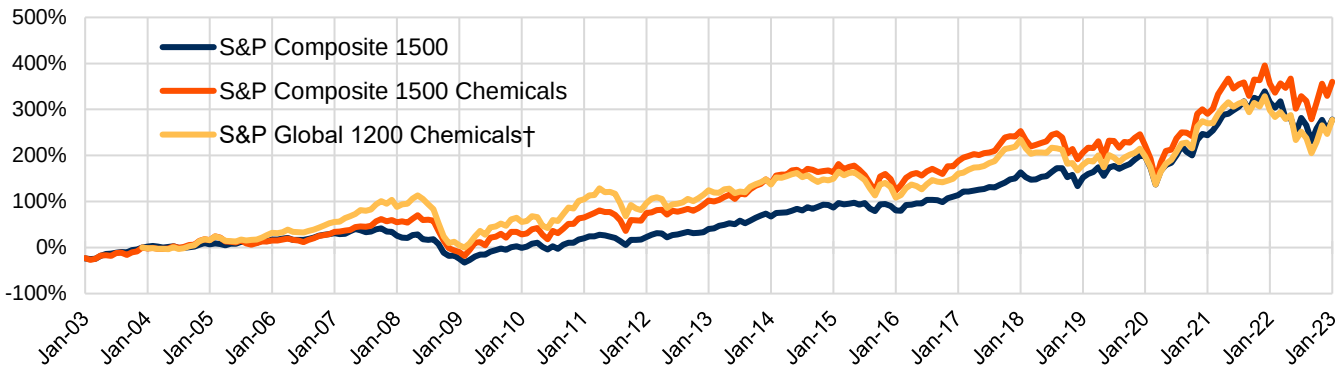
2.8% 2022E global GDP growth versus 6.1% in 2021

-20% 2023E global light vehicle production growth

-14.1% YTD change in ICIS Petrochemical Index

+63.6% 2022 growth in the Fertilizers Price Index vs. 2021

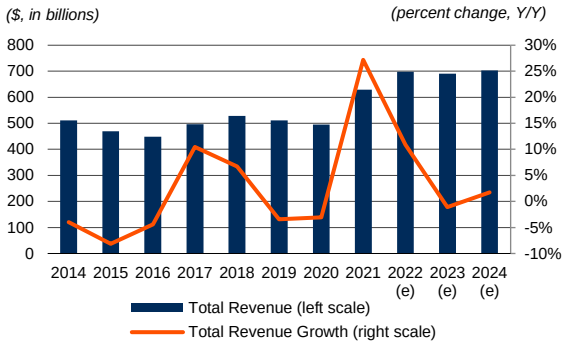
20-YEAR INDEX PERFORMANCE



†Global Index launched in November 2003.
*Data through January 31, 2023.
Source: CFRA, S&P Global Market Intelligence.

FINANCIAL METRICS

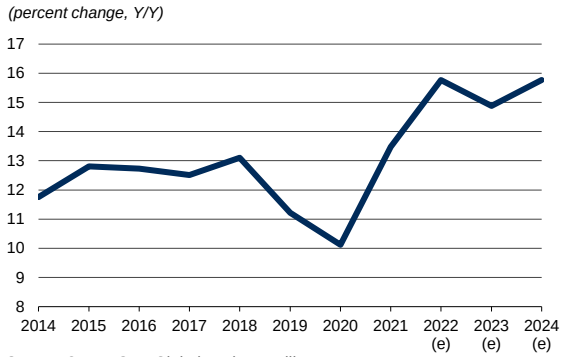
Revenue Growth



Source: CFRA, S&P Global Market Intelligence.

- The industry's revenue growth as a whole will likely be muted in 2023 and 2024 due to moderating prices and subdued economic sentiment (still way above 2019's level), following a spectacular recovery in 2021-2022.
- Consensus forecasts see revenue for the chemicals industry to decrease 1.1% in 2023 before growing 1.8% in 2024, following an expected 10.9% growth of 2022.

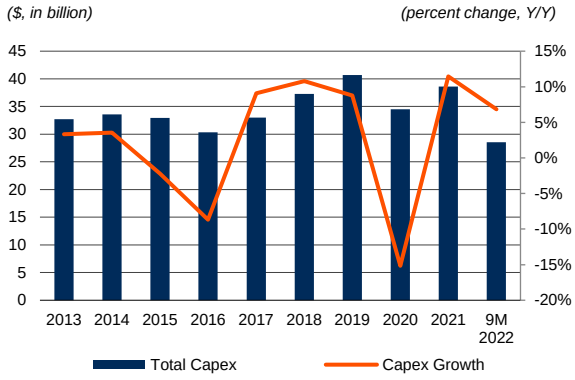
EBIT Margin



Source: CFRA, S&P Global Market Intelligence.

- Average EBIT margins are expected to remain elevated from 2022 through 2024, as the industry's revenue is expected to be resilient in those years.
- The average EBIT margin of the industry has averaged 12.1% in the past five years.

Capital Expenditure Growth



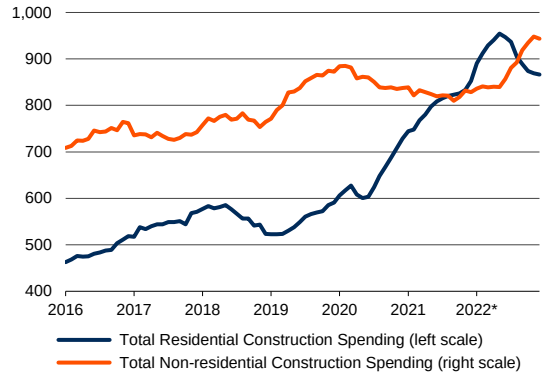
Source: CFRA, S&P Global Market Intelligence.

- Over the past decade, commodity and diversified chemical companies have invested in new production facilities, significantly expanding their capacity. Chemical companies had a huge cut in capex spending in 2020 amid pandemic-related demand shock.
- In the first nine months of 2022, capex for the industry increased 6.8% as chemical companies increased their capex on better market pricing and demand.
- We expect capital spending to moderate in the near term amid subdued economic sentiment and normalizing chemical pricing.

KEY INDUSTRY DRIVERS

U.S. Construction Spending

($, in billion)

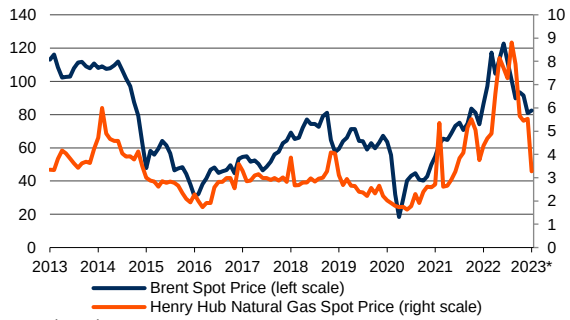


*Data through December 2022.
Source: Federal Reserve Economic Data.

- U.S. residential and non-residential spending is a good indicator of U.S. construction activity.
- U.S. residential spending increased 1.6% Y/Y in December 2022. However, the U.S. also experienced the seventh straight month of decline in residential spending in December, as higher mortgage rates and softer housing prices curtailed demand. We believe residential spending will continue to weaken as long as mortgage rates remain high, which is a negative for chemical demand.
- Non-residential spending, on the other hand, has been more robust compared to residential spending. Non-residential spending grew 13.8% Y/Y in December 2022, while averaging 10.8% Y/Y growth in the last six months (vs. an average of -1.4% for residential spending). The growth was driven by manufacturing, commercial, and highway and street construction. In 2023, we believe non-residential spending will benefit from federal infrastructure spending from the Infrastructure Investment and Jobs Act.

Oil/Natural Gas Prices

($ per barrel) *($ per million Btu)*

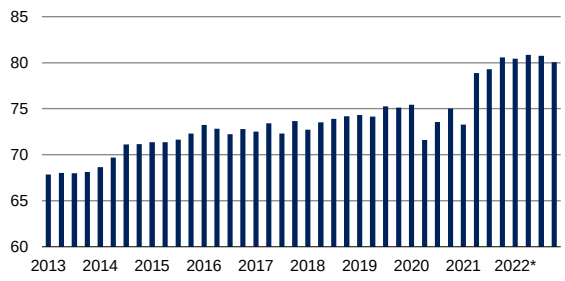


*Data through January.
Source: U.S. Energy Information Administration

- Oil prices recovered substantially from low levels in April 2020. U.S. chemical companies are now enjoying greater feedstock advantage (oil to natural gas price ratio of about 15x in July 2022 vs. 11x in April 2020).
- As of January 10, 2023, the EIA forecasts an annual average oil price of $83.10 per barrel in 2023 and $77.57 per barrel in 2024, while natural gas price is projected to average $4.90/Mmbtu in 2023 and $4.80/Mmbtu in 2024, implying gas price ratio of 17.0x in 2023 and 16.2x in 2024.

Capacity Utilization: Chemical

(percent)

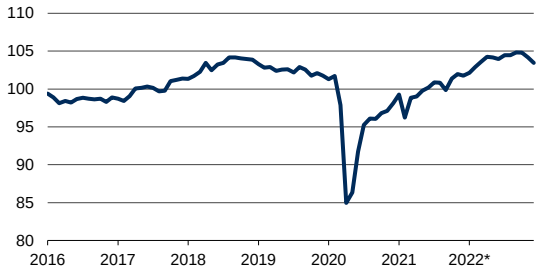


*Data through Q4 2022.
Source: Federal Reserve Economic Data.

- Capacity utilization captures the relationship between actual output and potential output.
- Capacity utilization for the chemicals industry declined to 80.1% as of Q4 2022, versus 80.6% in the same period of 2021, mirroring the slowdown in total manufacturing activity.
- Action Economics forecasts the total industry capacity utilization to slow to 78.6% in 2023 and 78.8% in 2024, versus 79.7% in 2022.

Industrial Production

*(Index 2017=100,
Seasonally Adjusted)*

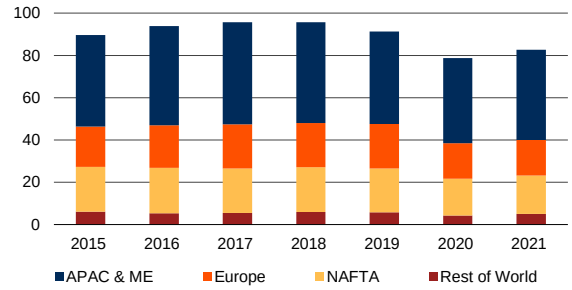


*Data through December 2022.
Source: American Chemistry Council, Federal Reserve Economic Data.

- Industrial production indices are important indicators of economic activity. Rising industrial production is a positive indicator for the chemicals industry, whereas falling production is a negative.
- Industrial production has increased significantly since the low point in Q2 2020, driven by a recovery in economic activity. However, industrial production has seen two straight months of decline in November and December of 2022, reflecting a slowdown in manufacturing activity.
- Action Economics forecasts industry production to expand 0.2% in 2023 and 2.0% in 2024.

Global Auto Sales

(units, in millions)

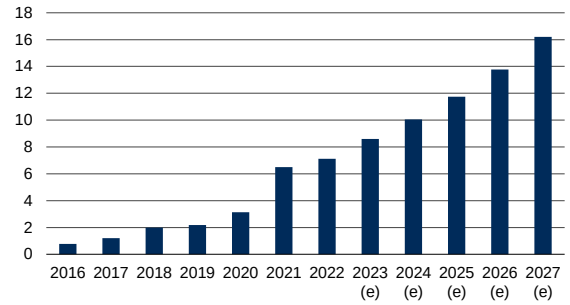


Source: International Organization of Motor Vehicle Manufacturers.

- Automobile manufacturing is a source of demand for chemical companies that make automotive paints/coatings, epoxies, plastics, tire additives, and other products that are used to manufacture automobiles or automobile parts.
- Global auto sales grew 5% in 2021, following a pandemic-driven decline in 2020.
- CFRA expects U.S. light vehicle sales to decline by 8.1% to 13.7 million units in 2022, amid chip shortages, supply chain disruptions, rising labor, raw materials, and borrowing costs. We see a 4% recovery in light vehicle sales in 2023, supported by recovering inventory levels and an increase in promotional activity.

Global Electric Vehicle Sales

(units, in million)

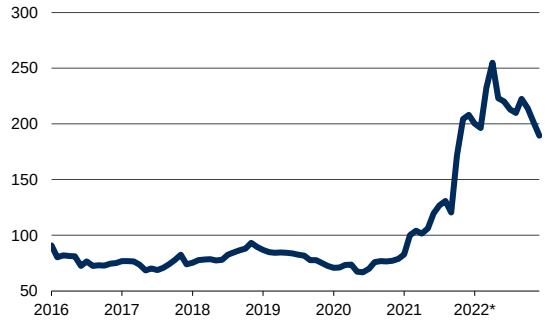


Sources: Statista.

- Similar to traditional automobile manufacturing, the production of electric vehicles also demands high usage of chemicals, particularly lithium for the battery.
- Global electric vehicle sales growth averaged 56.9% between 2017 and 2021. Global electric vehicle sales more than doubled in 2021, reaching 6.5 million units, followed by a relatively slow growth year of 2022 (9.5%).
- Statista forecasts global electric vehicle sales to reach 16.2 million unit in 2027, a 5-year CAGR of 18% in the 2023-2027 period.

Fertilizers Price Index

(index)



*Data through December 2022.
Source: World Bank.

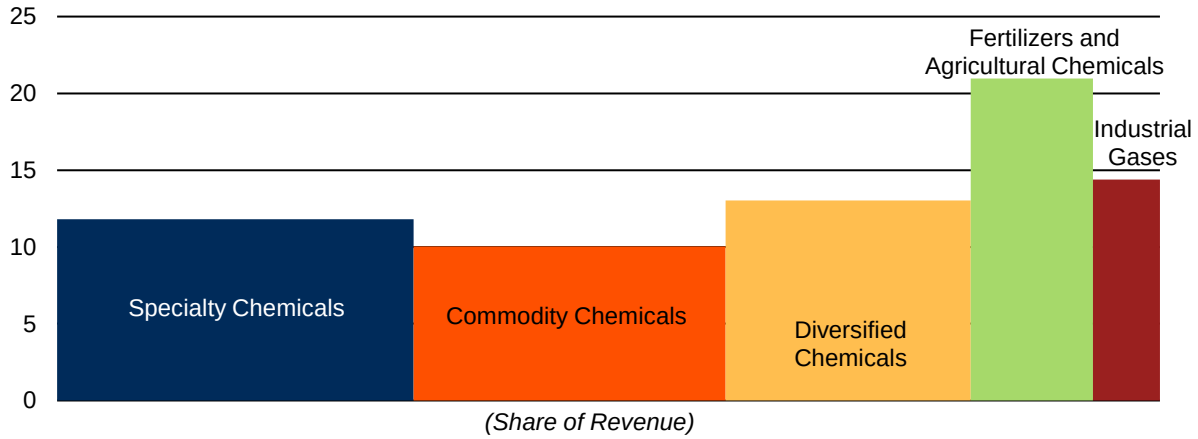
- We forecast nitrogen fertilizer prices, along with nutrient prices, such as phosphate and potash, to remain high in 2023 on tight supply and demand conditions as a result of the Russia-Ukraine war.
- China, the world's largest phosphate producer, has recently reduced output likely due to the country's environmental crackdown on the mining industry, coupled with the impact from continued Covid-19 lockdowns. Production in the U.S., the world's third largest phosphate producer, has also dropped since 2021. The decrease in production from both China and the U.S. will contribute to the tight supply we expect to see in 2023. Potash fertilizer prices have also increased under tight market conditions.
- In addition, EU and U.S. sanctions imposed on Belarus, a top potash exporter, will continue to put upward pressure on potash prices in the near term, in our view.

INDUSTRY TRENDS

Competitive Environment

Industry Profit Share
The chemicals industry is the largest component within the materials sector by market capitalization. The CFRA chemicals universe is comprised of five sub-industries and 60 companies. The profit map below reflects sub-industry share by revenue and corresponding EBIT margins.

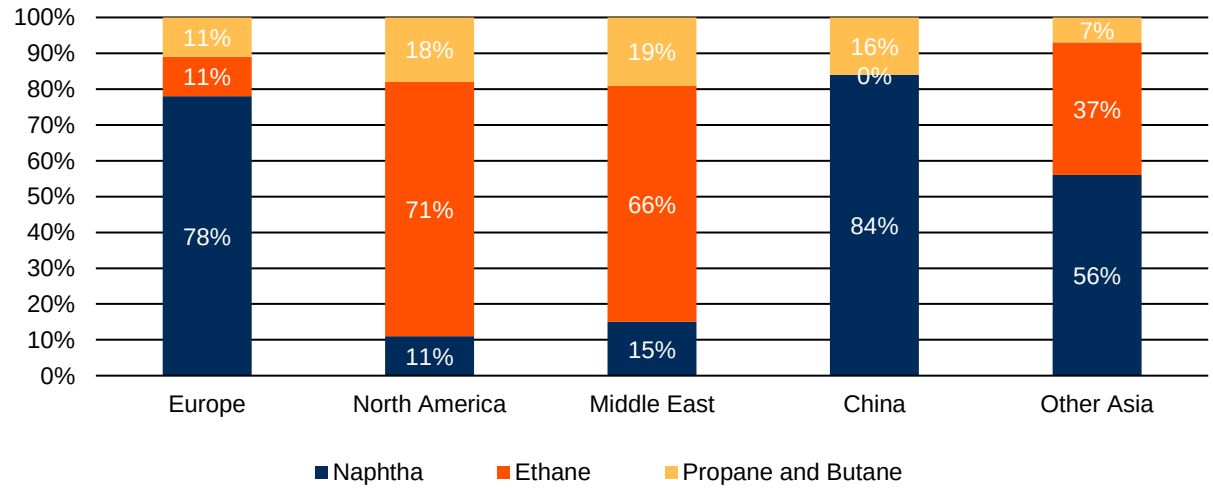
PROFIT SHARE MAP OF CHEMICALS SUB-INDUSTRIES (2017-2021 AVERAGE)
(Operating margin EBIT, in percent)



Source: CFRA, S&P Global Market Intelligence.

Feedstock Advantages and Product/Geographic Exposure Shape the Competitive Landscape
Within the industry, technology requirements, distribution, price, and availability of feedstocks are among the factors that determine the degree of competition within a given product line. Below we see that feedstock share varies across certain regions. This dynamic has been favorable for North America.

SHARE OF PETROCHEMICAL FEEDSTOCKS WORLDWIDE IN 2017*



*Latest available.
Sources: Statista.

