Executive Summary

In this edition of European Chemicals Update from Kroll, we evaluate current trends for key raw materials, prevailing investor sentiment and valuation developments in the featured pharma chemicals sub-sector.

Our top insights are detailed below.

Key raw materials prices in the chemicals sector witnessed a fall in Q3 2022, affected mainly by declining demand and accelerated deterioration of the global economic conditions.

Next, the ifo Business Climate Index for the German chemical industry has fallen further in Q3 2022, with current conditions showing a sharp decline and expectations falling further in the negative territory, mainly as a consequence of high energy costs in Europe, global economic conditions and imminent recession. This indicates the German companies’ concern regarding current business activities and extreme conditions in the near future.

Finally, in the pharma chemicals sub-sector, featured companies have shown a fall in the market capitalization. Bayer’s market capitalization held up best over the last 12 months, followed by Merck, Novozymes and Lonza Group.
Quarterly Market Review

Key Raw Materials

Petrochemicals

### Feedstock

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>USD/bbl</th>
<th>USD/MMBtu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brent Crude Oil</td>
<td>[Graph]</td>
<td>[Graph]</td>
</tr>
<tr>
<td>Henry Hub Natural Gas</td>
<td>[Graph]</td>
<td>[Graph]</td>
</tr>
</tbody>
</table>

### Aromatics\(^{(1)}\)

<table>
<thead>
<tr>
<th>Aromatics</th>
<th>USD/MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene (W. Europe)</td>
<td>[Graph]</td>
</tr>
<tr>
<td>Mixed Xylenes (W. Europe)</td>
<td>[Graph]</td>
</tr>
</tbody>
</table>

### Olefins\(^{(1)}\)

<table>
<thead>
<tr>
<th>Olefins</th>
<th>USD/MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene (W. Europe)</td>
<td>[Graph]</td>
</tr>
<tr>
<td>Propylene (W. Europe)</td>
<td>[Graph]</td>
</tr>
<tr>
<td>Butadiene (W. Europe)</td>
<td>[Graph]</td>
</tr>
</tbody>
</table>

### Key Observations

- Crude oil slipped below USD 90/bbl in September 2022 after the peak of May 2022, reflecting a seasonal slowdown in refinery purchases and increased supplies, as well as concerns about global economy. However, in October 2022, Brent moved up to $95/bbl as a result of the decision of OPEC+ to curtail crude oil supply.

- Ethylene prices showed declining trend in Q3 2022 due to constant flow of cheaper imports from the APAC and North American regions. Additionally, in-house cost of production remains elevated due to higher energy and operation costs leading to weak output rates.

- Butadiene prices witnessed a mixed trend in Q3 2022 due to fluctuating demand dynamics, caused by speculation of recession across Europe.

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**Definitions:**
- MMBtu: 1 million British thermal units; bbl: barrels; MT: metric tons
- Note: (1) Bloomberg as of September 30, 2022
- Source: IEA, Chemanalyst, Bloomberg as of October 31, 2022
# Quarterly Market Review