Porter's Five Forces

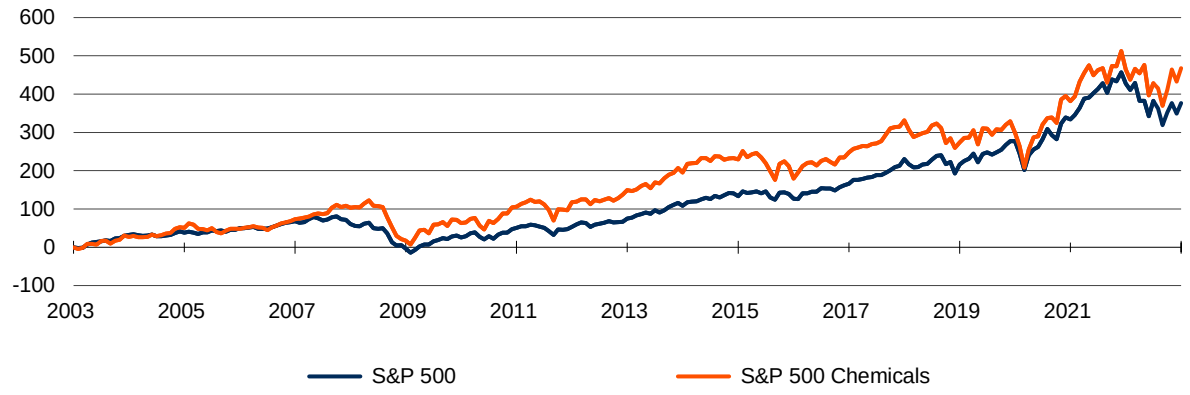
Below, we use the Porter's Five Forces framework as a tool to analyze the competitive environment of the chemicals industry.

Porter's Five Forces Analysis	
Degree of Rivalry / Competition (High)	Chemical products in general feature less product differentiation (except for specialty chemicals). As a result, competition for these products is based primarily on price. The ability of companies to maintain their margins therefore depends largely on their ability to control costs. Specialty chemicals have a higher level of product differentiation. Brand identity and product specialization are important for specialty products, which take competition away from pure price competition. Consequently, degree of rivalry is lower than common chemical products.
Bargaining Power of Customers (High)	For general chemical products, because products are mostly similar with minimum product differentiation, customers have relatively strong bargaining power given the ability of customers to switch to competitor products to achieve similar results. On the other hand, for products with high specialization (such as specialty chemicals) where customers find it difficult to get easy alternatives to the product, their bargaining power tends to be lower.
Bargaining Power of Suppliers (Low / Medium)	Bargaining power for suppliers is lower for commodity-like chemical products as the raw materials used are widely produced and used. In contrast, the bargaining power of suppliers is relatively higher for specialty chemical products because inputs are less commonly used and there are fewer suppliers available.
Threat of Substitutes (Low / Medium)	Threat of substitutes is generally low for the chemicals industry as it features highly capital-intensive differentiation (except for specialty chemicals and industrial gases). The cost of adding new facilities for high-volume commodity chemicals could amount to hundreds of millions of dollars. The specialty chemicals sub-industry, however, is less capital intensive. In addition, there is always a threat of new substitute products being introduced by competitor companies through product innovation.
Threat of New Entrants (Low / Medium)	Threat of new entrants is low for commodity chemicals, diversified chemicals, and fertilizers & agricultural chemicals sub-industries due to their high capital-intensive nature. The cost of adding new facilities, coupled with the energy requirements to produce high-volume commodity chemicals, creates a barrier to entry, in our view. However, the specialty chemicals and industrial gases sub-industries are less capital intensive than the other sub-industries, where there are many small companies competing with larger companies for individual product lines. Threats of new entrants are higher as a result.

Operating Environment

Negative Outlook for Chemicals Used in Residential Construction and Repair & Remodeling
In 2022, the Federal Reserve (Fed) continually hiked rates to combat the highest inflation in over 40 years. Because of this, many industries, such as residential construction and repair & remodeling (R&R), have taken a hit, especially in the latter half of 2022. New housing starts have declined 26% since February 2022 and existing home sales have declined 32% in the same period. Chemicals used in R&R are also expected to take a hit in 2023 as new home buyers delay home purchases until interest rates pull back, thus requiring less R&R in existing homes, supported by the Leading Indicator of Remodeling Activity (LIRA), which projects R&R spending to decrease to 2.6% in the fourth quarter of 2023 from 16.3% in the fourth quarter of 2022. In addition, the Architecture Billings Index (ABI), the leading economic indicator of demand for construction, has decreased 13% from May 2022 to November 2022 and has reported a score below 50 (a negative score) two consecutive months in a row, with the last reported score of below 50 being January 2021. We believe ABI will stay under 50 (negative) for majority of 2023, but think a positive ABI score could be achieved in 2024. These trends are directly related to higher interest and mortgage rates, which are not expected to moderate or lower in 2023. The Fed projects its funds rate to be between 3.9% and 4.9% by mid-2023, and mortgage rates have escalated with the average monthly 30-year fixed mortgage being 6.18%, lower than the 2022 high of 6.90%, but higher than 97% of average monthly mortgage rates in the last 10 years. With high interest and mortgage rates that are expected to remain elevated in 2023 (and likely increase), we believe industry participants that produce products heavily used in residential construction and R&R, such as sealants, adhesives, paints and coatings, will see a negative impact on demand as construction spending slows.

20-YEAR INDEX PERFORMANCE
(percent)



*Data through January 2023.
Source: CFRA, S&P Global Market Intelligence.

Key End Market Outlook
The chemicals industry's diverse and global exposure makes it sensitive to GDP growth. As of February 2023, Action Economics projects global GDP to grow 2.5% in 2023 and 3.2% in 2024, below 2022's 3.4%. The growth will be driven by continued growth in both emerging markets (GDP projected up 3.6% in 2023 and 4.2% in 2024) and developed markets (up 0.8% in 2023 and 1.7% in 2024). Chemical output is mostly in line. As of December 2022, the American Chemistry Council forecasts U.S. chemical output to gain 1.2% in 2023, following a growth of 3.9% in 2022. Below, we highlight our outlook across key chemical end markets.

The automotive market is a major consumer of various chemicals and we believe the auto end market will be a positive for the chemicals industry in 2023 with increased production in the U.S. and globally. As of

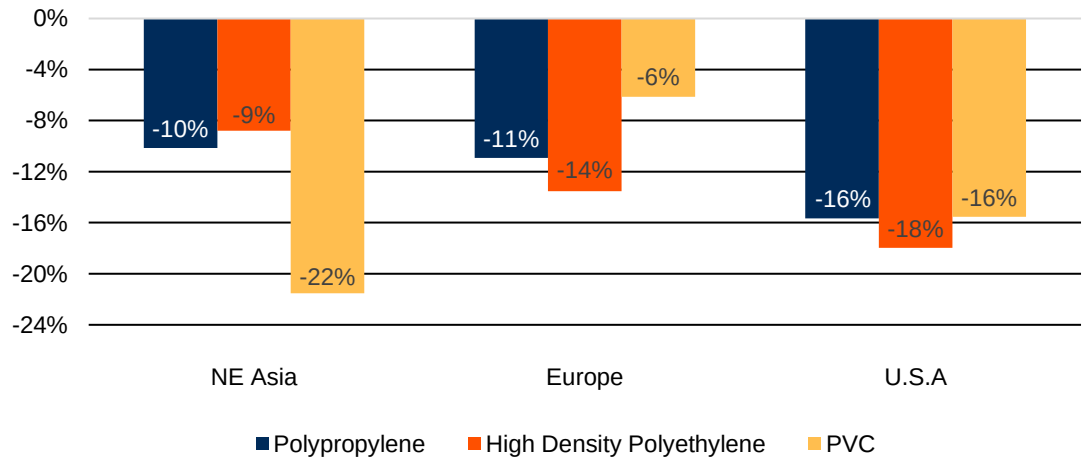
November 2022, domestic auto production increased 9% from January 2022 and rose 6.5% Y/Y compared to the same period in 2021. It is important to note that 2021 was an off year as global auto production was muted by semiconductor chip shortages. We believe it makes sense that auto production was on the rise in 2022 to play “catch up” and think this will last well into 2024. Another underlying trend in the auto market is the accelerated adoption of EVs, which we think adds more opportunities for chemicals through increased electronic applications and increased demand for high-temperature resistant material and lithium batteries. Global EV sales rose 62% from the first six months of 2022 versus the first six months of 2021. That said, we believe short-term trends in EVs may be under pressure as robust demand outpaces supply due to lithium shortages. Companies like Albemarle and Livent are starting new projects to source more lithium to keep pace with demand, and we believe this will benefit the chemical industry in the long term as projects take around two to four years to complete. Overall, we have a positive short to medium-term outlook for auto production, which we believe will bode well for chemicals involved in vehicle production, refrigerants, including nylon, polypropylene, polyethylene, and coatings.

As stated above, building & construction is another market tied directly to chemicals demand and we believe it will be a tough year with decreased residential construction and reduced spending on R&R given high interest and mortgage rates. That said, we think nonresidential construction could be a bright spot in 2023 as spending increases, and believe residential construction could recover in 2024 if interest rates pull back.

Commodity Chemical Prices to Moderate in 2023 but Remain Elevated

In 2022, petrochemical prices remained relatively high after a surge in 2021 due to tight supply and strong global demand. However, as of December 2022, the petrochemical manufacturing Producer Price Index dropped 19% from January 2022. We expect petrochemical prices to remain elevated in 2023 compared to historical levels, but believe prices will continue to moderate, and slightly drop, in 2023 as production normalizes and inventories rebuild amid falling economic sentiment. We also think U.S. petrochemical producers, who generally rely on natural gas liquids, maintain a cost advantage over international peers, particularly in Europe, who depend on heavier liquids tied to oil. As a result, we think 2023 will mark recovering margins in most of the U.S. petrochemical producers in CFRA’s coverage and acknowledge that prices will likely remain elevated compared to historical levels.

CHEMICALS PRICE INCREASE Y/Y FOR EACH REGION*



*Data as of January 2023.
Sources: CFRA, S&P Global Market Intelligence.

North America's Petrochemical Feedstock Advantage Expands as Oil Extends Its Gains

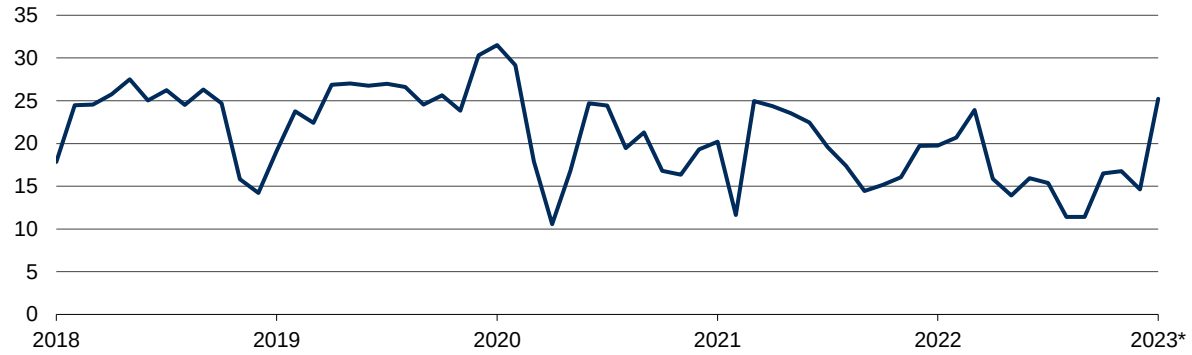
As a rule of thumb, when the oil-to-natural gas price ratio is above 7, U.S. petrochemical producers are relatively advantaged. By this definition, the U.S. has had the advantage for over a decade, and we do not expect a reversal in the medium term. In the chart below, we highlight the previous five years. In April 2020, we saw the ratio come down to 11 from more than 30 at the beginning of the year, which resulted in downward pressure on petrochemical prices and margins for petrochemical companies. Despite the substantial rise in oil prices in 2022, natural gas prices have also climbed at a meaningful rate. The Energy Information Administration's (EIA) 2023 implies a ratio of 17, which is lower than the average of 19 in 2021.

As of January 2023, Brent crude prices averaged $82.50 per barrel. Brent is the international benchmark price and WTI is the U.S. benchmark price. We use Brent when we want to compare the U.S. cost advantage relative to foreign competitors. Brent prices are forecast to average roughly $77.81 per barrel in 2023 versus $94.91 in 2022, according to the EIA. The EIA also expects the average Henry Hub spot price to decline to $4.90/MMBtu in 2023, from $6.42 in 2022 and $3.91 in 2021.

CFRA sees companies with the most feedstock flexibility (the ability to use natural gas liquids, liquefied petroleum gas, and naphtha) to produce petrochemicals and diverse regional exposure being the least impacted by volatility in feedstock prices.

BRENT CRUDE TO HENRY HUB NATURAL GAS PRICE RATIO

(times)

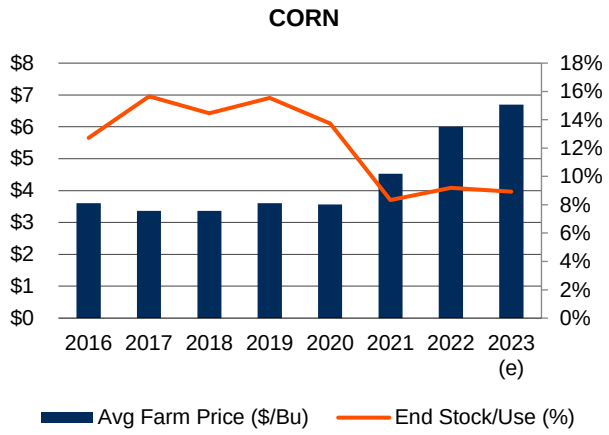


*Data through January 2023.
Source: CFRA, U.S. Energy Information Administration.

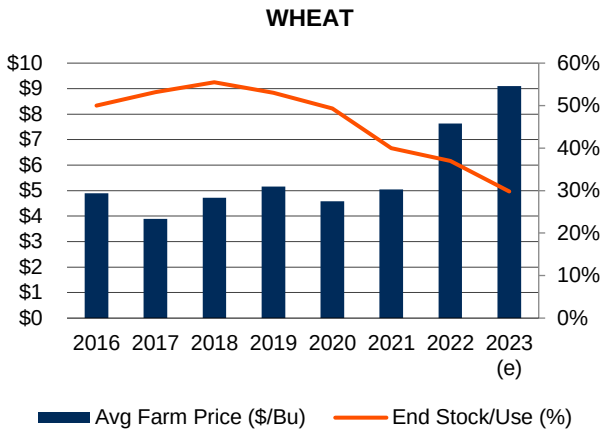
Outlook for Agricultural Chemicals and Fertilizers Remains Positive for 2023

Crop Prices to Remain Elevated in 2023

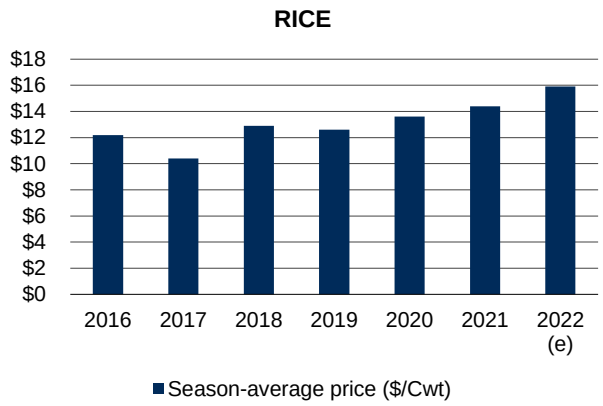
As of February 2023, the USDA estimates average prices of corn, wheat, barley, and rice for the 2022/2023 season to increase by 12%, 18%, 37%, and 24%, respectively, from the 2021/2022 season. As indicated in the charts below, end stock to use levels are still lower than they have been in recent years, and we believe this supports a prolonged agriculture cycle in which inventories need to be replenished. In addition, with higher crop prices comes increased income levels for farmers, allowing them to prioritize maximum yields. That said, a large risk in agriculture is unfavorable weather trends, which could possibly happen in 2023 given drier conditions. All in all, we think agriculture fundamentals will keep prices elevated in the medium term, which bodes well for agriculture input producers in 2023.



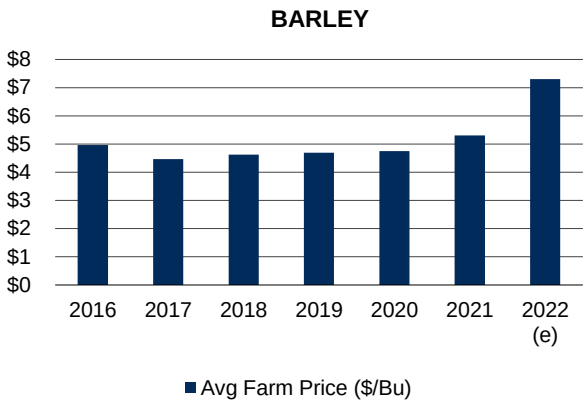
Source: CFRA, USDA.



Source: CFRA, USDA.



Source: CFRA, USDA.



Source: CFRA, USDA.

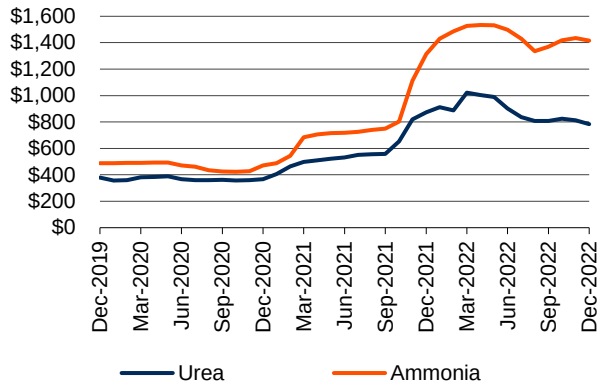
Fertilizers Continue to Face Tight Conditions

In 2021, nitrogen fertilizer prices more than doubled since December 2020 on tight global supply (curtailed production) and robust demand amid a strong agriculture year. In 2022, prices remained high and affordability dropped. In 2023, CFRA expects nitrogen fertilizer prices to stay elevated, especially in Europe, on higher natural gas costs and production curtailments amid the ongoing Russia-Ukraine war and China's reduced output due to the country's environmental crackdown on the mining industry and continued Covid-19 lockdowns. Natural gas is a key feedstock for nitrogen fertilizers and prices increased remarkably in 2022. This is especially true in Europe, where natural gas is priced at a significant premium to U.S. natural gas. Following the spikes in European natural gas prices, many nitrogen fertilizer producers announced they were curtailing their ammonia capacities. This has further tightened the market and has pushed fertilizer prices higher. We see further upside if European natural gas prices remain high enough to keep capacity offline. We expect North American nitrogen fertilizer producers to benefit from the higher prices.

We also expect phosphate fertilizer prices to remain elevated on tight supply, robust demand, and increased feedstock prices. China, the world's largest phosphate producer, has recently reduced output likely due to the country's environmental crackdown on the mining industry, coupled with impacts from continued Covid-19 lockdowns. Production in the U.S., the world's third largest phosphate producer, has also dropped since 2021. The decrease in production from both China and the U.S. will contribute to the tight supply we expect to see in 2023, in our view. Potash fertilizer prices have also increased under tight

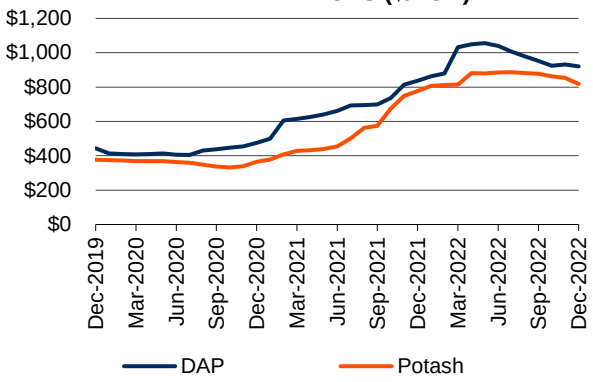
market conditions. We believe sanctions on key potash exporters, like Russia and Belarus (33% of global exports), will keep potash prices elevated in the near term.

NITROGEN FERTILIZER PRICES ($/TON)



Source: CFRA, DTN.

PHOSPHATE AND POTASH FERTILIZER PRICES ($/TON)



Source: CFRA, DTN.

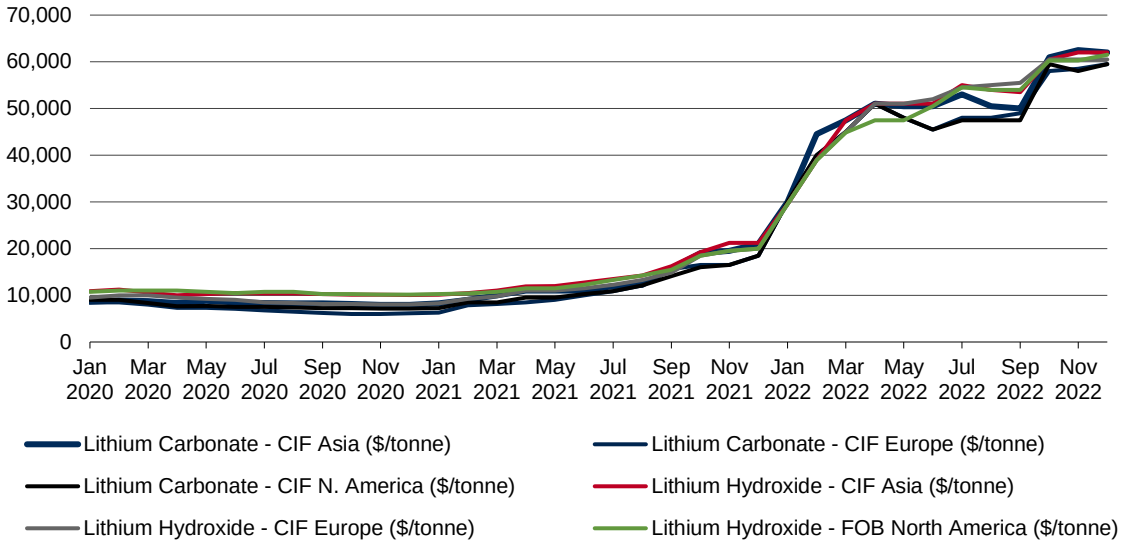
Catalysts in 2022: Sustainability and Increased Infrastructure Spending

Opportunities in Addressing the Circular Economy and the Decarbonization Movement

CFRA expects to see continued investments in mechanical (collecting waste plastic, remelting, and using to make other products) and molecular recycling (decomposition into component molecules) technologies as the war on plastic builds momentum. There are seven different types of plastics produced, and mechanical recycling is only suited for certain resins. Investments include R&D and capacity additions for plants that can convert consumer waste into plastic resins. CFRA thinks Eastman Chemical Company is leading the way with various investments in its recycling technology. In January 2022, Eastman announced that it plans to invest up to $1 billion in a molecular recycling facility in France, which would use the company's polyester renewal technology.

One of the key trends in the decarbonization movement is the accelerated adoption of EVs, which primarily use lithium-ion batteries. The global EV stock has expanded significantly over the last decade and we think EV sales will continue to gain a meaningful share of total vehicle sales over the next 10 years. As a result, the demand for lithium compounds, including lithium carbonate and lithium hydroxide, has outpaced supply, driving lithium prices higher in 2021 and 2022. This will result in higher earnings for lithium companies, including Albemarle and Livent.

LITHIUM PRICE CHART
($/tonne)



*Data through December 2022.
Source: S&P CapIQ Pro.

CFRA also forecasts opportunities in investments in Green/Blue Hydrogen. For Blue Hydrogen, this may include carbon capture retrofits to hydrogen plants (for industrial gas companies). Green Hydrogen would include investments in electrolyzers (a system used to break water into hydrogen and oxygen). As renewable sources scale and electrolyzer costs fall, we expect Green Hydrogen to play a more significant role in global decarbonization. We also note that increased adoption of Green Hydrogen bodes well for companies that manufacture materials used in fuel cells and electrolyzers.

Environmental Protection Agency Taking Action to Address PFAS
On October 18, 2021, the Environmental Protection Agency (EPA) announced its strategic roadmap to address per- and polyfluoroalkyl substance (PFAS), broadly used chemicals that break down very slowly over time. The roadmap consists of actions the EPA plans to take from 2021 to 2024 to address PFAS. This includes the investment in researching PFAS exposures and toxicities, preventing PFAS from entering air, land, and water at levels that have adverse impacts on human health, and accelerating cleanup of PFAS contamination. CFRA believes a more regulated chemicals environment will translate to potential liabilities.

Increased Federal Infrastructure Spending Bodes Well for Chemicals
In November 2021, the bipartisan infrastructure bill, consisting of $1.2 trillion in investments across a variety of industries, was signed into law. Spending provisions span from traditional projects, like roads, bridges, and waterways, to more progressive projects, including clean energy and EV infrastructure. CFRA expects the infrastructure bill to spur growth in building retrofits, automotive and transportation, 5G infrastructure, and more. The chemicals industry, given its depth and breadth of exposure across various supply chains and end markets, will be a direct beneficiary of an infrastructure program, in our view.

M&A Environment

The ability to generate strong free cash flow in 2021 was supported by strong demand trends and elevated prices. Several companies took initiative to pay down debt, return cash to shareholders, and pursue mergers and acquisitions (M&A). Some of the prominent 2021 M&A examples within CFRA's coverage include Celanese's acquisition of Exxon's Santoprene business for $1.15 billion and Westlake's acquisition of Boral Limited's North American building products business for $2.15 billion. This trend has continued in 2022 with Celanese's acquisition of DuPont's Mobility & Materials segment for $11 billion. We highlight more examples in the table below. Given continued cash generation following a period of deleveraging, CFRA expects a more active M&A environment in the near term.

RECENT M&A DEALS OF CHEMICAL INDUSTRY
(DEALS OF AT LEAST $1 BILLION, AS OF JANUARY 31 2023)

ANNOUNCED DATE	CLOSED DATE	BUYERS	TARGET	TRANSACTION VALUE ($ MILLION)	TRANSACTION STATUS
02/18/2022	-	Celanese Corporation	DuPont de Nemours	11,000.0	Closed
04/01/2022	-	Fuda Alloy Materials Co.,Ltd	Kaiman Aluminum	3,487.3	Announced
04/20/2022	-	Avient Corporation	Koninklijke DSM N.V.	1,498.5	Closed
05/17/2022	-	PETRONAS Chemicals International B.V.	Perstorp Holding AB	2,458.3	Closed
05/31/2022	-	Koninklijke DSM N.V.	Firmenich International SA	20,573.6	Announced
05/31/2022	-	Advent International Corporation; LANXESS Aktiengesellschaft	Koninklijke DSM N.V.	3,969.5	Announced
06/08/2022	-	Hahn & Company	Polyester Film Business	1,274.3	Closed
06/08/2022	-	Plasma, LP	PI Advanced Materials Co	1,060.7	Announced
07/28/2022	-	INEOS Limited	Shanghai Secco Petrochemical	1,559.5	Closed
08/01/2022	-	Aramco Overseas Company B.V.	Global Products Business of Valvoline Inc.	2,650.0	Announced
11/14/2022	-	Shandong Energy Group New Material Co., Ltd.	Zibo Qixiang Tengda Chemical Co., Ltd	2,868.6	Announced
11/30/2022	-	Corteva, Inc.	The Stoller Group, Inc.	1,200.0	Announced
12/12/2022	-	Novozymes A/S	Chr. Hansen Holding A/S	12,536.2	Announced

Source: CFRA, S&P Global Market Intelligence

HOW THE INDUSTRY OPERATES

The chemicals industry is large and comprises a wide array of companies that produce different chemical substances that range from commodity raw materials used in other industries, to finished consumer products such as medicines and soap. In this survey, we cover commodity chemicals, fertilizers and agricultural chemicals, specialty chemicals, and industrial gases.

CATEGORIZING CHEMICALS

COMMODITY CHEMICALS

Commodity chemicals, or basic chemicals, generally serve in the production of other chemicals and chemical products as well as manufactured goods. Most commodity chemicals are produced in large quantities and are homogenous in nature. Due to the lack of product differentiation, customers tend to base their purchasing decisions on price, which is directly correlated with feedstock costs and capacity utilization. Production is capital and energy intensive, resulting in low profit margins.

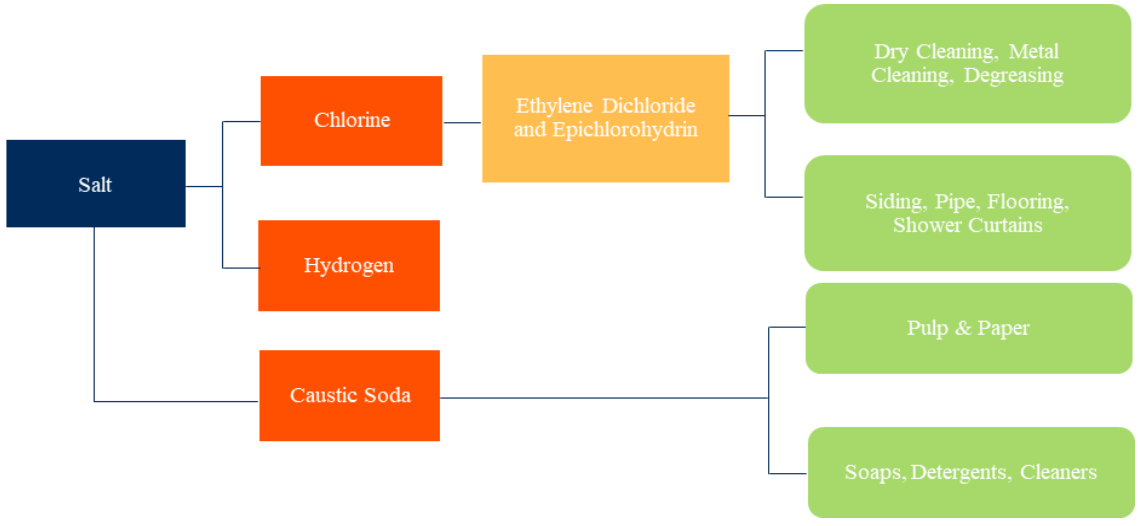
In this section, we will cover the commodity chemicals that are most important to CFRA's coverage, including inorganic chemicals, organic chemicals (petrochemicals), and plastic resins.

INORGANIC CHEMICALS

Inorganic chemicals – substances or chemical compounds that lack carbon – include metals, minerals, and organometallic compounds. This survey will cover chlor-alkalis, which comprise the bulk of basic chemicals produced. This segment supplies building-block inorganic chemicals, catalysts, and reagents used in other products.

Chlor-Alkalis
Chlor-alkalis include chlorine and caustic soda (sodium hydroxide) and other alkalis such as soda ash.

◆ **Chlorine and caustic soda.** Chlorine and caustic soda are produced as co-products of salt brine electrolysis. Chlorine and caustic soda are produced in a fixed ratio of 1 to 1.1. Because chlorine gas is a dangerous product that is expensive to store, demand for chlorine drives the supply and demand balance for both chlorine and caustic soda. Pricing is based on the electrochemical unit (ECU) – a ton of chlorine with the commensurate amount of caustic soda. Chlorine and caustic soda have a variety of end-uses as highlighted in the graphic below:



Chemical companies with exposure to chlor-alkali within CFRA's coverage include Dow Inc., Olin Corporation, and Westlake Corporation.

ORGANIC CHEMICALS

Organic chemicals are substances that contain carbon. Their main sources are crude oil and natural gas. Organics include olefins, aromatics, and methanol, which can be further processed into intermediates and solvents. End products include plastics as well as synthetic rubbers and fibers, detergents, pharmaceuticals, adhesives, inks, dyes, and explosives. The distinctions among these classifications are often blurred, with certain basic and intermediate chemicals frequently sold as end products.

Olefins

Olefins are straight-chain hydrocarbons. Ethane, propane, and butane from natural gas are treated using the "steam-crack" process (the cracking of feedstocks done in the presence of steam) to yield varying percentages of ethylene, propylene, and butadiene. These three substances are the most important olefins, as they are the building blocks for most organic chemicals and synthetic materials.

◆ **Ethylene.** This is the largest-volume organic chemical produced in the U.S. Demand for plastics (polyethylene [or PE], polyvinyl chloride [or PVC], and polystyrene) accounts for about three quarters of final ethylene demand. Other important uses are for the manufacture of antifreeze, synthetic fibers and rubber, solvents, and detergents.

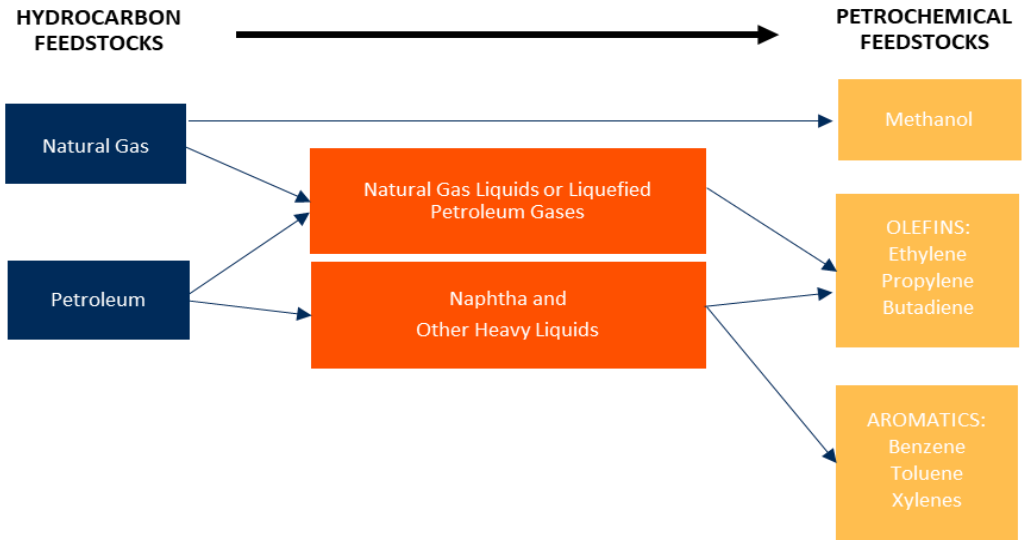
◆ **Propylene.** Propylene is the second-largest organic chemical in terms of volume. The chemical's largest market, at about 50%, is for the manufacture of polypropylene resin. It is also used to make derivative chemicals such as acrylonitrile, propylene oxide, cumene, and isopropanol.

Aromatics

Aromatics include benzene, toluene, and xylenes. A large percentage of aromatics are produced through petroleum refining, so the economies of aromatics production are linked to those of gasoline production. Aromatics' prices are thus closely tied to the demand for and the price of crude oil and gasoline. Important chemical end uses of aromatics are for the manufacture of plastic resins, fibers, and rubber.

Methanol

Methanol is an alcohol that is synthesized by a catalytic reaction of carbon monoxide with hydrogen gas. It is used as a raw material in various intermediate chemicals, including acetic acid and formaldehyde, which are used to make adhesives, plastics, fibers, and plywood.



POLYMERS (PLASTICS)

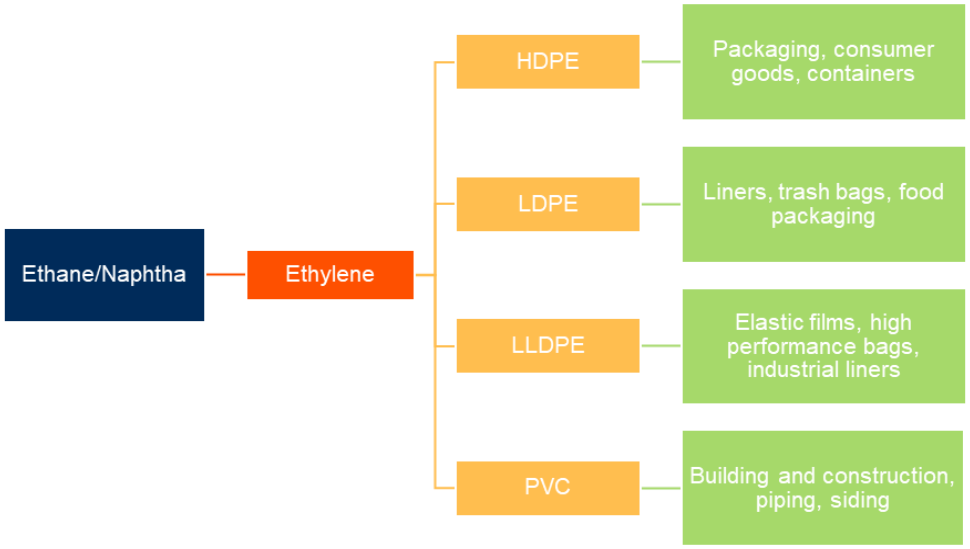
Plastics are produced directly or indirectly from such organic chemicals as ethylene, propylene, butadiene, and benzene. Plastics output may be formed into pellets, flakes, granules, powders, liquid resins, sheeting, or film. Much of the demand for plastics comes from the packaging and consumer markets, two segments that tend to be fairly recession resistant. Major producers in the U.S. are ExxonMobil Chemical, Dow, LyondellBasell, Chevron Phillips Chemical, Westlake Chemical, and Huntsman (Polyurethane).

There are two kinds of plastics: thermoplastics, which can be re-softened to their original condition by heat, and thermosets, which cannot be re-softened. Thermoplastics have accounted for about 85% of total plastics production in recent years, given the ability of thermoplastic to be recycled as well as lower production costs.