## Raw Materials Wrap-Up

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit</th>
<th>Type</th>
<th>Delivery</th>
<th>Source</th>
<th>Oct 2021</th>
<th>Jan 2022</th>
<th>Apr 2022</th>
<th>Jul 2022</th>
<th>Oct 2022</th>
<th>ΔQoQ</th>
<th>ΔYoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphtha</td>
<td>USD/MT</td>
<td>1 Mo. Fwd</td>
<td>CIF N.W. Europe</td>
<td>Bloomberg</td>
<td>766.0</td>
<td>804.2</td>
<td>894.1</td>
<td>737.5</td>
<td>657.8</td>
<td>(10.8%)</td>
<td>(14.1%)</td>
</tr>
<tr>
<td>Methanol</td>
<td>EUR/MT</td>
<td>Spot</td>
<td>FOB Rotterdam</td>
<td>Polymerupdate</td>
<td>401.0</td>
<td>405.0</td>
<td>352.0</td>
<td>386.0</td>
<td>348.0</td>
<td>(9.8%)</td>
<td>(13.2%)</td>
</tr>
<tr>
<td>Acrylic acid</td>
<td>USD/MT</td>
<td>Spot</td>
<td>DDP W. Europe</td>
<td>Tecnon Orbichem</td>
<td>2,436.0</td>
<td>2,456.0</td>
<td>2,536.0</td>
<td>2,292.0</td>
<td>2,007.0</td>
<td>(12.4%)</td>
<td>(17.6%)</td>
</tr>
<tr>
<td>Adipic acid</td>
<td>USD/MT</td>
<td>Contract</td>
<td>DDP W. Europe</td>
<td>Tecnon Orbichem</td>
<td>3,713.0</td>
<td>3,905.0</td>
<td>4,100.0</td>
<td>3,719.0</td>
<td>3,542.0</td>
<td>(4.8%)</td>
<td>(4.6%)</td>
</tr>
<tr>
<td>Caustic soda (liquid)</td>
<td>USD/MT</td>
<td>Spot</td>
<td>DDP W. Europe</td>
<td>Tecnon Orbichem</td>
<td>966.0</td>
<td>1,169.0</td>
<td>1,546.0</td>
<td>1,582.0</td>
<td>2,411.0</td>
<td>52.4%</td>
<td>149.6%</td>
</tr>
<tr>
<td>Chlorine (liquid)</td>
<td>USD/MT</td>
<td>Spot</td>
<td>DDP W. Europe</td>
<td>Tecnon Orbichem</td>
<td>265.0</td>
<td>424.0</td>
<td>405.0</td>
<td>382.0</td>
<td>369.0</td>
<td>(3.4%)</td>
<td>39.2%</td>
</tr>
<tr>
<td>Urea (prill)</td>
<td>USD/MT</td>
<td>Spot</td>
<td>FOB Black Sea</td>
<td>Green Markets</td>
<td>750.0</td>
<td>842.5</td>
<td>600.0(2)</td>
<td>443.5</td>
<td>507.5</td>
<td>14.4%</td>
<td>(32.3%)</td>
</tr>
</tbody>
</table>

**Definitions:**
- CIF: Cost, insurance and freight
- FOB: Free on board
- DDP: Delivered duty paid
- QoQ: Quarter on Quarter
- YoY: Year on Year

**Note:** (1) Data as of month ending (2) Data as of May 31, 2022

Source: Bloomberg as of October 31, 2022
Quarterly Market Review

ifo Survey German Chemical Industry

German Chemical Industry | Business Cycle

Key Observations

- October 2022 expectations have declined as compared to the previous two quarters.
- Current conditions have moved into a negative trajectory after a continuous fall since September 2021.
- The falling expectations and negative current conditions indicate the German companies’ concern regarding current business activities and tough conditions in the near future. The effects of the imminent global recession are seen in the chemical industry too.

Note: Boom: good conditions, expected improvement; Downswing: good conditions, expected deterioration; Recession: bad conditions, expected deterioration; Upswing: bad conditions, expected improvement

Source: ifo Institut für Wirtschaftsforschung, Bloomberg as of October 31, 2022.
Quarterly Market Review

ifo Survey German Chemical Industry

German Chemical Industry | Business Indicators

Key Observations

• The chemicals business climate fell from (11.6) in June 2022 to (36.8) in October 2022.

• Order income was hit by a sharp downturn in October 2022.

• Inventory levels increased further after the continuous downfall from previous year.

• A negative order income level and rising inventory levels may indicate that chemical customers continue to scale back on orders.

Explanatory note
The ifo Business Climate Index is based on ca. 9,000 monthly survey responses from firms in manufacturing, construction, wholesaling and retailing. The firms are asked to give their assessments of the current business situation and their expectations for the next six months. They can characterize their situation as “good,” “satisfactory” or “poor” and their business expectations for the next six months as “more favorable,” “unchanged” or “more unfavorable.” The balance value of the current business situation is the difference between the percentages of the responses “good” and “poor,” and the balance value of the expectations is the difference between the percentages of the responses “more favorable” and “more unfavorable.” The business climate is a transformed mean of the balances of the business situation and the expectations. For the purpose of calculating the index values, the transformed balances are all normalized to the average of the year 2005.