Thermoplastics

The five largest-volume thermoplastics are polyethylene, polyvinyl chloride, polypropylene, polystyrene, and polyester plastics.

◆ **Polyethylene.** The thermoplastic polyethylene (PE) – including high-, low-, and linear low-density polyethylene (LLDPE) – is one of the largest, if not the largest-volume plastic on a combine basis. Packaging is the largest market for PE, followed by consumer and institutional products, and exports.



◆ **Polypropylene.** Polypropylene (PP) is one of the largest plastic resins by volume. Much of the growth is propelled by broadening applications in the automotive, durable goods, and textile markets. The major end markets for PP are packaging, consumer and institutional products, furniture/furnishings, transportation, and exports, according to the ACC.

◆ **Polyvinyl chloride.** Polyvinyl chloride (PVC) is also one of the largest plastics in terms of volume. Demand is highly dependent on housing and construction-related markets, which account for about 70% of U.S. consumption. Construction uses include pipes, siding, window and doorframes, fencing, and decking.

Thermosets

This category includes phenolics, polyester resins, epoxies, urea, and melamine, which are considered relatively mature products. Demand for these low-volume products is closely tied to the highly cyclical building and construction markets, which generally account for about two-thirds of demand.

FERTILIZERS AND AGRICULTURAL CHEMICALS

Fertilizers are substances or mixtures that contain one or more of the major plant nutrients and sometimes secondary and/or trace nutrients. They are added to soil to replace essential nutrients depleted by crops. The main nutrients are phosphorus (in the form of ammonium phosphates and superphosphates derived from phosphate rock), nitrogen (supplied as anhydrous ammonia and urea), and potassium (supplied as potash). Secondary and trace nutrients include calcium, magnesium, sulfur, iron, copper, and zinc.

FERTILIZERS

Fertilizer markets are both seasonal and volatile. Demand is a function of grain prices, government farm programs, the acreage and mix of crops planted, weather patterns, farming practices, and the value of the U.S. dollar. Population growth and dietary trends play important roles as well. The cultivation of corn is the largest single use of fertilizer in the U.S., followed by wheat, soybeans, cotton, and other crops. Fertilizer pricing is largely driven by raw material costs and farm incomes. Popular fertilizer companies include CF Industries, the Mosaic Company, Nutrien Ltd., and Yara.

Nitrogen Fertilizer
Nitrogen is the largest-volume nutrient used for higher crop growth and yield. It must be reapplied via fertilizer each year because it is absorbed by crops or escapes from the soil through leaching, volatilization, or erosion and runoff. As a result, nitrogen-based fertilizer typically sees more stable demand, on a per-acre-planted basis, than does either phosphate or potash. Common nitrogen fertilizers include urea and anhydrous ammonia.

Phosphate Fertilizer
The U.S. is the world's largest consumer and importer of phosphate rock and the largest processor and exporter of phosphate chemicals converted from phosphate rock. The USGS estimates that fertilizer and animal feed supplements account for more than 95% of annual U.S. demand of phosphate rock, which totaled 22 million metric tons in 2021. Industrial and consumer applications accounted for the balance of demand; there is now no exporting of phosphate rock. A small amount of rock is imported (accounting for about 11% of demand), virtually all from Peru and Morocco; the bulk is used by three phosphoric acid producers.

Phosphate rock is combined with sulfuric acid to yield phosphoric acid, which is then further processed into fertilizers such as diammonium phosphate. All phosphate rock mining companies are vertically integrated with one or more fertilizer plants, usually located near the mine.

Potash Fertilizer
Potash fertilizer is used to improve quality of the crop. Potash is mined primarily from deposits of potassium salts. Canada is by far the world's largest producer, followed by Russia, Belarus, China, and Germany. Common potash fertilizers include Muriate of Potash (MOP) and Sulfate of Potash (SOP).

AGRICULTURAL CHEMICALS

Crop Protection
Crop protection products consist of pesticides and seed treatment. Companies involved in the crop protection market include Bayer, FMC Corporation, and Corteva, Inc.

◆ **Pesticides.** Pesticides consist of agrochemicals that are used to ensure safety of crops during the planting process and are used to increase crop yields by fighting off multiple pests. Pesticides can be categorized into herbicides, insecticides, and fungicides. One of the key drivers for pesticides is the increasing demand for food security in emerging countries with large populations.

SPECIALTY CHEMICALS

Specialty chemicals (or “specialties”) are generally made from basic chemicals, and, because they are designed for specific applications and/or customers, they may be produced in small volumes. Specialties are sold largely based on their performance attributes and are often critical components of the end products in which they are used. They require higher R&D spending and incur a greater amount of marketing and customer service costs than do commodity chemicals. Products include paints and coatings, adhesives and sealants, catalysts, additives (cosmetics, plastic, paper, etc.),

PAINTS AND COATINGS

Used to create a protective and/or decorative layer, paints and coatings are among the industry’s major product categories. The substances used to make them include resins, solvents, additives, pigments, and, in some products, a diluent. Popular Paints and Coatings companies in CFRA’s coverage include Sherwin Williams, PPG Industries, and RPM International.

Paints and coatings are used in various end-markets, including architectural, automotive, and specialty applications. According to IHS Markit, 55% of coatings produced worldwide are used to decorate and protect new construction and maintain existing structures, while 35% are used to decorate and protect industrial products. The remaining 10% are used for special purposes. Pricing for paints and coatings is largely driven by raw materials, including pigments & fillers, solvents, and resins.

ADDITIVES

Plastics are combined with additives and other ingredients – stabilizers, colorants, flame retardants, and reinforcing agents – and then shaped or molded into a solid state under heat and pressure. These characteristics generally narrow the scope of the plastics’ use to a specific market or product.

Other additives include those used in food & beverage and cosmetics. Food additives are used to preserve the shelf life of a certain product or add certain qualities, like color and flavor, to a food. Cosmetic additives are used in various products, including hair cleaning and conditioning products, fragrances, and powders and pigments.

LITHIUM

Lithium, the main raw material of lithium-ion batteries for electric cars and mobile devices, has seen surging demand in recent years. The share of batteries in global end-use of lithium increased to 74% in 2021, from 35% in 2015, according to the USGS. Commercial lithium arises from two major sources: underground brine deposits and mineral ore deposits.

Through **brine** deposits, lithium carbonate is produced, which involves pumping up lithium rich brine from below the ground into shallow pans for evaporation, series of chemical treatment, and filtration.

The process of recovering lithium from **ore** in general involves removing the mineral material from the earth, and then heating and pulverizing it.

Lithium carbonate is a colorless crystalline compound that can be used in ceramic and porcelain glazes, pharmaceuticals, and luminescent paints, and can be converted to lithium hydroxide to produce lithium-ion batteries. Lithium carbonate also has various medical uses.

Lithium hydroxide is an inorganic compound that is mainly used in the production of lithium-ion batteries, ceramics glass, and grease.

INDUSTRIAL GASES

Industrial gases are produced primarily by air separation; that is, they are extracted from the atmosphere. Examples of gases produced in this manner are nitrogen, oxygen, argon, and the rare gases. Some gases, including hydrogen, acetylene, and carbon dioxide, are co-products or byproducts of other processes. Air separation plants are sometimes built on the customer's property, which leads to low customer switching in those locations. There are two other basic distribution methods for industrial gases: bulk supply (high volume) and cylinders (low volume). Industrial gases companies in CFRA's coverage include Linde and Air Products & Chemicals.

In the dominant cryogenic air separation process, air is cooled and pressurized until it becomes a liquid, with the various gases extracted through fractional distillation. However, non-cryogenic production technologies are a growing source of nitrogen and oxygen. The two key non-cryogenic systems are membrane separation and pressure swing adsorption. Facilities based on either of these systems tend to be significantly smaller than cryogenic plants, and thus can be located directly on a customer's site. Due to their lower capital and energy requirements, these two methods produce gases at a much lower cost – sometimes 50% less than the traditional cryogenic method.

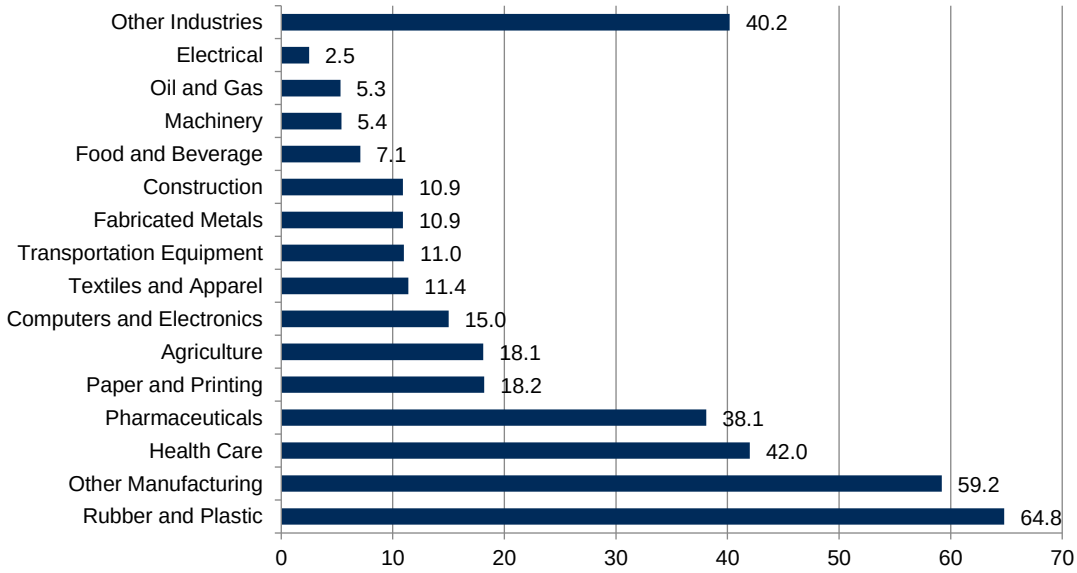
These lower costs have spurred the development of new applications for industrial gases, opening up new gas markets in which cryogenic gases would be uneconomical. Non-cryogenic methods also are taking some existing small-volume business away from cryogenically produced gases, freeing up much-needed cryogenic production capacity.

Chemicals Industry Characteristics

Production

The business of chemistry is large and complex, reaching practically every end-market across the globe. However, chemical production is relatively concentrated in the U.S. Gulf Coast region as natural gas feedstocks are more readily available than in other regions across the U.S. According to the ACC, 80% of primary petrochemicals are produced in Texas and Louisiana. We can see below that the U.S. chemicals industry has a wide breadth of customers, including the industry itself.

U.S. BUSINESS OF CHEMISTRY FLOW CHART 2021 ($, BILLIONS)



Sources: American Chemistry Council.

Cyclicality
The manufacturing, automobile, agriculture, and housing segments are the largest customers of the chemicals industry. As such, the chemicals industry is cyclical in nature and generally correlates with the health of economy or commercial viability of its end products. However, some businesses within the industry are not as cyclical as others. The paint and coating segment, for instance, can be negatively affected by an economic downturn as housing markets and car sales dwindle.

Such imbalances, however, generally do not apply to specialty chemicals as they are manufactured in lower volumes than basic chemicals and are largely used in final products for specific applications. These specialized products are less susceptible to cyclical demand, thus reducing pricing volatility. The value of specialty chemicals to the customer also raises the “switching cost”, offsetting the bargaining power of customers. Capacity additions for specialty chemicals are commonly small or designed for unique products, and thus can be done relatively quickly to closely match demand growth.

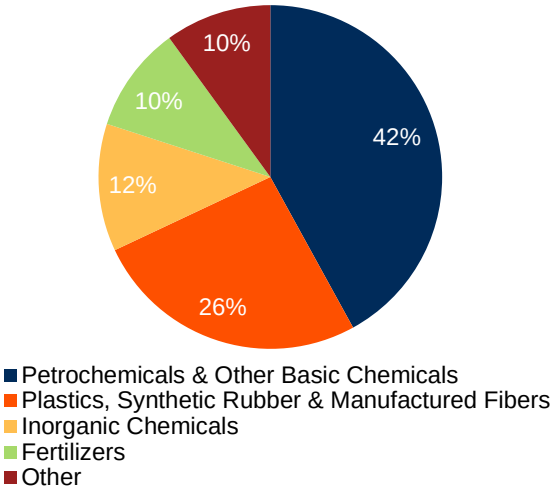
Capital Intensity
The cost of adding new facilities for high-volume commodity chemicals could amount to hundreds of millions of dollars. These large plants are required to achieve economies of scale that enable efficient manufacturing of chemicals products. Other factors include the complex nature of technology used in plants and equipment; ancillary investments in utilities, storage, and distribution systems; and the high levels of expensive, sophisticated safety and environmental protection equipment required for today’s chemical facilities.

The specialty chemicals sub-industry is less capital intensive than the commodity chemicals sub-industry. Manufacturing plants for specialty chemicals are usually small to medium in size and cost from a few million to several tens of millions of dollars. However, specialty chemicals companies may need many manufacturing or distribution sites for the large number of unique, low-volume products that their customers require.

Both commodity and specialty chemicals firms must maintain capital budgets for the continual upgrading and replacement of existing plants. Facilities periodically undergo extensive modernization programs, often resulting in the expansion of rated capacity potential. Long lead times are normal for the construction of new facilities – especially for commodity products – because larger plants are needed. Local authorities must be notified, to obtain zoning and environmental approvals, and plants must be designed, constructed, and put into operation. Thus, it is difficult for a chemical company to make short-term changes in capital spending and for capacity to match major changes in demand.

Energy Intensity
The chemicals industry is highly energy intensive. Take the U.S. chemicals industry as an example. The bulk chemicals industry is responsible for almost half of the growth in industrial natural gas demand, according to the EIA’s “Annual Energy Outlook 2021” report.

SHARE OF TOTAL ENERGY CONSUMPTION BY SEGMENT IN 2021



Sources: American Chemistry Council.

The U.S. chemicals industry's energy costs for fuel and power needs accounted for around 85% of production costs, according to the ACC's "2022 Guide to the Business of Chemistry". Companies purchase much of their energy needs under long-term contracts, which help reduce sensitivity to fluctuations in spot oil and natural gas prices. For manufacturers of some products, such as petrochemicals, energy consumption for both fuel and raw materials accounts for most of the total cost of production.

Distribution Methods Vary

Chemicals is the largest exporting sector in the U.S. Chemicals are transported over the road, by rail, by water, and by air. The U.S. chemicals industry shipped nearly 948 million tons of chemicals and products (including consumer products and drugs) within the U.S. in 2020 (latest available), according to the ACC. The ACC estimates that the total cost of transportation for the chemicals industry was nearly $55.4 billion in 2020.

Over 57% of all chemical and product tonnage in 2020 (latest data available) was shipped by truck, according to the Association of American Railroads (AAR). Trucking is most widely used for small-volume packaged products, as well as for industrial gases and consumer products, such as pharmaceuticals and detergents. Railroads accounted for 19% of tonnage in 2020, while waterborne transport moved 20% of chemical tonnage, mainly for shipping of large-volume commodity chemicals.

Other modes of transportation include pipelines, rail/truck intermodal, and air cargo. Pipelines accounted for 5% of volume in 2020, mainly for short-distance transportation of industrial gases and petrochemicals such as ethylene. In some regions, suppliers commonly connect directly to their customers' plants by pipeline.

HOW TO ANALYZE A COMPANY IN THIS INDUSTRY

When analyzing a company in the chemicals industry, one should take into account such factors as economic and end-market conditions, the nature of the company's product lines (such as commodity or specialty) and any issues that may be unique to the company.

The level of demand for a company's products is determined in large part by economic conditions. These include growth in GDP and/or industrial production, as well as conditions in important end markets.

Product Line Fundamentals

Various questions about a company's product lines need to be considered. What kinds of chemicals does the company produce? Is the company's product mix commodity or specialty in nature? How sensitive are those products to the business cycle? What is the outlook for industry capacity additions or reductions in those product lines? How great is the company's ability to pass on raw material cost increases to customers? To what extent is the company forced to pass any manufacturing or raw material cost savings on to customers? Is the company changing or improving its product mix?

Scrutinizing Supply

Changes in industry capacity in a company's product line should be assessed. Industry capacity changes can greatly influence a product's selling prices and profit margins. Generally, changes in industry capacity play a greater role for commodities than for specialties.

To take advantage of economies of scale, commodity chemicals are usually produced in larger facilities than are specialties. Commodity producers have sizable fixed costs, which must be spread over many units of production for the firm to make a profit. Thus, capacity additions or reductions can significantly affect a commodity chemical's balance of supply and demand, influencing capacity utilization rates, prices and profit margins.

In the case of new supply, a producer of commodity chemicals that has brought the new capacity on-stream will attempt to sell its new supply. In addition, other producers will try to maintain their existing volumes in the face of the new competition. Consequently, all producers may be forced to reduce selling prices to win or maintain customers. It is common, however, for suppliers to obtain long-term supply agreements from customers, which help to stabilize production volumes. In addition, given the large capital requirements for new production facilities, suppliers often line up customers for some or all the output of a new facility before beginning construction.

When falling demand leads to excess supply, chemical producers may reduce selling prices to maintain volumes. The lower prices and/or volumes can cause certain facilities to operate at a loss, in which case their owners may reduce capacity to cut their losses. The product's supply/demand situation should then move closer to equilibrium; depending on the situation, its supply may even be permanently reduced.

As economic growth or new applications increase demand for a product, excess capacity is used up. Eventually, a product's supply and demand come into balance. Producers can then stabilize or even increase selling prices. If rising demand leads to tight capacity and significantly higher prices, producers are encouraged to add new capacity. Thus, the business cycle repeats itself.

In the analysis of specialty chemicals companies, industry capacity changes generally play a small role. Again, because specialty chemicals are largely sold based on their performance attributes, and because their demand is relatively stable, industry supply/demand balances exert less influence over selling prices and profit margins than is the case with commodities. Capacity additions for specialties are commonly small or are designed for unique products; either way, they can be completed relatively quickly. Thus,

specialty chemicals companies can readily make short-term changes in capital spending and capacity in response to significant changes in demand.

Company Characteristics

When analyzing a company, consider its specific characteristics, such as geographic reach, acquisition strategy, and new products.

Geographic Reach
The extent of a company's geographic reach is important in that it can diversify risk. A broad international mix of customers helps to reduce a company's exposure to an economic downturn in any one country, and thus to smooth its sales and earnings trends.

Geographic expansion may provide growth opportunities. The countries of the Asia-Pacific region, Latin America, and Eastern Europe have higher potential economic growth rates than do U.S. and Western European economies, which are more mature. However, the cost of such expansions – in terms of capital spending, acquisitions, product development or marketing – may hurt near-term financial results. Changes in currency exchange rates also will affect results.

Acquisition Strategy
A company's acquisition strategy must be considered. Companies that perceive limited growth opportunities in existing markets or products may see acquisitions as the main avenue to growth. When assessing such a company, the investor needs to ask several questions.

How does the company's management allocate capital to internal growth and acquisition-based external growth? What are its acquisition criteria? How does management address the conflict between investments that serve to reduce cyclical exposure and those that sharpen the company's focus on current markets and customers? Are the company's acquisitions closely related to its existing businesses, or is the company diversifying its product mix? Is the company's diversification strategy consistent with its core competencies?

New Products
All companies in the chemicals industry introduce new products, but producers of specialty chemicals must do so continually. Questions to ask include the following: At what rate is the company releasing new products? Are customers accepting those products? Is the company improving its product mix by introducing higher-margin goods? Is the company's response to customer demand being driven by changes in final consumer preferences, government regulations, or technology? Is it maintaining or increasing its market share? This latter question is often hard to answer in the specialty chemicals sub-industry since information on individual products is often lacking and most segments have few public competitors.

Looking at the Income Statement

When looking at the income statement, six key items to review are sales, operating margins, special items, interest expense, net income, and earnings per share (EPS).

Sales
A natural place to begin a financial analysis of a chemicals company is with its sales figures. Changes in sales are largely due to fluctuations in sales volume, selling prices, product mix, and currency exchange rates. Acquisitions and divestitures also play a part.

When evaluating any period of less than one year (such as one quarter, six months, or nine months), compare it with the same period in prior years. This neutralizes such variations as holidays, normally

scheduled plant shutdowns or seasonal cycles in end markets such as agriculture. If possible, look at sales for ongoing businesses or product lines to eliminate the impact of acquisitions and divestitures.

For an indication of emerging business trends, look at sequential changes in sales. Sequential trends can reveal early signs of changes in selling prices or demand. For example, if industry conditions worsen throughout the year and selling prices remain low compared with the preceding year, it could lead to a negative analysis for the near term. However, if sequential trends reveal that prices have begun to turn up, they will support a more positive outlook.

Compare changes in sales with the company's historical growth rates and the rates of its competitors. Are the company's sales growing or declining, and why? Are its core markets or product lines growing faster or slower than in the past? Is it becoming more efficient in its use of resources to generate sales? Is it adding new capacity or introducing new products, gaining or losing market share? [Note: market share in the chemicals industry is often hard to determine because of a lack of information for many individual products.]

Watch Out! *Chemical companies provide certain cash sales incentives and allow returns from customers. Therefore, management must make a variety of estimates in calculating provisions for appropriate allowances at the time of sale. Revenues are presented net of these provisions, while accounts receivable are presented net of the related allowances. Consequently, the amount of the provision can be manipulated to manage revenues and earnings up or down in any given period.*

Operating Margins

Operating margins are calculated by taking a company's sales and subtracting costs of labor, raw materials, energy and utilities, plant operations, and depreciation of plant and equipment. Also subtracted are expenses for selling, marketing, administration, and R&D. The resulting operating profit is divided by the sales figure to derive the operating margin.

In general, costs for raw materials, manufacturing, and depreciation account for a larger percentage of total costs for a commodity chemicals company than they do for a specialty company. Operating margins over a business cycle are generally more volatile for commodities than for specialties, due to more rapid changes in selling prices, raw material costs, and production levels. Even relatively small changes in selling prices and production levels can dramatically alter margins for commodity chemicals. Changes in raw material costs also can widen or narrow margins. Operating margins for specialty chemicals are usually relatively stable over a business cycle, due to the low volatility in production levels and selling prices. Therefore, margins normally do not vary significantly from one year to the next.

Changes in the cost of various commodity chemicals and other raw materials can materially affect margins for specialty chemicals, as their selling prices may not change or may lag changes in costs. Therefore, during periods of robust demand for commodity chemicals, higher raw material costs can result in a margin squeeze for specialty products. In times of weak demand, margins can widen. In either case, the impact will vary by specialty product and company.

Other factors that may change margins for a company in the chemicals industry are the costs associated with businesses recently acquired or divested, major new plant construction or maintenance programs, environmental cleanup projects, and an unusual number of new product introductions. Technology improvements for manufacturing processes initially incur some costs but may reduce costs and improve profit margins in the long term.

Watch Out! *Some chemical companies incur substantial costs related to R&D. Under U.S. GAAP, R&D costs must be expensed as incurred. A sharp decline in R&D costs relative to sales raises concern that a company may be delaying or cutting back on R&D costs in the current period to boost earnings. This practice may benefit current period earnings at the expense of future earnings as the company suffers due to inadequate investment in new products resulting from lower R&D.*

Special Items

Companies may report special or nonrecurring charges or gains for various reasons. Nonrecurring items may include gains or losses from the sale of assets, costs associated with a major acquisition, or charges for the expected costs of restructuring a business line or the overall company.

Restructuring charges taken by a company can relate to downturns in a certain chemicals market or the overall industry, or to conditions specific to the company. Such restructuring costs may include employee severance, plant closings, or the write-down of assets such as plants and equipment, inventories, and goodwill for a previously acquired product or business. Normally, these actions lead to lower future expenses in areas such as personnel and depreciation.

Watch Out! *Special charges for unusual or infrequent items, e.g., restructuring charges, are often excluded from non-GAAP earnings and therefore provide the potential for a dishonest management to enhance analysts' perception of its profitability through aggressive use of these special charges. The company may also position itself to boost reported earnings in future periods by either (a) recording excess reserves on the liability side of the balance sheet or (b) by reducing the carrying value of assets that will be used in subsequent periods.*

Interest Expense

Despite the industry's capital intensity, interest expense is normally less important in an analysis of a chemicals company than are the factors discussed earlier. The industry is generally profitable, with a positive cash flow.

Acquisitions and divestitures, as well as changes in capital spending and the pace of stock repurchases, can result in a company seeing higher or lower debt and interest expense than in prior years. The change in interest expense could be temporary, as a company might plan to return to prior debt levels. Alternatively, it could be a permanent change, if the company intends to leverage its balance sheet more or less than in the past.

Net Income

Net income is the bottom line: the profit or loss remaining after all expenses and income taxes are paid. To get the best idea of a company's true earnings, look at net income for a company's ongoing businesses before special items. For example, while a company's net income may be growing because of acquisitions, its other businesses could have earnings problems. Changes in accounting methods—such as for inventory valuations, depreciation schedules, and assumption of pension costs—can also affect net income comparisons.

A company's net profit margin (net income divided by sales) should be compared with historical levels and with other companies' net margins. Changes in net margins indicate whether a company is using its resources more or less efficiently than in past years and relative to other companies. Other factors, such as rapid changes in selling prices and/or raw material costs, also can affect net margins. Again, for reasons discussed earlier in this section, earnings and margins are more volatile for commodity companies than for specialty companies.

Watch Out! *Companies in the chemicals industry are fixed asset intensive, making depreciation a significant expense for most of these companies. Since depreciation is based on estimates of asset lives, management can manipulate these estimates to manage earnings. Specifically, extending the depreciable life of an asset will boost a company's earnings while shortening depreciable lives will decrease earnings.*

Watch Out! *Companies can use the environmental and legal liability accounts to help manipulate earnings. Many companies in this industry have environmental liabilities and book reserves related to them. In addition, these companies may be subject to litigation for a variety of reasons, including product liability and patent infringement.*

Earnings per Share

Earnings per share (EPS) should be adjusted for nonrecurring items to obtain accurate comparisons with prior years. Investors naturally like to see a company's EPS growth accelerate from year to year. However, changes in the number of shares used in calculating EPS – if the company issues new shares or buys back outstanding shares – can result in EPS growth that is slower or faster than net income.

The potential impact on a company's EPS from the conversion of any outstanding stock options should also be considered. If converted into new stock, such options can have a significant impact on EPS.

Balance Sheet Data

Investors should look at a company's balance sheet to determine its financial strength or potential problems. Changes in the working capital ratio—the ratio of current assets to current liabilities—will show whether the company is using more or less cash than usual for normal operations and whether the business has a potential liquidity problem. A buildup in accounts receivable as a percentage of sales may indicate problems with customers' bill payments, while growth in the inventory-to-sales ratio can foretell a slowdown in production levels or asset write-offs.

The capital structure of the balance sheet should be examined. Specialty chemicals companies tend to have lower debt-to-capital ratios than do commodity companies, reflecting lower capital requirements. The chemicals industry's debt-to-total capitalization ratio in 2015-2019 was about 40%. A debt analysis should also include the earnings-to-fixed-charges coverage ratio, which is the number of times interest expense is earned by operating profits.

Return on equity (ROE) – net income divided by equity – indicates the company's earnings power. Increases in a company's ROE may indicate improved utilization of financial resources or debt leverage, or a reduction in its equity level.

It Is Not Easy Being Green

For most companies in the chemicals industry, one major potential liability that may not be fully recorded on the balance sheet is the future cost for environmental remediation of existing plants or hazardous waste sites. When a company can reasonably determine its probable liability for the partial or full cleanup of a particular site, it makes a reserve against earnings in that amount. Total reserves for environmental remediation costs may be found in the company's notes to financial statements, although the extent of disclosure varies by company.

If changing environmental regulations result in additional potential costs – or if new liability is determined for additional sites – the company may need to set aside new reserves, reducing reported earnings. The notes to a company's financial statements may also indicate its annual expenses for operating and maintaining environmental facilities, as well as capital outlays for environmental equipment.

Cash Flow

Given that the commodity chemicals sub-industry is quite capital intensive, any company analysis should include an examination of cash flow. Cash flow analysis reveals how a company's cash is generated and how much of it is available from normal operations to fund capital expenditures, make acquisitions, distribute as dividends, or repay debt.

In its simplest definition, cash flow from operating activities (CFO) is net income plus depreciation and amortization (D&A) expenses. D&A are non-cash charges – that is, companies deduct them as expenses, but they require no cash outlays. A broader definition of CFO includes changes in working capital (current assets minus current liabilities) because these changes can consume – or free up – cash.

Cash flow as a percentage of revenues and cash flow as a percentage of assets are ratios that indicate how much cash flow is generated by each dollar of a company's revenue or assets. Cash flow analysis will show whether a company can fund unusual expenses or capital projects from internally generated sources or if it will need to borrow to pay for them. New chemicals facilities can cost several hundred million dollars. A careful analysis will also indicate whether the dividend can be raised or is under pressure for cutting or elimination to help conserve cash. The availability of cash flow above normal needs would let the company repay debt or repurchase common stock.

The cyclical nature of the commodity chemicals sub-industry means that a company's cash flow changes during a business cycle. During the down portion of the cycle, a company will trim expenses and capital outlays to conserve cash. A reduced need for working capital that results from lower sales and/or inventories will also free up cash. A severe downturn may force a company to cut or eliminate its dividend, both of which are unusual occurrences in the chemicals industry.

As cash flow rises in a business upturn, a company should be able to increase capital spending if additional capacity is needed, and to boost dividends to shareholders. At such times, a company is likely to use cash to raise its level of working capital. Major capacity expansions may also require external funds, but completion of such projects could result in the company generating free cash flow.

Watch Out! *Some companies engage in supplier financing arrangements (aka reverse factoring). Basically, a company arranges for a financial institution to pay its suppliers and the company repays the financial institution later. This effectively lengthens the supplier payment terms and can result in overstated cash flows and understated leverage ratios.*

Valuation Methods

Stocks in the chemicals industry generally tend to be volatile, partly reflecting the underlying cyclicality of the industry. As discussed earlier in this section, prospects for future profit growth are paramount in determining a company's worth.

Common valuation measurements include multiples of EPS and cash flow. Keep in mind that valuations depend on various factors, including overall investor sentiment, industry and economic conditions, the level of interest rates, and the extent to which future earnings seem predictable. As is the case with other measures, valuations of a particular company should be compared with those of similar companies in the same industry. An investor should also examine a company or industry's historical valuations relative to a benchmark price-to-earnings ratio.

For the chemicals industry, especially for commodity companies, wide swings in the valuation ratios can occur over the business cycle, as the industry's earnings are affected by changing economic conditions,

as well as by the industry going into and out of favor with investors. At the extremes of the business and earnings cycles, the valuation measures can produce results that border on the meaningless.

Caution must be exercised in the interpretation of these metrics. A company that appears cheap relative to its peers, for example, may be at certain competitive disadvantages, such as a relative lack of new product innovations, higher debt levels, or lower profit margins, to name a few reasons. As a result, other investors may place a lower valuation on the shares of such a company.

It is also important to take into account how management is performing and how well it is using the company's capital, such as by examining the profitability on various assets, as discussed earlier in this section. A change in management can lead to an increase in the value of a company's stock if investors perceive that steps will be taken to produce higher returns.

◆ **P/E ratio.** The most common means of valuing equities, the price-to-earnings (P/E) ratio is calculated as the share price divided by EPS, for either the past 12 months or the projected EPS for a specified future period.

◆ **EV/EBITDA.** As an alternative to the standard P/E ratio, to eliminate distortions caused by differing tax rates and leverage, and to better evaluate a company's operating performance, investors compare the company's enterprise value (EV), which is a combination of net debt (total debt less cash) and stock market value, to its earnings before interest, taxes, depreciation, and amortization (EBITDA) – EV/EBITDA.

GLOSSARY

Blue hydrogen—This is produced when natural gas is split into hydrogen and CO2, but the CO2 is captured and then stored.

Benzene—Benzene is the simplest aromatic compound, in terms of chemical composition, and the most widely used. Major end uses include styrenic plastics (polystyrene and ABS), phenolic resins, polycarbonate and epoxy resins, polyurethanes, nylon, synthetic rubber, and detergents.

Cracker—Any device that splits the molecules in a gas or liquid, usually by electrolysis, into atoms. The thermal cracking of natural gas proceeds at very high temperature resulting in olefins (Mostly ethylene/propylene).

Diammonium Phosphate (DAP)—The world's most widely used phosphorus fertilizer. It is made from two common constituents in the fertilizer industry, and its relatively high nutrient content and excellent physical properties make it a popular choice in farming and other industries.

Electrochemical Unit (ECU)—The chlor-alkali process produces chlorine and caustic soda in set ratios of 1 unit of chlorine and 1.1 units of caustic soda. The combination of 1 unit of chlorine and 1.1 units of caustic soda is an ECU.

Electrolysis—Process by which electric current is passed through a substance to effect a chemical change. The chemical change is one in which the substance loses or gains an electron (oxidation or reduction). Electrolysis is commonly used in chlor alkali production.

Feedstock—A chemical used to support a large-scale chemical reaction. The term usually refers to an organic substance. Also known as a raw material or unprocessed material.

Fungicides—Agrochemicals used to protect plants from fungi and mold. A fungicide can be classified based on its mobility in the plant, its chemical group, or how it targets fungi. Fungus thrives in damp climates, so fungicides are generally in demand during wet seasons.

Green ammonia—Produced using CO2 free energy sources. About 90% of ammonia produced is used in fertilizer.

Green hydrogen—Produced by splitting water by electrolysis. This produces only hydrogen and oxygen. Hydrogen is used and oxygen is vent to the atmosphere with no negative impact.

Herbicides—Agrochemicals used for the control of weeds. Herbicides can be categorized based on timing of application, varying between pre-emergent and post emergent (before or after the crop emerges through the soil).

High-density polyethylene (HDPE)—The largest-volume polyethylene. Its primary uses include blow moldings (mainly for bottles and containers), films and sheets for packaging and bags, injection moldings (pails, crates, and tubs and containers), pipes and conduits, and extruded products.

Insecticides—Agrochemicals used to control insect pests. Insecticides can be classified based on how insects are exposed to them (digested or contact).

Linear low-density polyethylene (LLDPE)—The fastest-growing polyethylene for many years and the second-largest volume polyethylene plastic. Major uses include film products (bags and liners, along with packaging and stretch/shrink-wrap films), extruded products (including sheet and pipe and conduit), injection molding, and roto-molding resins.

Low-density polyethylene (LDPE)—The smallest volume polyethylene plastic. Major end uses include films and sheets (mainly for packaging, bags, and liners), extrusion coatings, extruded products (including wire and cable), and injection moldings.

Naphtha—Used in the petrochemicals industry as feedstock to steam reformers and steam crackers for the production of hydrogen (which may be and is converted into ammonia for fertilizers), ethylene, and other olefins.

Natural Gas Liquids (NGLs)—Used in petrochemical feedstock and turned into various chemical-based products.

Sulfate of Potash (SOP)—Provides both potassium and sulphur in soluble forms. SOP contains no chloride and hence has a much lower salt index than MOP. Where soils are saline or sodic and where irrigation water may have high chloride levels, SOP is the preferred form of potassium to use.

Urea—The most common and cheapest nitrogen fertilizer in the world. It is made when carbon dioxide is reacted with anhydrous ammonia. It is processed in the form of granules and can be applied directly to the soil.

Volatilization—The conversion of a liquid chemical into a vapor.

INDUSTRY REFERENCES

PERIODICALS

Chemical & Engineering News
cen.acs.org
Covers the chemicals profession and the chemicals processing industries; presents industrial, commercial, educational, and government viewpoints.

Fertilizers and Related Chemicals
Inorganic Chemicals
Paint, Varnish, and Lacquer
census.gov/manufacturing/cir/index.html
U.S. government publications providing data on production and shipments of selected products, including nitrogen fertilizer materials, phosphoric and sulfuric acid, major inorganic chemicals, and paint and coatings.

Fertilizer Use and Price
ers.usda.gov/data-products/fertilizer-use-and-price.aspx
Reports data on fertilizer consumption by selected major crops.

ICIS Chemical Business
icis.com/chemicals
News and prices on industrial and specialty chemicals, allied products, drugs, flavors, perfumes, and plastics.

IHS Chemical Week
chemweek.com/cw
Interprets news for business and technical managers in the chemicals processing industries.

Monthly Statistical Reports—Resins
americanchemistry.com
Provides production and sales data for the largest-volume plastic resins.

Oil & Gas Journal
ogj.com
A weekly petroleum industry publication with worldwide coverage.

PlasticsToday
plasticstoday.com
Covers developments in resin technology, machinery, processing techniques, and additives.

Telvent DTN, Data Transmission Network and Dataline
dtnpf.com
A private company that provides services for the analysis and delivery of real-time weather, agricultural, energy, and commodity market information.

The Fertilizer Institute: TFI Market Intelligence
tfi.org/our-industry/market-intelligence
Reports on production and shipments of fertilizer products.

U.S. Chlorine & Caustic Production Statistics Report
chlorineinstitute.org
Reports on chlor-alkali industry production and operating rates.

TRADE ASSOCIATIONS

American Chemistry Council
americanchemistry.com
Trade association representing the U.S. chemicals industry on public policy issues; coordinates research and testing programs, and administers the industry's environmental, health, and safety programs. Member companies account for more than 90% of U.S. industrial chemicals capacity.