Source: ifo Institut für Wirtschaftsforschung, Bloomberg as of October 31, 2022
Quarterly Market Review

Economic Environment

U.S. Weekly Railcar Chemicals Loadings

Loadings per week

24,000
26,000
28,000
30,000
32,000
34,000
36,000

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

2022  2021  2020  2019

Source: Association of American Railroads, Bloomberg as of October 31, 2022

Currency Trends

USD/EUR  USD/GBP  USD/CHF


Source: Bloomberg as of October 31, 2022
Quarterly Market Review

Rebalanced Stock Development in Europe and the U.S.

**Europe: STOXX 600**

![STOXX 600 Europe Chart](image)

**U.S.: S&P 500**

![S&P 500 Chart](image)

Source: Bloomberg as of October 31, 2022
M&A Transaction Review

Announced Deals

European M&A Quarterly Trend

Key Observations

- Twenty out of the 76 transactions announced in last four months had a disclosed value totaling EUR 6.4 billion (bn).

- The top 10 transactions announced in the last seven months, based on reported deal values (see table on next page), have a combined value of EUR 27.6 bn.

- Notable transactions include Koninklijke DSM acquisition of Firmenich International in the area of consumer specialty, and Advent Inc. and Lanxess acquisition of Engineering Materials business of Koninklijke DSM, in the area of specialty chemicals.

Source: Capital IQ as of October 31, 2022
Note: Screening includes transactions in which the target, buyer or seller is from Europe. Announced transactions include bids made, letters of intent, definitive agreements and registered offerings (definition by Capital IQ).
### M&A Transaction Review

#### Top 10 European Deals Announced During the Last Seven Months

<table>
<thead>
<tr>
<th>Announced</th>
<th>Acquirer</th>
<th>HQ</th>
<th>Target</th>
<th>HQ</th>
<th>Target Business Description</th>
<th>Stake Acquired</th>
<th>Enterprise Value (M)</th>
<th>LTM Revenue (M)</th>
<th>LTM EBITDA Margin (%)</th>
<th>EV / LTM Revenue (x)</th>
<th>EV / LTM EBITDA (x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 31, 2022</td>
<td>Koninklijke DSM</td>
<td>NL</td>
<td>Firmenich International</td>
<td>CH</td>
<td>Firmenich International develops, manufactures and sells fragrances and flavors</td>
<td>100.0%</td>
<td>18,669.6</td>
<td>4,356.4</td>
<td>18.9%</td>
<td>4.3x</td>
<td>22.5x</td>
</tr>
<tr>
<td>May 31, 2022</td>
<td>Advent Lanxess</td>
<td>U.S.</td>
<td>Engineering Materials</td>
<td>NL</td>
<td>Engineering Materials business of Koninklijke DSM comprises specialty materials business</td>
<td>100.0%</td>
<td>3,850.0</td>
<td>1,500.0</td>
<td>22.3%</td>
<td>2.6x</td>
<td>11.5x</td>
</tr>
<tr>
<td>May 17, 2022</td>
<td>Petronas Chemicals</td>
<td>NL</td>
<td>Perstorp Holding</td>
<td>SE</td>
<td>Perstorp Holding manufactures and sells specialty chemicals</td>
<td>100.0%</td>
<td>2,249.9</td>
<td>1,453.6</td>
<td>18.2%</td>
<td>1.6x</td>
<td>8.6x</td>
</tr>
<tr>
<td>Apr 20, 2022</td>
<td>Avient Corporation</td>
<td>U.S.</td>
<td>Protective Materials</td>
<td>NL</td>
<td>Protective Materials business of Koninklijke DSM comprises protective materials manufacturing business.</td>
<td>100.0%</td>
<td>1,370.8</td>
<td>335.0</td>
<td>31.3%</td>
<td>4.1x</td>
<td>13.1x</td>
</tr>
<tr>
<td>Jun 2, 2022</td>
<td>Agrofert</td>
<td>CZ</td>
<td>Nitrogen business of</td>
<td>AT</td>
<td>Nitrogen business of Borealis comprises fertilizer, melamine, and technical nitrogen products manufacturing</td>
<td>100.0%</td>
<td>810.0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Jul 6, 2022</td>
<td>Coats Group</td>
<td>UK</td>
<td>Texon International</td>
<td>UK</td>
<td>Texon International manufactures materials including non-woven and saturated felts, extruded filmic materials, and wet web saturated cellulose board used in footwear, fashion accessories and clothing</td>
<td>100.0%</td>
<td>232.8</td>
<td>129.7</td>
<td>15.9%</td>
<td>1.8x</td>
<td>11.3x</td>
</tr>
<tr>
<td>Aug 31, 2022</td>
<td>Global Amines Company</td>
<td>SG</td>
<td>Quats business of Clariant</td>
<td>DE</td>
<td>Quats business of Clariant comprises the additives manufacturing business unit</td>
<td>50.0%</td>
<td>224.4</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Oct 11,2022</td>
<td>Safex Chemicals India</td>
<td>IN</td>
<td>Briar Chemicals Ltd.</td>
<td>UK</td>
<td>A chemical company, manufactures agrochemical products</td>
<td>100.0%</td>
<td>83.0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Aug 8, 2022</td>
<td>Stratasys</td>
<td>U.S.</td>
<td>Additive Manufacturing</td>
<td>NL</td>
<td>Additive Manufacturing Materials Business of Covestro comprises photopolymers materials manufacturing business.</td>
<td>100.0%</td>
<td>80.0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>May 18, 2022</td>
<td>BEWI ASA</td>
<td>NO</td>
<td>Jabilite Group</td>
<td>UK</td>
<td>Jabilite Group manufactures expandable polystyrene (EPS) products for insulation and packaging applications.</td>
<td>51.0%</td>
<td>23.2</td>
<td>47.3</td>
<td>n/a</td>
<td>0.5x</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Source: Capital IQ, Merger Market and company information

Note: Transactions ordered by value. Includes announcements through October 2022. Figures converted with exchange rate as per the respective announcement date.

Definitions:
- **Enterprise Value (EV):** Market Capitalization + Total Debt + Preferred Equity + Minority Interest - Cash and Short-Term Liabilities
- **EBITDA:** Earnings Before Interest, Taxes, Depreciation and Amortization; **LTM:** Last Twelve Months
M&A Transaction Review

Strategic Alliances and Collaborations

**Gerresheimer and Merck Transform Primary Packaging into Digital Twins**
**October 2022**

Gerresheimer and Merck jointly developed a proof of concept, which aims to transform the pharma supply chain by creating digital twins for primary packaging. Through a single interconnected network, participants will benefit from full traceability and digital trust, resulting in cost savings, improved quality and even new business models.

**BASF and the Catholic University of the North Collaborate on Mining Research, Development and Innovation**
**October 2022**

BASF and the Catholic University of the North (UCN) in Antofagasta, Chile have signed a collaboration agreement to promote research, development and innovation in mining. The aim of collaboration is to strengthen the cooperation between academia, students and industry experts and to leverage synergies in the development of innovative products and solutions. As part of the venture, BASF established a technical service and development laboratory for flotation, hydrometallurgy and solid-liquid separation at UCN.

**Solvay Sodi Plans to Build a Thermal Processing Plant for Alternative fuels**
**October 2022**

Solvay Sodi, through its newly established subsidiary Devnya Energy, submitted a letter of investment intention to the Regional Inspectorate of Environment and Water in Varna, for the construction of a steam generation plant fueled by local alternative fuels at its soda ash plant in Devnya, Bulgaria. This facility is intended to replace a steam generation plant that is currently powered by imported fossil fuels.