American Coatings Association
paint.org
Represents paint and chemical coatings manufacturers, and their raw materials and equipment suppliers.

American Fuel & Petrochemical **Manufacturers**
(formerly National Petrochemical & Refiners Association)
afpm.org
Gathers and disseminates historical and scientific information, and statistics pertaining to the petroleum refining and petrochemical manufacturing industries.

Association of American Railroads
aar.org
An industry trade group representing primarily the major freight railroads of North America.

CropLife America
croplifeamerica.org
Promotes the environmentally sound use of crop protection products; members include producers of agricultural pesticides.

Plastics Industry Association
plasticsindustry.org
Trade association with members that include resin suppliers, processors, distributors, and machinery builders.

The Chlorine Institute
chlorineinstitute.org
Trade association for companies involved or interested in the production, distribution, and use of chlorine and related alkali chemicals.

World Resources Institute
wri.org
A global research organization that spans more than 60 countries, with work focusing on seven critical issues at the intersection of environment and development: climate, energy, food, forests, water, cities, and the ocean.

GOVERNMENT AGENCIES

The United Nations Environment Programme
unenvironment.org
The leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

U.S. Census Bureau
census.gov
Agency within the U.S. Department of Commerce; collects and provides data about the U.S. population and the economy.

U.S. Department of Agriculture
usda.gov
Federal agency that, among other things, tracks crop acreage and fertilizer usage.

U.S. Department of Labor
dol.gov
Federal agency that, among other things, tracks changes in employment, prices, and other national economic measurements.

U.S. Environmental Protection Agency
epa.gov
Federal agency charged with protecting public health and the natural environment; enforces government regulations affecting air, water, and land resources.

U.S. Geological Survey
usgs.gov
Agency within the U.S. Department of the Interior; provides the nation with information helping to describe and understand the Earth.

CONSULTING FIRMS

McKinsey & Company
mckinsey.com
A market research and business consulting firm.

Merchant Research & Consulting
mcgroup.co.uk
A worldwide management consulting firm that advises on strategic management to corporations, governments, and other organizations.

Young & Partners LLC
youngandpartners.com
International investment banking firm focused on the chemicals and life science industries.

COMPARATIVE COMPANY ANALYSIS

		Operating Revenues															
		Million $							CAGR (%)			Index Basis (2012=100)					
Company	Yr. End	2021	2020	2019	2018	2017	2016	2015	10-Yr.	5-Yr.	1-Yr.	2021	2020	2019	2018	2017	2016
COMMODITY CHEMICALS																	
LG CHEM, LTD.	DEC	35,809.4	27,620.8	23,692.8	25,316.0	24,056.0	17,160.5	17,171.5	6.5	15.6	41.9	209	161	138	147	140	100
DOW INC.	DEC	54,968.0	38,542.0	42,951.0	49,604.0	43,730.0	36,099.0	37,101.0	NA	8.8	42.6	148	104	116	134	118	97
LYONDELLBASELL INDUSTRIES N.V.	DEC	46,173.0	27,753.0	34,727.0	39,004.0	34,484.0	29,183.0	32,735.0	-0.4	9.6	66.4	141	85	106	119	105	89
PETRONAS CHEMICALS GROUP BERHAD	DEC	5,526.2	3,573.7	3,997.6	4,733.6	4,280.6	3,090.6	3,150.5	3.6	10.7	60.3	175	113	127	150	136	98
WESTLAKE CORPORATION	DEC	11,778.0	7,504.0	8,118.0	8,635.0	8,041.0	5,076.0	4,463.0	12.5	18.3	57.0	264	168	182	193	180	114
OLIN CORPORATION	DEC	8,910.6	5,758.0	6,110.0	6,946.1	6,268.4	5,550.6	2,854.4	16.3	9.9	54.8	312	202	214	243	220	194
VALVOLINE INC.	SEP	1,037.2	727.0	2,390.0	2,285.0	2,084.0	1,929.0	1,967.0	NA	-11.7	42.7	53	37	122	116	106	98
CABOT CORPORATION	SEP	3,409.0	2,614.0	3,337.0	3,242.0	2,717.0	2,411.0	2,871.0	0.9	7.2	30.4	119	91	116	113	95	84
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIM	DEC	14,054.2	11,442.8	14,411.5	15,668.7	14,141.4	11,218.5	12,445.7	-0.7	2.8	19.5	113	92	116	126	114	90
MATIV HOLDINGS, INC.	DEC	1,440.0	1,074.4	1,022.8	1,041.3	982.1	839.9	764.1	6.2	11.4	34.0	188	141	134	136	129	110
DIVERSIFIED CHEMICALS																	
BASF SE	DEC	89,387.0	72,353.5	66,564.9	68,948.9	73,514.6	60,751.6	76,512.6	0.7	6.4	32.9	117	95	87	90	96	79
SOLVAY SA	DEC	13,003.5	11,882.6	12,599.0	12,936.8	13,189.2	10,602.8	10,950.9	4.2	2.6	17.7	119	109	115	118	120	97
HUNTSMAN CORPORATION	DEC	8,453.0	6,018.0	6,797.0	7,604.0	6,845.0	7,518.0	8,139.0	-2.8	2.4	40.5	104	74	84	93	84	92
THE CHEMOURS COMPANY	DEC	6,345.0	4,969.0	5,526.0	6,638.0	6,183.0	5,400.0	5,717.0	-2.3	3.3	27.7	111	87	97	116	108	94
LANXESS AKTIENGESELLSCHAFT	DEC	8,594.3	7,466.7	7,633.3	7,813.1	7,841.0	8,127.3	8,582.1	-1.5	-0.4	23.8	100	87	89	91	91	95
FERTILIZERS AND AGRICULTURAL CHEMICALS																	
CORTEVA, INC.	DEC	15,655.0	14,217.0	13,846.0	14,287.0	10,684.0	14,041.0	14,041.0	NA	2.2	10.1	111	101	99	102	76	100
NUTRIEN LTD.	DEC	26,861.0	20,053.0	19,316.0	18,772.0	4,010.0	3,921.0	5,791.0	12.6	46.9	34.0	464	346	334	324	69	68
THE MOSAIC COMPANY	DEC	12,357.4	8,681.7	8,906.3	9,587.3	7,409.4	7,162.8	8,895.3	2.2	11.5	42.3	139	98	100	108	83	81
FMC CORPORATION	DEC	5,045.2	4,642.1	4,609.8	4,285.3	2,531.2	2,538.9	2,491.0	5.2	14.7	8.7	203	186	185	172	102	102
CF INDUSTRIES HOLDINGS, INC.	DEC	6,538.0	4,124.0	4,590.0	4,429.0	4,130.0	3,685.0	4,308.0	0.7	12.2	58.5	152	96	107	103	96	86
K+S AKTIENGESELLSCHAFT	DEC	3,654.2	2,975.0	2,861.3	4,624.6	4,355.2	3,648.9	4,534.9	-2.2	-1.5	32.1	81	66	63	102	96	80
THE SCOTTS MIRACLE-GRO COMPANY	SEP	4,925.0	4,131.6	3,156.0	2,663.4	2,642.1	2,506.2	2,371.1	5.8	14.5	19.2	208	174	133	112	111	106
AMERICAN VANGUARD CORPORATION	DEC	556.9	458.7	468.2	454.3	355.0	312.1	289.4	6.3	12.3	21.4	192	159	162	157	123	108
INDUSTRIAL GASES																	
LINDE PLC	DEC	30,793.0	27,243.0	28,228.0	14,836.0	11,358.0	10,534.0	10,776.0	10.6	23.9	13.0	286	253	262	138	105	98
AIR PRODUCTS AND CHEMICALS, INC.	SEP	10,323.0	8,856.3	8,918.9	8,930.2	8,187.6	7,503.7	7,824.3	0.7	6.6	16.6	132	113	114	114	105	96
SPECIALTY CHEMICALS																	
THE SHERWIN-WILLIAMS COMPANY	DEC	19,944.6	18,361.7	17,900.8	17,534.5	14,983.8	11,855.6	11,339.3	8.6	11.0	8.6	176	162	158	155	132	105
SIKA AG	DEC	10,149.4	8,903.6	8,373.0	7,200.9	6,411.4	5,658.4	5,482.6	7.3	10.0	17.5	185	162	153	131	117	103
ECOLAB INC.	DEC	12,733.1	11,790.2	12,562.0	12,222.1	13,835.9	13,151.8	13,545.1	6.5	-0.6	8.0	94	87	93	90	102	97
DUPONT DE NEMOURS, INC.	DEC	16,653.0	14,338.0	15,436.0	22,594.0	11,672.0	48,158.0	48,778.0	-12.0	-19.1	16.1	34	29	32	46	24	99
ALBEMARLE CORPORATION	DEC	3,328.0	3,128.9	3,589.4	3,375.0	3,072.0	2,677.2	2,826.4	1.5	4.4	6.4	118	111	127	119	109	95
PPG INDUSTRIES, INC.	DEC	16,802.0	13,834.0	15,146.0	15,374.0	14,748.0	14,270.0	14,241.0	2.5	3.3	21.5	118	97	106	108	104	100
GIVAUDAN SA	DEC	7,332.1	7,145.5	6,404.8	5,617.1	5,182.9	4,590.6	4,390.7	5.5	7.5	5.7	167	163	146	128	118	105
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	11,656.0	5,084.0	5,140.0	3,977.5	3,398.7	3,116.4	3,023.2	15.4	30.2	129.3	386	168	170	132	112	103
KONINKLIJKE DSM N.V.	DEC	10,467.4	9,915.6	8,975.4	10,610.3	10,365.0	8,360.6	8,386.6	0.2	3.1	13.5	125	118	107	127	124	100
NOVOZYMES A/S	DEC	2,286.9	2,302.8	2,158.7	2,207.1	2,343.5	2,008.0	2,037.7	3.6	1.1	6.7	112	113	106	108	115	99

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

Net Income

Company	Yr. End	Million $ 2021	2020	2019	2018	2017	2016	2015	CAGR (%) 10-Yr.	5-Yr.	1-Yr.	Index Basis (2012=100) 2021	2020	2019	2018	2017	2016
COMMODITY CHEMICALS																	
LG CHEM, LTD.	DEC	3,080.9	471.1	271.4	1,322.8	1,821.0	1,064.2	979.8	5.6	23.4	615.9	314	48	28	135	186	109
DOW INC.	DEC	6,311.0	1,225.0	-1,359.0	4,641.0	465.0	1,432.0	6,427.0	NA	34.5	415.2	98	19	-21	72	7	22
LYONDELLBASELL INDUSTRIES N.V.	DEC	5,610.0	1,420.0	3,390.0	4,688.0	4,879.0	3,836.0	4,476.0	10.1	7.9	295.1	125	32	76	105	109	86
PETRONAS CHEMICALS GROUP BERHAD	DEC	NA	405.1	686.4	1,157.8	1,027.2	653.8	647.5	6.9	20.2	351.2	NA	63	106	179	159	101
WESTLAKE CORPORATION	DEC	2,015.0	330.0	421.0	996.0	1,304.0	399.0	646.0	22.8	38.2	510.6	312	51	65	154	202	62
OLIN CORPORATION	DEC	1,296.7	-969.9	-11.3	327.9	549.5	-3.9	-1.4	18.3	NM	NM	NM	69279	807	NM	NM	279
VALVOLINE INC.	SEP	420.3	316.6	208.0	166.0	304.0	273.0	196.0	NA	9.0	32.8	214	162	106	85	155	139
CABOT CORPORATION	SEP	250.0	-238.0	157.0	-113.0	248.0	147.0	-334.0	0.6	11.2	NM	-75	71	-47	34	-74	-44
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIM	DEC	314.9	96.2	317.9	767.3	943.9	857.7	499.9	7.8	-19.6	218.5	63	19	64	153	189	172
MATIV HOLDINGS, INC.	DEC	88.9	83.8	85.8	94.5	34.5	82.8	89.7	-0.4	1.4	6.1	99	93	96	105	38	92
DIVERSIFIED CHEMICALS																	
BASF SE	DEC	6,281.1	-1,296.6	9,450.1	5,389.3	7,298.3	4,281.6	4,330.2	-1.1	6.4	NM	145	-30	218	124	169	99
SOLVAY SA	DEC	1,078.1	-1,176.8	132.4	1,004.1	1,274.0	655.5	440.9	14.4	8.8	NM	245	-267	30	228	289	149
HUNTSMAN CORPORATION	DEC	1,045.0	1,034.0	562.0	337.0	636.0	326.0	93.0	15.5	26.2	1.1	1124	1112	604	362	684	351
THE CHEMOURS COMPANY	DEC	608.0	219.0	-52.0	995.0	746.0	7.0	-90.0	-8.2	144.2	177.6	-676	-243	58	NM	-829	-8
LANXESS AKTIENGESELLSCHAFT	DEC	303.7	1,082.6	230.1	493.5	104.5	202.7	179.2	-6.2	6.8	-69.8	169	604	128	275	58	113
FERTILIZERS AND AGRICULTURAL CHEMICALS									NA	NA	NA	NA	NA	NA	NA	NA	NA
CORTEVA, INC.	DEC	1,759.0	681.0	-959.0	-5,065.0	2,916.0	503.0	503.0	NA	28.5	158.3	350	135	-191	NM	580	100
NUTRIEN LTD.	DEC	3,153.0	459.0	992.0	3,573.0	327.0	323.0	1,270.0	0.2	57.7	586.9	248	36	78	281	26	25
THE MOSAIC COMPANY	DEC	1,630.6	666.1	-1,067.4	470.0	-107.2	297.8	1,000.4	-4.2	40.5	144.8	163	67	-107	47	-11	30
FMC CORPORATION	DEC	736.5	551.5	477.4	502.1	535.8	209.1	489.0	7.2	28.6	33.5	151	113	98	103	110	43
CF INDUSTRIES HOLDINGS, INC.	DEC	917.0	317.0	493.0	290.0	358.0	-277.0	700.0	-5.0	NM	189.3	131	45	70	41	51	-40
K+S AKTIENGESELLSCHAFT	DEC	3,392.7	-2,097.6	99.8	48.2	221.7	183.8	537.8	18.1	76.5	NM	631	-390	19	9	41	34
THE SCOTTS MIRACLE-GRO COMPANY	SEP	512.5	387.4	460.7	63.7	218.3	315.3	159.8	11.8	10.2	32.3	321	242	288	40	137	197
AMERICAN VANGUARD CORPORATION	DEC	18.6	15.2	13.6	24.2	20.3	12.8	6.6	-1.7	7.8	21.9	282	231	206	367	308	194
INDUSTRIAL GASES									NA	NA	NA	NA	NA	NA	NA	NA	NA
LINDE PLC	DEC	3,826.0	2,501.0	2,285.0	4,381.0	1,247.0	1,500.0	1,547.0	8.6	20.6	53.0	247	162	148	283	81	97
AIR PRODUCTS AND CHEMICALS, INC.	SEP	2,099.1	1,886.7	1,760.0	1,497.8	3,000.4	631.1	1,277.9	5.5	27.2	11.3	164	148	138	117	235	49
SPECIALTY CHEMICALS																	
THE SHERWIN-WILLIAMS COMPANY	DEC	1,864.4	2,030.4	1,541.3	1,108.7	1,727.9	1,132.7	1,053.8	15.5	10.5	-8.2	177	193	146	105	164	107
SIKA AG	DEC	1,149.5	931.9	776.4	694.0	660.3	554.4	459.7	17.3	13.2	27.1	250	203	169	151	144	121
ECOLAB INC.	DEC	1,129.9	-1,205.1	1,558.9	1,429.1	1,504.6	1,229.0	1,002.1	9.3	-1.7	NM	113	-120	156	143	150	123
DUPONT DE NEMOURS, INC.	DEC	6,467.0	-2,951.0	498.0	3,845.0	1,159.0	4,318.0	7,685.0	9.0	8.4	NM	84	-38	6	50	15	56
ALBEMARLE CORPORATION	DEC	123.7	375.8	533.2	693.6	54.9	643.7	334.9	-10.9	-28.1	-67.1	37	112	159	207	16	192
PPG INDUSTRIES, INC.	DEC	1,439.0	1,059.0	1,243.0	1,341.0	1,594.0	873.0	1,406.0	2.8	10.5	35.9	102	75	88	95	113	62
GIVAUDAN SA	DEC	900.6	839.8	724.8	673.8	738.8	634.0	624.2	12.5	5.0	10.5	144	135	116	108	118	102
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	270.0	363.0	456.0	337.3	295.7	405.0	419.2	0.1	-7.8	-25.6	64	87	109	80	71	97
KONINKLIJKE DSM N.V.	DEC	1,906.1	619.0	850.6	1,233.1	2,124.2	655.5	95.6	7.5	22.0	231.2	1994	648	890	1290	2223	686
NOVOZYMES A/S	DEC	481.2	464.3	473.7	494.8	503.0	433.1	410.8	5.6	0.6	11.4	117	113	115	120	122	105