**Linde and SLB Collaborate on Carbon Capture and Sequestration**
**October 2022**

Linde and SLB entered a strategic collaboration on carbon capture, utilization and sequestration projects to accelerate decarbonization solutions across industrial and energy sectors. The collaboration will combine decades of experience in carbon dioxide (CO₂) capture and sequestration; innovative technology portfolios; project development and execution expertise; and engineering, procurement and construction capabilities.

**ProSpecieRara and Symrise Have Formed a Collaboration for the Sustainable Use of Plant Genetic Resources in Germany**
**October 2022**

The collaboration will serve as a role model to ensure that some of the benefits that result from the use of plant genetic diversity flow back to their conservation. The agreement aims at motivating further companies to also make a voluntarily contribution to biodiversity.

**Solvay Opens a New Microbiology Lab for the Energy Sector in the UK**
**October 2022**

Solvay opened a new, advanced microbiology lab in Oldbury, UK to address the energy sector’s needs to expedite the analysis of problematic microbes in determining their impact on biofouling and corrosion. The lab will largely support Solvay’s premiere line of TOLCIDE® biocides, which for more than 40 years has provided fast-acting and powerful microbial control in applications for pipelines, drilling muds, completion fluids, well remediation, fracturing, water-floods and industrial water treatment.

Source: Company press statements
M&A Transaction Review

Strategic Alliances and Collaborations

Umicore and PowerCo Establish Joint Venture (JV) for European Battery Materials Production
September 2022

Umicore and PowerCo, the new battery company of the Volkswagen Group, announced a JV for precursor and cathode material production in Europe. Starting in 2025, the JV will supply PowerCo's European battery cell factories with key materials. The partners aim to produce cathode materials and their precursors for 160 GWh cell capacity per year by end of the decade, which compares to an annual production capacity that could power about 2.2mn full electric vehicles.

BASF and GS Engineering and Construction(GS E&C) Intend to Jointly Develop Modular Solutions for Carbon Capture
September 2022

BASF and GS E&C signed a Memorandum of Understanding on a strategic partnership to jointly develop modular solutions for carbon capture facilities. The partners want to develop individual package solutions from standardized elements for customers from all industries in order to remove CO₂ from exhaust gases and process it so that it can be further utilized or stored.

Solvay Expands Amodel® PPA Capacity to Address Growth in Demand in the Automotive Industry
September 2022

Solvay announced that it is increasing its Amodel® polyphthalamide (PPA) resin capacity by 15% at its Augusta manufacturing site in Georgia, U.S. as a result of operational excellence initiatives. The new capacity facilitates the production of innovative and more sustainable Amodel® PPA grades that offer a reduced CO₂ footprint due to manufacturing improvements.

Source: Company press statements
Public Trading Analysis

Sub-Sector Summary

Regression Analysis

**EV / Revenue vs. EBITDA Margin**

- **EV / Revenue (FY22E)**
  - **y = 16.942x - 1.3279**
  - **R² = 0.4035**

**EV / EBITDA vs. Revenue Growth**

- **EV / EBITDA (FY22E)**
  - **y = 165.2x + 4.1902**
  - **R² = 0.3553**

See pages 18–20 for constitution of sub-sectors

Source: Capital IQ as of October 31, 2022
Public Trading Analysis

Sub-Sector Summary

Sub-Sector Trading Multiples (EV / EBITDA)

<table>
<thead>
<tr>
<th>LTM Actual</th>
<th>LTM Rebased</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV / EBITDA</td>
<td>EV / EBITDA</td>
</tr>
</tbody>
</table>

Diversified: 40%  
Industrial Gases: 55%  
Agriculture: 70%  
Industrial Specialty: 85%  
Consumer Specialty: 100%  
Pharma Chemicals: 115%

Source: Capital IQ as of October 31, 2022
Public Trading Analysis

Sub-Sector Focus: Pharma Chemicals

Share Price Development and Regression Analysis

Share Price Development Rebased

![Share Price Development Graph]

EV / Revenue vs. EBITDA Margin

![EV / Revenue vs. EBITDA Margin Graph]

\[ y = 56.663x - 13.128 \quad R^2 = 0.8131 \]