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

Company	Yr. End	Return on Revenues (%)						Return on Assets (%)						Return on Equity (%)					
		2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
COMMODITY CHEMICALS																			
LG CHEM, LTD.	DEC	8.6	1.7	1.1	5.2	7.6	6.2	7.2	1.2	0.9	5.1	7.8	6.3	17.4	3.2	2.3	9.0	0.0	9.4
DOW INC.	DEC	11.5	3.2	NM	9.4	1.1	4.0	10.0	2.0	NM	5.5	NA	NA	40.4	9.6	NM	0.0	0.0	0.0
LYONDELLBASELL INDUSTRIES N.V.	DEC	12.1	5.1	9.8	12.0	14.1	13.1	15.3	4.0	11.1	16.6	18.6	16.4	55.9	17.5	36.6	48.5	65.2	60.8
PETRONAS CHEMICALS GROUP BERHAD	DEC	31.9	11.3	17.2	24.5	24.0	21.2	15.8	4.1	7.2	12.8	12.6	9.2	22.0	5.2	9.2	16.5	15.4	11.7
WESTLAKE CORPORATION	DEC	17.1	4.4	5.2	11.5	16.2	7.9	10.9	2.4	3.2	8.6	10.8	3.7	27.4	5.7	7.4	18.1	28.9	11.3
OLIN CORPORATION	DEC	14.6	NM	NM	4.7	8.8	NM	15.2	NM	NM	3.6	6.0	NM	63.2	NM	NM	11.7	21.9	NM
VALVOLINE INC.	SEP	40.5	43.5	8.7	7.3	14.6	14.2	13.2	10.4	10.1	9.0	15.9	15.0	684.1	NM	NM	NM	NM	190.2
CABOT CORPORATION	SEP	7.3	NM	4.7	NM	9.1	6.1	7.6	NM	5.2	NM	7.4	4.8	30.0	NM	15.4	NM	18.2	11.9
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIM	DEC	2.2	0.8	2.2	4.9	6.7	7.6	4.3	1.4	4.9	11.8	15.5	17.5	6.7	2.2	7.4	17.9	23.0	26.4
MATIV HOLDINGS, INC.	DEC	6.2	7.8	8.4	9.1	3.5	9.9	3.7	5.3	5.8	6.4	2.2	7.1	13.4	13.4	14.8	17.2	6.5	17.0
DIVERSIFIED CHEMICALS																			
BASF SE	DEC	7.0	NM	14.2	7.8	9.9	7.0	6.3	NM	9.7	5.4	7.7	5.3	15.7	NM	6.5	11.6	16.6	13.3
SOLVAY SA	DEC	8.3	NM	1.1	7.8	9.7	6.2	4.7	NM	0.6	4.0	4.9	2.6	12.2	NM	NM	7.0	8.9	6.0
HUNTSMAN CORPORATION	DEC	12.4	17.2	8.3	4.4	9.3	4.3	11.1	11.9	6.8	4.2	6.2	3.5	26.8	9.0	15.4	22.5	21.1	23.6
THE CHEMOURS COMPANY	DEC	9.6	4.4	NM	15.0	12.1	0.1	8.1	3.1	NM	13.5	10.2	0.1	64.1	29.0	NM	105.7	154.2	6.0
LANXESS AKTIENGESELLSCHAFT	DEC	3.5	14.5	3.0	6.3	1.3	2.5	2.5	10.0	2.4	5.0	0.8	1.9	6.5	32.2	8.9	9.1	1.7	6.4
FERTILIZERS AND AGRICULTURAL CHEMICALS																			
CORTEVA, INC.	DEC	11.2	4.8	NM	NM	27.3	3.6	4.2	1.6	NM	NM	NA	NA	7.2	3.0	NM	0.0	0.0	0.0
NUTRIEN LTD.	DEC	11.7	2.3	5.1	19.0	8.2	8.2	6.3	1.0	2.1	7.9	1.9	1.9	13.8	2.0	4.2	NM	1.9	2.4
THE MOSAIC COMPANY	DEC	13.2	7.7	NM	4.9	NM	4.2	7.4	3.4	NM	2.3	NM	1.8	15.9	7.0	NM	4.6	NM	3.1
FMC CORPORATION	DEC	14.6	11.9	10.4	11.7	21.2	8.2	7.0	5.4	4.8	5.0	5.8	3.4	26.6	20.9	18.8	18.2	NM	6.7
CF INDUSTRIES HOLDINGS, INC.	DEC	14.0	7.7	10.7	6.5	8.7	NM	7.4	2.6	4.1	2.3	2.7	NM	21.7	7.7	11.4	6.9	6.8	NM
K+S AKTIENGESELLSCHAFT	DEC	92.8	NM	3.5	1.0	5.1	5.0	34.1	NM	0.8	0.4	1.9	1.8	57.8	NM	0.6	1.0	4.2	3.9
THE SCOTTS MIRACLE-GRO COMPANY	SEP	10.4	9.4	14.6	2.4	8.3	12.6	10.7	11.5	15.2	2.1	7.9	11.4	60.3	54.3	80.7	25.0	28.4	36.0
AMERICAN VANGUARD CORPORATION	DEC	3.3	3.3	2.9	5.3	5.7	4.1	2.7	2.2	2.0	4.1	3.8	3.0	5.1	4.3	4.0	7.6	6.9	4.7
INDUSTRIAL GASES																			
LINDE PLC	DEC	12.4	9.2	8.1	29.5	11.0	14.2	4.7	2.8	2.6	4.7	6.1	7.8	8.3	5.2	4.2	13.5	21.8	29.7
AIR PRODUCTS AND CHEMICALS, INC.	SEP	20.3	21.3	19.7	16.8	36.6	8.4	7.8	7.5	9.3	7.8	16.2	3.5	15.4	16.3	16.0	14.0	13.3	15.4
SPECIALTY CHEMICALS																			
THE SHERWIN-WILLIAMS COMPANY	DEC	9.3	11.1	8.6	6.3	11.5	9.6	9.0	10.0	7.5	5.8	8.7	16.8	61.7	52.5	39.2	30.1	64.0	82.5
SIKA AG	DEC	11.3	10.5	9.3	9.6	10.3	9.8	9.8	8.4	7.5	10.7	11.1	11.0	27.3	25.6	31.4	27.0	20.4	20.6
ECOLAB INC.	DEC	8.9	NM	12.4	11.7	10.9	9.3	5.3	NM	7.5	7.1	7.5	6.7	17.0	13.2	17.2	16.1	20.8	17.9
DUPONT DE NEMOURS, INC.	DEC	38.8	NM	3.2	17.0	9.9	9.0	14.1	NM	0.7	2.0	0.6	5.4	5.5	NM	NM	0.4	0.4	16.5
ALBEMARLE CORPORATION	DEC	3.7	12.0	14.9	20.6	1.8	24.0	1.1	3.6	5.4	9.1	0.7	7.9	3.9	10.4	15.4	19.5	2.6	13.0
PPG INDUSTRIES, INC.	DEC	8.6	7.7	8.2	8.7	10.8	6.1	6.7	5.4	7.0	8.4	9.6	5.5	23.6	19.1	25.0	25.8	26.3	11.3
GIVAUDAN SA	DEC	12.3	11.8	11.3	12.0	14.3	13.8	7.2	7.0	6.8	7.1	9.9	9.9	22.0	20.7	19.0	18.2	21.1	19.2
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	2.3	7.1	8.9	8.5	8.7	13.0	0.7	2.7	3.4	2.6	6.4	10.1	2.0	5.8	7.4	8.7	17.8	25.1
KONINKLIJKE DSM N.V.	DEC	18.2	6.2	9.5	11.6	20.5	7.8	10.5	3.5	5.6	7.9	13.8	4.8	12.9	6.0	8.8	14.5	26.9	11.1
NOVOZYMES A/S	DEC	21.0	20.2	21.9	22.4	21.5	21.6	12.7	13.8	15.4	16.4	17.0	16.3	26.8	24.9	27.5	28.4	27.1	26.1

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

Company	Yr. End	Current Ratio						Debt/Capital Ratio (%)						Debt as a % of Net Working Capital					
		2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
COMMODITY CHEMICALS																			
LG CHEM, LTD.	DEC	1.4	1.2	1.3	1.7	1.7	1.7	37.2	34.4	31.4	23.5	14.1	15.5	238.1	303.6	259.8	102.6	55.3	60.5
DOW INC.	DEC	1.6	1.7	1.6	2.5	0.0	0.0	42.5	56.0	54.8	36.6	NA	NA	180.3	205.1	266.4	80.8	NA	NA
LYONDELLBASELL INDUSTRIES N.V.	DEC	1.7	2.1	1.8	1.9	2.5	2.1	49.9	68.1	60.2	49.4	49.0	61.5	235.3	263.4	277.2	185.2	123.7	176.1
PETRONAS CHEMICALS GROUP BERHAD	DEC	4.3	5.1	4.9	3.2	3.2	4.7	6.0	6.2	5.8	6.9	0.0	0.1	13.7	15.4	14.9	17.9	0.0	0.3
WESTLAKE CORPORATION	DEC	2.2	2.6	2.2	2.4	1.8	2.0	36.5	35.2	35.0	30.5	36.8	50.6	168.2	168.2	229.5	160.8	209.0	312.5
OLIN CORPORATION	DEC	1.3	1.4	1.6	1.5	1.8	1.7	49.3	72.6	58.0	52.5	56.9	61.0	455.0	740.0	527.9	532.0	488.1	571.2
VALVOLINE INC.	SEP	1.8	3.2	1.9	1.8	1.7	1.8	92.4	104.0	124.1	138.3	120.9	179.9	350.1	197.4	354.8	411.5	355.4	225.2
CABOT CORPORATION	SEP	1.2	1.8	2.0	1.5	1.8	2.6	42.7	57.4	48.8	48.2	30.0	41.0	273.4	240.5	171.5	220.5	124.8	145.7
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIM	DEC	1.3	1.1	1.4	1.8	1.8	1.7	7.2	15.6	5.2	1.6	2.1	2.2	43.6	220.3	22.7	4.4	6.8	9.2
MATIV HOLDINGS, INC.	DEC	2.6	2.4	2.7	3.0	2.9	2.7	65.0	47.8	47.4	52.4	55.3	46.3	348.5	259.4	199.3	214.9	236.0	191.6
DIVERSIFIED CHEMICALS																			
BASF SE	DEC	1.7	1.8	1.9	1.9	2.1	1.7	25.1	34.1	27.7	34.9	31.3	30.5	93.8	126.2	110.7	90.3	97.3	130.4
SOLVAY SA	DEC	1.2	1.6	1.5	1.7	1.5	1.3	19.7	28.4	23.8	22.8	24.3	28.9	166.4	169.2	138.2	117.7	162.7	252.9
HUNTSMAN CORPORATION	DEC	1.9	1.8	1.9	1.8	1.8	2.0	25.2	29.4	44.3	45.7	40.1	73.8	81.9	96.2	126.9	168.8	83.2	232.0
THE CHEMOURS COMPANY	DEC	1.8	1.8	1.8	1.9	2.1	1.4	77.2	82.9	87.6	79.5	82.6	97.1	246.4	330.6	330.7	249.8	221.9	451.3
LANXESS AKTIENGESELLSCHAFT	DEC	1.8	2.2	2.4	2.6	1.6	3.3	41.5	42.1	50.3	49.1	39.1	41.8	132.9	97.5	124.6	112.3	146.1	71.8
FERTILIZERS AND AGRICULTURAL CHEMICALS																			
CORTEVA, INC.	DEC	1.6	1.7	1.6	1.7	0.0	0.0	4.2	4.2	0.5	9.4	NA	NA	18.6	17.7	2.1	78.5	NA	NA
NUTRIEN LTD.	DEC	1.1	1.4	1.2	1.4	2.1	0.8	29.1	31.5	30.3	25.6	37.0	34.4	647.3	341.3	620.4	246.7	258.0	NM
THE MOSAIC COMPANY	DEC	1.1	1.1	1.4	1.7	2.3	2.1	25.2	27.9	31.4	28.4	32.1	28.2	653.1	1,008.6	378.5	239.6	176.3	239.1
FMC CORPORATION	DEC	1.4	1.5	1.5	1.3	1.7	2.0	53.4	53.7	56.8	43.1	54.1	49.9	217.9	205.2	235.1	222.5	213.7	134.0
CF INDUSTRIES HOLDINGS, INC.	DEC	1.8	1.5	1.5	1.8	2.5	3.9	36.5	39.8	41.2	45.0	41.2	47.1	298.4	805.2	1,280.6	825.7	530.2	293.4
K+S AKTIENGESELLSCHAFT	DEC	1.9	1.4	1.5	1.6	1.4	1.6	15.6	51.4	44.9	42.4	37.1	32.7	106.8	186.0	437.2	404.9	452.7	319.7
THE SCOTTS MIRACLE-GRO COMPANY	SEP	1.8	1.3	1.7	1.4	1.6	1.5	68.6	68.0	71.0	87.4	69.7	66.3	250.3	546.2	375.6	717.7	396.9	359.9
AMERICAN VANGUARD CORPORATION	DEC	1.5	1.9	2.4	2.1	2.0	2.3	12.3	22.9	30.2	22.7	20.2	12.7	43.9	67.6	75.3	58.7	60.2	31.5
INDUSTRIAL GASES																			
LINDE PLC	DEC	0.7	0.8	0.9	1.3	1.0	1.2	22.0	25.0	19.8	19.8	56.1	65.1	NM	NM	NM	317.2	NM	2,326.1
AIR PRODUCTS AND CHEMICALS, INC.	SEP	3.0	3.6	2.5	2.2	2.4	1.3	33.7	37.4	22.4	23.5	26.2	43.6	128.6	118.5	117.1	124.2	105.3	469.8
SPECIALTY CHEMICALS																			
THE SHERWIN-WILLIAMS COMPANY	DEC	0.9	1.0	1.0	1.0	1.1	1.3	84.8	69.6	67.8	72.6	77.7	40.5	NM	NM	7,518.6	19,308.8	2,505.8	156.9
SIKA AG	DEC	2.0	2.0	1.9	2.3	2.3	3.0	41.7	52.3	54.7	62.5	14.0	19.2	151.6	199.3	230.7	157.9	32.0	36.2
ECOLAB INC.	DEC	1.3	1.7	1.3	1.3	1.3	1.4	56.1	51.9	41.2	46.3	47.0	47.1	771.5	305.6	505.1	669.0	605.2	490.1
DUPONT DE NEMOURS, INC.	DEC	1.9	2.4	1.2	1.7	1.9	1.9	28.6	28.5	28.0	11.6	24.1	43.5	283.5	93.0	934.3	23.6	133.5	187.5
ALBEMARLE CORPORATION	DEC	1.1	1.2	1.6	1.7	2.1	2.9	25.0	37.7	40.7	27.0	27.0	35.0	1,444.3	669.9	343.6	170.9	110.9	97.9
PPG INDUSTRIES, INC.	DEC	1.4	1.4	1.4	1.4	1.7	1.5	50.6	50.7	45.7	48.0	42.2	44.7	327.2	282.9	253.0	274.6	160.4	167.4
GIVAUDAN SA	DEC	1.5	1.8	1.8	2.3	1.9	2.4	49.7	52.5	48.2	46.7	27.0	27.7	358.4	258.0	240.7	184.6	98.3	90.9
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	1.9	1.6	1.9	2.6	2.5	1.8	34.7	37.1	38.7	42.4	49.1	39.5	330.9	327.1	287.5	248.4	144.7	150.1
KONINKLIJKE DSM N.V.	DEC	2.5	2.4	2.4	2.5	2.4	1.6	23.6	31.2	23.9	23.1	27.4	30.7	78.0	106.1	78.9	62.3	82.2	142.2
NOVOZYMES A/S	DEC	1.4	1.7	1.5	1.2	1.3	1.8	23.2	22.4	19.1	11.4	10.4	12.7	171.0	118.0	116.9	112.1	83.6	60.5

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

Company	Yr. End	Price/Earnings Ratio (High-Low) 2020	2019	2018	2017	2016	2015	Dividend Payout Ratio (%) 2020	2019	2018	2017	2016	2015	Dividend Yield (High-Low, %) 2020	2019	2018	2017	2016	2015
COMMODITY CHEMICALS																			
LG CHEM, LTD.	DEC	127 - 34	96 - 71	23 - 16	17 - 10	20 - 13	22 - 10	34.7	146.8	31.2	18.9	27.0	26.8	1.4 - 0.2	2.0 - 0.2	2.1 - 1.5	2.0 - 1.1	2.0 - 1.2	2.1 - 1.2
DOW INC.	DEC	35 - 13	NM - NM	NA - NA	NA - NA			169.1	NM	80.0	695.7	0.0	0.0	5.4 - 3.9	12.7 - 4.9	6.9 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
LYONDELLBASELL INDUSTRIES N.V.	DEC	22 - 8	10 - 7	10 - 7	9 - 6	10 - 8	11 - 8	98.9	43.1	33.1	29.0	36.4	31.5	5.3 - 3.6	12.0 - 4.4	6.1 - 4.2	4.6 - 3.0	4.6 - 3.4	4.8 - 3.2
PETRONAS CHEMICALS GROUP BERHAD	DEC	39 - 20	27 - 19	16 - 13	15 - 13	21 - 17	21 - 14	59.0	82.5	48.5	46.0	46.4	46.0	5.6 - 1.3	5.2 - 1.4	4.7 - 3.1	3.8 - 2.9	3.4 - 2.3	3.3 - 2.1
WESTLAKE CORPORATION	DEC	33 - 12	25 - 17	16 - 8	11 - 6	19 - 13	16 - 10	41.5	31.4	12.0	7.9	24.3	14.2	1.5 - 1.0	3.5 - 1.4	1.9 - 1.2	1.5 - 0.7	1.4 - 0.9	1.8 - 1.2
OLIN CORPORATION	DEC	NM - NM	NM - NM	20 - 9	11 - 8	NM - NM	NM - NM	NM	NM	40.7	24.2	NM	NM	3.7 - 1.2	8.6 - 3.4	5.2 - 2.9	4.1 - 2.1	3.2 - 2.2	6.3 - 3.0
VALVOLINE INC.	SEP	14 - 5	21 - 16	30 - 24	17 - 13	15 - 14	NA - NA	26.6	38.5	34.9	13.2	0.0	0.0	2.4 - 1.5	4.9 - 1.8	2.5 - 1.3	1.5 - 0.8	1.0 - 0.8	0.0 - 0.0
CABOT CORPORATION	SEP	NM - NM	24 - 14	NM - NM	15 - 12	22 - 13	NM - NM	NM	51.0	NM	31.0	44.2	NM	4.0 - 2.2	6.6 - 2.8	3.7 - 2.0	2.4 - 1.8	2.5 - 2.0	2.8 - 1.8
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIN	DEC	42 - 23	20 - 10	12 - 7	9 - 7	8 - 5	18 - 7	217.3	125.1	62.7	44.2	18.7	6.5	9.0 - 5.5	16.5 - 6.2	13.4 - 8.5	10.0 - 5.3	6.9 - 2.2	3.5 - 0.0
MATIV HOLDINGS, INC.	DEC	16 - 8	16 - 9	16 - 8	42 - 33	17 - 11	16 - 11	65.6	63.4	56.3	150.4	59.7	52.3	6.2 - 3.5	8.4 - 3.9	7.0 - 3.9	6.2 - 3.6	4.6 - 3.6	5.5 - 3.7
DIVERSIFIED CHEMICALS																			
BASF SE	DEC	NM - NM	8 - 6	19 - 11	15 - 12	20 - 13	22 - 15	NM	34.9	60.5	45.3	65.7	64.5	5.7 - 4.5	8.5 - 4.6	5.7 - 4.3	4.8 - 3.1	3.8 - 3.1	4.9 - 3.6
SOLVAY SA	DEC	NM - NM	97 - 74	14 - 10	13 - 10	19 - 12	29 - 18	NM	458.5	59.5	47.8	75.7	93.6	4.0 - 3.2	6.6 - 3.6	4.5 - 3.4	3.9 - 2.9	3.1 - 2.6	4.7 - 3.1
HUNTSMAN CORPORATION	DEC	6 - 3	10 - 7	25 - 13	13 - 7	15 - 6	64 - 24	13.9	26.7	46.3	18.9	36.8	130.1	3.1 - 2.2	5.1 - 2.5	3.7 - 2.6	3.3 - 1.4	2.6 - 1.5	6.3 - 2.6
THE CHEMOURS COMPANY	DEC	21 - 5	NM - NM	10 - 5	14 - 5	700 - 81	NM - NM	74.9	NM	14.9	2.9	314.3	NM	4.2 - 2.6	13.8 - 3.9	8.4 - 2.5	3.5 - 0.2	0.6 - 0.2	3.8 - 0.5
LANXESS AKTIENGESELLSCHAFT	DEC	6 - 3	28 - 17	16 - 8	74 - 64	30 - 16	31 - 19	9.3	38.5	17.2	73.6	28.6	27.9	2.0 - 1.4	3.3 - 1.5	2.0 - 1.4	1.7 - 0.9	1.2 - 0.9	1.6 - 1.0
FERTILIZERS AND AGRICULTURAL CHEMICALS																			
CORTEVA, INC.	DEC	44 - 23	NM - NM	NA - NA	NA - NA	NA - NA		57.0	NM	0.0	33.9	0.0	0.0	1.4 - 1.0	2.5 - 1.3	2.1 - 1.6	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
NUTRIEN LTD.	DEC	80 - 45	43 - 36	13 - 10	NA - NA	NA - NA	NA - NA	224.4	103.0	26.6	100.9	250.5	94.8	3.9 - 2.6	7.2 - 3.6	3.9 - 3.1	3.6 - 0.0	0.0 - 0.0	0.0 - 0.0
THE MOSAIC COMPANY	DEC	13 - 4	NM - NM	30 - 19	NM - NM	37 - 26	19 - 10	11.4	NM	8.2	NM	129.3	38.5	1.3 - 0.6	2.9 - 0.9	1.1 - 0.3	0.4 - 0.3	4.8 - 0.4	5.0 - 3.4
FMC CORPORATION	DEC	29 - 14	28 - 19	26 - 19	24 - 14	38 - 22	18 - 9	41.4	44.1	17.8	16.6	42.4	17.7	2.2 - 1.5	2.9 - 1.5	2.3 - 1.6	0.9 - 0.7	1.2 - 0.7	2.0 - 1.2
CF INDUSTRIES HOLDINGS, INC.	DEC	32 - 14	24 - 17	45 - 29	28 - 17	NM - NM	23 - 13	81.4	53.8	96.6	78.2	NM	40.3	3.3 - 1.8	5.7 - 2.5	3.1 - 2.3	3.3 - 2.1	4.7 - 3.1	5.6 - 2.6
K+S AKTIENGESELLSCHAFT	DEC	NM - NM	40 - 22	117 - 68	26 - 20	26 - 18	15 - 9	NM	53.9	159.1	31.1	126.4	34.8	0.5 - 0.0	4.8 - 0.5	2.4 - 1.4	2.3 - 1.3	5.8 - 1.2	7.2 - 3.5
THE SCOTTS MIRACLE-GRO COMPANY	SEP	25 - 11	14 - 7	97 - 65	26 - 22	16 - 11	26 - 21	34.0	27.0	188.4	55.1	37.0	69.6	1.7 - 1.0	3.0 - 1.3	3.7 - 2.0	3.0 - 1.9	2.5 - 2.1	3.2 - 2.4
AMERICAN VANGUARD CORPORATION	DEC	38 - 22	42 - 27	29 - 17	34 - 22	44 - 23	69 - 43	7.7	17.1	9.1	7.9	4.5	17.3	0.6 - 0.0	0.7 - 0.0	0.6 - 0.4	0.5 - 0.3	0.4 - 0.2	0.3 - 0.0
INDUSTRIAL GASES																			
LINDE PLC	DEC	55 - 32	50 - 36	13 - 11	36 - 27	24 - 18	25 - 18	81.1	82.8	26.6	72.3	57.1	52.9	1.7 - 1.3	2.6 - 1.5	2.2 - 1.7	2.3 - 0.0	2.7 - 2.0	3.1 - 2.4
AIR PRODUCTS AND CHEMICALS, INC.	SEP	36 - 21	29 - 19	25 - 22	11 - 10	54 - 40	27 - 20	58.5	56.5	59.9	26.3	114.3	53.0	2.4 - 1.7	3.0 - 1.8	3.0 - 2.0	2.9 - 2.2	2.8 - 2.2	2.8 - 2.2
SPECIALTY CHEMICALS																			
THE SHERWIN-WILLIAMS COMPANY	DEC	33 - 18	35 - 23	40 - 31	22 - 14	25 - 19	26 - 19	24.0	27.3	29.1	18.5	27.6	23.7	0.8 - 0.6	1.4 - 0.7	1.1 - 0.8	0.9 - 0.7	1.3 - 0.9	1.4 - 1.0
SIKA AG	DEC	42 - 23	35 - 23	31 - 24	NA - NA	NA - NA	NA - NA	39.5	38.6	41.3	37.9	35.2	39.7	1.0 - 0.7	1.7 - 0.9	1.5 - 1.2	1.6 - 1.3	0.0 - 0.0	0.0 - 0.0
ECOLAB INC.	DEC	NM - NM	39 - 26	32 - 26	26 - 23	30 - 24	36 - 29	NM	35.5	34.6	29.8	34.8	40.0	0.9 - 0.8	1.5 - 0.8	1.3 - 0.9	1.3 - 1.0	1.3 - 1.1	1.4 - 1.1
DUPONT DE NEMOURS, INC.	DEC	NM - NM	267 - 93	46 - 30	101 - 79	17 - 12	9 - 6	NM	323.5	90.8	292.8	57.0	29.3	1.9 - 1.4	4.2 - 1.8	4.2 - 1.5	2.9 - 0.0	3.3 - 0.0	4.5 - 3.2
ALBEMARLE CORPORATION	DEC	42 - 14	18 - 12	21 - 11	292 - 174	16 - 8	21 - 14	43.1	28.5	20.8	256.3	21.0	35.6	1.2 - 0.5	3.0 - 1.1	2.5 - 1.4	1.5 - 0.9	1.4 - 0.9	2.4 - 1.4
PPG INDUSTRIES, INC.	DEC	33 - 16	25 - 19	22 - 17	19 - 15	35 - 27	23 - 16	46.8	37.7	33.8	27.2	47.4	27.2	1.7 - 1.2	2.8 - 1.4	2.0 - 1.6	2.0 - 1.5	1.8 - 1.4	1.8 - 1.2
GIVAUDAN SA	DEC	51 - 33	40 - 29	34 - 29	29 - 22	30 - 25	28 - 23	76.9	78.6	80.5	71.5	76.9	73.8	1.8 - 1.4	2.3 - 1.5	2.6 - 2.0	2.8 - 2.3	3.3 - 2.4	3.1 - 2.6
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	44 - 29	38 - 26	41 - 32	42 - 31	28 - 20	24 - 19	89.0	68.9	68.3	69.7	45.7	37.9	2.9 - 2.0	3.2 - 2.1	2.8 - 1.9	2.3 - 1.8	2.2 - 1.8	2.2 - 1.7
KONINKLIJKE DSM N.V.	DEC	51 - 30	28 - 16	15 - 11	8 - 6	18 - 12	123 - 89	57.1	38.4	20.9	11.3	30.6	197.7	1.8 - 1.2	2.6 - 1.6	2.7 - 1.8	2.5 - 2.0	3.0 - 2.2	4.0 - 2.6
NOVOZYMES A/S	DEC	41 - 27	30 - 24	32 - 26	34 - 23	33 - 22	39 - 27	52.5	45.6	40.8	38.2	34.8	32.8	1.6 - 1.0	1.9 - 1.3	1.9 - 1.4	1.5 - 1.1	1.6 - 1.1	1.5 - 0.9

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

Company	Yr. End	Earnings per Share ($)						Tangible Book Value per Share ($)						Share Price (High-Low, $)					
		2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
COMMODITY CHEMICALS																			
LG CHEM, LTD.	DEC	35.7	6.1	3.4	17.1	23.8	14.5	208.0	186.8	168.0	179.4	177.6	149.2	881.5 - 512.9	793.0 - 211.3	346.5 - 248.2	402.0 - 271.3	398.8 - 231.7	286.2 - 179.0
DOW INC.	DEC	8.4	1.6	-1.8	6.2	0.6	0.0	8.9	0.2	1.3	24.6	0.0	0.0	71.4 - 51.3	58.2 - 22.0	60.5 - 40.4	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
LYONDELLBASELL INDUSTRIES N.V.	DEC	16.8	4.2	9.6	12.0	12.2	9.1	28.2	15.8	15.8	19.9	19.8	12.3	118.0 - 84.1	95.5 - 33.7	98.9 - 68.6	122.0 - 77.5	111.6 - 78.0	93.8 - 69.1
PETRONAS CHEMICALS GROUP BERHAD	DEC	0.2	0.1	0.1	0.1	0.1	0.1	1.0	0.9	0.9	0.9	0.9	0.8	2.2 - 1.6	2.0 - 1.0	2.3 - 1.6	2.5 - 1.8	1.9 - 1.7	1.7 - 1.3
WESTLAKE CORPORATION	DEC	15.6	2.6	3.3	7.6	10.0	3.1	34.0	34.0	31.7	30.6	23.8	13.9	106.5 - 74.4	84.9 - 29.0	81.0 - 55.8	124.3 - 59.8	107.5 - 56.4	61.5 - 39.5
OLIN CORPORATION	DEC	8.0	-6.1	-0.1	2.0	3.3	0.0	-1.0	-9.4	-8.0	-5.4	-6.5	-6.3	64.8 - 22.8	26.4 - 8.8	27.3 - 15.4	38.8 - 17.9	37.5 - 25.4	26.9 - 12.3
VALVOLINE INC.	SEP	2.3	1.7	1.1	0.8	1.5	1.6	-2.8	-3.3	-4.1	-4.3	-2.2	-2.9	37.5 - 22.5	23.8 - 9.1	23.9 - 16.9	25.6 - 17.5	25.3 - 21.0	24.5 - 18.3
CABOT CORPORATION	SEP	4.3	-4.2	2.6	-1.9	3.9	2.3	12.5	8.0	14.2	16.0	19.6	15.8	65.3 - 42.7	48.2 - 20.0	50.6 - 37.1	68.6 - 39.6	64.7 - 50.2	54.2 - 36.1
SINOPEC SHANGHAI PETROCHEMICAL COMPANY LIM	DEC	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.4	0.3	0.3 - 0.2	0.3 - 0.2	0.5 - 0.3	0.7 - 0.4	0.6 - 0.5	0.6 - 0.4
MATIV HOLDINGS, INC.	DEC	2.8	2.7	2.8	3.1	1.1	2.7	-15.7	-2.6	-0.1	-2.0	-3.2	3.2	50.8 - 28.1	42.6 - 20.0	46.6 - 24.4	48.1 - 24.4	47.0 - 36.3	47.0 - 29.0
DIVERSIFIED CHEMICALS																			
BASF SE	DEC	6.8	-1.4	10.3	5.9	7.9	4.7	33.8	27.4	33.0	23.1	26.5	19.1	82.9 - 64.9	83.8 - 45.7	83.7 - 62.4	113.1 - 65.7	117.6 - 94.8	93.2 - 59.1
SOLVAY SA	DEC	10.4	-11.4	1.3	9.7	12.3	6.3	38.9	24.7	29.3	30.4	21.7	6.5	134.9 - 103.2	128.7 - 64.6	125.1 - 92.3	138.1 - 97.8	158.5 - 127.6	118.5 - 74.4
HUNTSMAN CORPORATION	DEC	4.7	4.7	2.4	1.4	2.6	1.4	15.2	11.5	9.9	8.7	10.1	4.8	35.6 - 24.1	26.6 - 12.2	25.7 - 17.3	36.1 - 17.6	33.8 - 18.9	20.5 - 7.5
THE CHEMOURS COMPANY	DEC	3.6	1.3	-0.3	5.5	3.9	0.0	6.0	3.9	3.1	4.9	3.8	-0.4	38.9 - 23.3	27.9 - 7.0	41.6 - 11.7	54.6 - 25.2	58.1 - 20.8	27.3 - 3.1
LANXESS AKTIENGESELLSCHAFT	DEC	3.5	12.5	2.6	5.4	1.1	2.2	17.9	21.0	12.8	13.6	7.2	24.2	76.6 - 57.4	79.3 - 31.4	72.5 - 44.3	85.6 - 45.4	84.9 - 71.9	67.1 - 34.7
FERTILIZERS AND AGRICULTURAL CHEMICALS																			
CORTEVA, INC.	DEC	2.4	0.9	-1.3	-6.8	3.5	0.7	7.2	5.1	3.5	69.9	0.0	0.0	50.0 - 36.5	40.2 - 20.4	32.8 - 24.1	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
NUTRIEN LTD.	DEC	5.5	0.8	1.7	5.7	0.4	0.4	16.3	13.7	14.8	17.7	9.7	9.5	78.3 - 48.7	51.0 - 27.3	56.8 - 46.7	55.8 - 40.5	0.0 - 0.0	0.0 - 0.0
THE MOSAIC COMPANY	DEC	4.3	1.8	-2.8	1.2	-0.3	0.8	25.6	22.2	21.2	22.5	22.6	22.7	43.2 - 23.2	23.7 - 6.5	33.9 - 17.4	37.4 - 22.9	34.4 - 19.2	31.5 - 22.0
FMC CORPORATION	DEC	5.7	4.2	3.6	3.7	4.0	1.6	-8.7	-10.0	-13.0	-8.4	-8.8	5.3	123.7 - 87.3	122.3 - 56.8	102.0 - 70.6	98.7 - 69.4	96.0 - 56.4	60.0 - 32.2
CF INDUSTRIES HOLDINGS, INC.	DEC	4.2	1.5	2.2	1.2	1.5	-1.2	5.2	2.1	2.0	2.2	4.6	3.8	74.8 - 38.1	48.2 - 19.7	55.2 - 38.9	56.5 - 35.7	43.4 - 25.0	41.0 - 20.8
K+S AKTIENGESELLSCHAFT	DEC	17.7	-11.0	0.5	0.3	1.2	1.0	31.0	13.7	20.5	18.9	20.1	19.1	18.8 - 8.9	14.0 - 5.5	20.9 - 10.9	29.6 - 16.7	30.0 - 22.7	24.6 - 16.7
THE SCOTTS MIRACLE-GRO COMPANY	SEP	9.0	6.8	8.2	1.1	3.6	5.1	-5.4	-9.4	-9.5	-18.9	-9.3	-5.7	254.3 - 133.4	202.6 - 76.5	114.6 - 59.5	110.1 - 58.0	108.0 - 81.5	98.8 - 62.2
AMERICAN VANGUARD CORPORATION	DEC	0.6	0.5	0.5	0.8	0.7	0.4	4.2	3.6	3.3	3.9	3.4	5.5	22.5 - 14.2	19.6 - 11.4	21.2 - 12.7	24.0 - 14.0	24.0 - 14.7	20.0 - 9.6
INDUSTRIAL GASES																			
LINDE PLC	DEC	7.3	4.7	4.2	13.1	4.3	5.2	6.3	5.6	11.1	15.5	7.0	4.6	347.0 - 240.8	269.8 - 146.7	214.3 - 151.9	169.8 - 140.0	156.4 - 115.0	125.0 - 95.6
AIR PRODUCTS AND CHEMICALS, INC.	SEP	9.4	8.5	7.9	6.8	13.6	2.9	55.1	48.7	44.6	43.9	41.2	26.9	316.4 - 245.8	327.9 - 167.4	241.9 - 153.6	175.2 - 148.4	164.8 - 133.6	157.8 - 114.6
SPECIALTY CHEMICALS																			
THE SHERWIN-WILLIAMS COMPANY	DEC	7.0	7.4	5.5	3.9	6.1	4.0	-33.5	-29.3	-27.7	-30.3	-32.7	1.8	354.2 - 218.1	252.7 - 108.5	199.0 - 123.7	159.9 - 118.4	138.6 - 90.1	104.2 - 78.3
SIKA AG	DEC	7.2	5.9	5.0	4.7	4.3	3.6	0.2	-7.1	-8.9	-0.3	16.0	14.1	423.1 - 259.8	281.0 - 141.4	190.9 - 123.5	151.4 - 114.5	0.0 - 0.0	0.0 - 0.0
ECOLAB INC.	DEC	3.9	-4.2	5.3	4.9	5.1	4.1	-17.7	-9.9	0.7	-10.0	-12.4	-11.3	238.9 - 201.1	231.4 - 124.6	209.9 - 141.3	162.9 - 125.7	138.0 - 117.3	124.6 - 98.6
DUPONT DE NEMOURS, INC.	DEC	11.9	-4.0	0.7	5.0	2.2	10.6	-3.1	16.0	-7.8	59.7	9.7	11.6	87.3 - 66.4	71.6 - 28.3	180.2 - 61.6	231.2 - 146.7	221.6 - 169.6	178.0 - 120.8
ALBEMARLE CORPORATION	DEC	1.1	3.5	5.0	6.3	0.5	5.7	31.8	21.1	18.8	15.5	14.9	16.9	291.5 - 133.8	153.5 - 48.9	93.1 - 58.6	138.7 - 71.9	145.0 - 87.0	92.2 - 45.8
PPG INDUSTRIES, INC.	DEC	6.0	4.5	5.2	5.5	6.2	3.3	-11.6	-7.5	-5.6	-6.0	-1.7	-2.8	183.0 - 132.1	149.9 - 69.8	134.4 - 96.8	122.1 - 94.4	119.9 - 94.6	117.0 - 88.4
GIVAUDAN SA	DEC	96.9	90.4	78.0	72.5	79.6	68.3	-110.4	-129.1	-72.4	-32.8	117.7	105.1	5329.0 - 3730.8	4632.9 - 2831.3	3161.6 - 2300.5	2538.7 - 2042.8	2357.0 - 1754.6	2083.1 - 1680.5
INTERNATIONAL FLAVORS & FRAGRANCES INC.	DEC	1.1	3.2	4.0	3.8	3.7	5.1	-22.9	-18.8	-20.0	-22.4	1.4	3.3	157.1 - 103.9	143.9 - 92.1	153.0 - 104.9	157.4 - 122.1	156.6 - 113.2	143.6 - 97.2
KONINKLIJKE DSM N.V.	DEC	11.0	3.5	4.8	6.9	12.1	3.7	26.4	21.0	27.4	30.6	26.8	17.4	228.0 - 154.3	185.3 - 100.6	132.6 - 77.4	106.5 - 77.9	98.5 - 68.0	68.0 - 43.2
NOVOZYMES A/S	DEC	1.7	1.6	1.7	1.7	1.7	1.4	3.8	5.1	5.1	5.0	4.9	4.3	82.9 - 52.0	68.7 - 41.8	50.3 - 39.7	55.7 - 39.9	58.2 - 38.4	47.5 - 31.3

Note: Data as originally reported. Non-USD currencies are translated into USD. CAGR-Compound annual growth rate. Only top 10 constituents by market cap. are shown.
Souce: S&P Capital IQ.

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