Source: Bloomberg as of October 31, 2022

Source: Capital IQ as of October 31, 2022

See pages 18–20 for constitution of sub-sectors

Source: Bloomberg as of October 31, 2022
Public Trading Analysis

Sub-Sector Focus: Pharma Chemicals

Capital Expenditure / Depreciation

Source: Capital IQ, Bloomberg as of October 31, 2022

Source: Capital IQ as of October 31, 2022
Public Trading Analysis

Sub-Sector Focus: Pharma Chemicals

Research and Development Expenditures in % of Sales

Pharma Chemicals

Merck

Novozymes

Lonza

Bayer

Chemicals Sub-Sector Average (FY21)

Source: Capital IQ, Bloomberg as of October 31, 2022

Source: Capital IQ as of October 31, 2022
## Public Trading Analysis

### Company Trading Statistics

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diversified</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arkema SA</td>
<td>80.1</td>
<td>71.2</td>
<td>135.0</td>
<td>59%</td>
<td>5,916.6</td>
<td>8,055.6</td>
<td>11,543.0</td>
<td>1,250.0</td>
<td>2,051.8</td>
<td>10.8%</td>
</tr>
<tr>
<td></td>
<td>BASF SE</td>
<td>45.4</td>
<td>37.9</td>
<td>69.2</td>
<td>66%</td>
<td>40,642.4</td>
<td>61,078.4</td>
<td>87,779.0</td>
<td>11,576.0</td>
<td>10,899.0</td>
<td>13.2%</td>
</tr>
<tr>
<td></td>
<td>Clariant AG</td>
<td>16.3</td>
<td>14.0</td>
<td>20.6</td>
<td>79%</td>
<td>5,355.3</td>
<td>6,480.5</td>
<td>4,909.8</td>
<td>767.4</td>
<td>878.4</td>
<td>15.6%</td>
</tr>
<tr>
<td></td>
<td>Evonik Industries AG</td>
<td>18.7</td>
<td>16.5</td>
<td>29.7</td>
<td>63%</td>
<td>8,693.2</td>
<td>12,365.2</td>
<td>18,238.0</td>
<td>2,309.0</td>
<td>2,562.8</td>
<td>12.7%</td>
</tr>
<tr>
<td></td>
<td>Lanxess AG</td>
<td>34.3</td>
<td>28.2</td>
<td>59.5</td>
<td>58%</td>
<td>2,954.4</td>
<td>5,527.4</td>
<td>9,250.0</td>
<td>1,048.0</td>
<td>956.0</td>
<td>11.3%</td>
</tr>
<tr>
<td></td>
<td>Solvay SA</td>
<td>91.2</td>
<td>74.0</td>
<td>111.7</td>
<td>82%</td>
<td>9,456.1</td>
<td>11,806.1</td>
<td>15,442.0</td>
<td>2,965.0</td>
<td>2,850.1</td>
<td>19.2%</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Agriculture**                        |                               |                      |                             |            |                  |               |             |                |                 |                |                     |
|                                        | Israel Chemicals Ltd.         | 9.2                  | 7.8                         | 11.9       | 77%              | 11,801.3      | 14,296.8    | 10,159.2       | 3,883.4         | 4,088.2       | 38.2%               | 3.7x          | 3.5x               |
|                                        | K+S AG                        | 22.4                 | 13.4                        | 36.5       | 61%              | 4,279.7       | 4,789.1     | 4,537.8        | 2,474.8         | 2,599.9       | 54.5%               | 1.9x          | 1.8x               |
|                                        | KWS Saat SE                   | 58.8                 | 53.5                        | 76.9       | 76%              | 1,940.4       | 2,456.2     | 1,539.5        | 243.3           | 253.5         | 15.8%               | 10.1x         | 9.7x               |
|                                        | Tessenderlo Group NV          | 30.7                 | 29.0                        | 37.5       | 82%              | 1,321.7       | 1,379.3     | 2,400.1        | 423.5           | 399.3         | 17.6%               | 3.3x          | 3.5x               |
|                                        | Yara International ASA        | 45.1                 | 36.0                        | 49.2       | 92%              | 11,500.6      | 15,250.3    | 24,017.3       | 4,290.3         | 4,698.6       | 17.9%               | 5.6x          | 3.3x               |
|                                        | **Average**                   |                      |                             |            |                  |               |             |                |                 |              |                     | 28.8%        | 4.9x               |

Source: Capital IQ as of October 31, 2022; includes the most actively traded European chemical companies for respective covered sectors
## Public Trading Analysis

### Company Trading Statistics

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Share Price 31-Oct-22</th>
<th>52-Week Share Price</th>
<th>Market Cap</th>
<th>Enterprise Value</th>
<th>Revenues LTM</th>
<th>EBITDA LTM</th>
<th>EBITDA Margin</th>
<th>EV / EBITDA LTM</th>
<th>EV / EBITDA FY2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Specialty</strong></td>
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</tr>
<tr>
<td>AkzoNobel NV</td>
<td>62.4</td>
<td>55.0 - 104.6</td>
<td>60%</td>
<td>11,076.9</td>
<td>15,244.9</td>
<td>10,643.0</td>
<td>1,058.0</td>
<td>1,178.2</td>
<td>9.9%</td>
</tr>
<tr>
<td>Covestro AG</td>
<td>34.4</td>
<td>27.7 - 58.5</td>
<td>59%</td>
<td>6,652.4</td>
<td>9,548.4</td>
<td>18,342.0</td>
<td>2,238.0</td>
<td>1,756.5</td>
<td>12.2%</td>
</tr>
<tr>
<td>EMS-Chemie Holding AG</td>
<td>635.8</td>
<td>597.4 - 1,056.5</td>
<td>60%</td>
<td>14,871.3</td>
<td>14,787.5</td>
<td>2,405.1</td>
<td>696.5</td>
<td>707.9</td>
<td>29.0%</td>
</tr>
<tr>
<td>Johnson Matthey Plc</td>
<td>22.5</td>
<td>19.2 - 32.6</td>
<td>69%</td>
<td>4,109.2</td>
<td>5,110.1</td>
<td>18,962.7</td>
<td>781.0</td>
<td>871.9</td>
<td>4.1%</td>
</tr>
<tr>
<td>Kemira Oyj</td>
<td>13.4</td>
<td>10.4 - 14.0</td>
<td>96%</td>
<td>2,048.9</td>
<td>2,967.6</td>
<td>3,321.8</td>
<td>397.2</td>
<td>477.4</td>
<td>12.0%</td>
</tr>
<tr>
<td>Lenzing AG</td>
<td>48.4</td>
<td>44.1 - 134.2</td>
<td>36%</td>
<td>1,285.0</td>
<td>3,037.1</td>
<td>2,576.2</td>
<td>305.9</td>
<td>326.0</td>
<td>11.9%</td>
</tr>
<tr>
<td>Sika AG</td>
<td>228.1</td>
<td>192.0 - 389.6</td>
<td>59%</td>
<td>35,055.1</td>
<td>37,885.8</td>
<td>10,794.1</td>
<td>1,931.7</td>
<td>2,020.3</td>
<td>17.9%</td>
</tr>
<tr>
<td>Synthomer Plc</td>
<td>1.3</td>
<td>1.0 - 6.1</td>
<td>21%</td>
<td>611.2</td>
<td>1,837.5</td>
<td>2,829.2</td>
<td>360.5</td>
<td>359.5</td>
<td>12.7%</td>
</tr>
<tr>
<td>Umicore SA</td>
<td>33.4</td>
<td>28.8 - 51.1</td>
<td>65%</td>
<td>8,007.1</td>
<td>9,015.6</td>
<td>25,226.6</td>
<td>1,018.2</td>
<td>1,152.7</td>
<td>4.0%</td>
</tr>
<tr>
<td>Victrex Plc</td>
<td>19.2</td>
<td>17.7 - 29.5</td>
<td>65%</td>
<td>1,669.7</td>
<td>1,647.6</td>
<td>373.3</td>
<td>125.6</td>
<td>131.3</td>
<td>33.6%</td>
</tr>
<tr>
<td>Wacker Chemie AG</td>
<td>117.9</td>
<td>98.6 - 187.1</td>
<td>63%</td>
<td>5,857.0</td>
<td>5,818.7</td>
<td>8,070.9</td>
<td>2,048.4</td>
<td>2,114.2</td>
<td>25.4%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
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<td><strong>Industrial Gases</strong></td>
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<tr>
<td>Air Liquide SA</td>
<td>132.3</td>
<td>114.4 - 153.4</td>
<td>86%</td>
<td>69,026.7</td>
<td>83,252.3</td>
<td>26,695.7</td>
<td>6,265.5</td>
<td>7,159.1</td>
<td>23.5%</td>
</tr>
<tr>
<td>Linde Plc(1)</td>
<td>300.7</td>
<td>265.4 - 356.2</td>
<td>84%</td>
<td>148,664.9</td>
<td>161,703.6</td>
<td>34,431.5</td>
<td>10,947.6</td>
<td>10,996.2</td>
<td>31.8%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
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<td></td>
<td><strong>27.6%</strong></td>
</tr>
</tbody>
</table>

Source: Capital IQ as of October 31, 2022; includes the most actively traded European chemical companies for respective covered sectors

Note: (1) Based on company filings and press releases, following the merger of Praxair, Inc. and Linde AG, a new legal entity, Linde Plc, has been established with headquarters in the UK and shares listed in both Frankfurt Stock Exchange (XETRA:LIN) and New York Stock Exchange (NYSE:LIN). In accordance, our coverage for Linde AG has been replaced by Linde Plc.
# Public Trading Analysis

## Company Trading Statistics

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</thead>
<tbody>
<tr>
<td><strong>Company Name</strong></td>
<td><strong>31-Oct-22</strong></td>
<td><strong>Low</strong></td>
<td><strong>High</strong></td>
<td><strong>% of High</strong></td>
<td><strong>2022</strong></td>
<td><strong>EV</strong></td>
<td><strong>Margin</strong></td>
<td><strong>LTM</strong></td>
<td><strong>FY2022E</strong></td>
<td><strong>LTM</strong></td>
</tr>
<tr>
<td>Chr. Hansen Holding A/S</td>
<td>56.2</td>
<td>48.4</td>
<td>76.5</td>
<td>73%</td>
<td>7,394.9</td>
<td>8,275.2</td>
<td>1,218.0</td>
<td>405.2</td>
<td>430.3</td>
<td>33.3%</td>
</tr>
<tr>
<td>Croda International Plc</td>
<td>78.6</td>
<td>68.1</td>
<td>122.1</td>
<td>64%</td>
<td>10,886.8</td>
<td>11,288.9</td>
<td>2,421.2</td>
<td>658.4</td>
<td>685.4</td>
<td>27.2%</td>
</tr>
<tr>
<td>Koninklijke DSM NV</td>
<td>119.3</td>
<td>110.3</td>
<td>200.5</td>
<td>60%</td>
<td>20,634.2</td>
<td>22,179.2</td>
<td>9,802.0</td>
<td>1,648.0</td>
<td>1,609.9</td>
<td>16.8%</td>
</tr>
<tr>
<td>Givaudan SA</td>
<td>3,020.0</td>
<td>2,698.8</td>
<td>4,919.9</td>
<td>61%</td>
<td>27,865.4</td>
<td>33,037.8</td>
<td>6,975.5</td>
<td>1,399.5</td>
<td>1,538.2</td>
<td>20.1%</td>
</tr>
<tr>
<td>Symrise AG</td>
<td>103.4</td>
<td>91.9</td>
<td>132.7</td>
<td>78%</td>
<td>14,445.4</td>
<td>16,693.7</td>
<td>4,178.1</td>
<td>870.8</td>
<td>951.7</td>
<td>20.8%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
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<tr>
<td></td>
<td><strong>23.6%</strong></td>
<td><strong>18.7x</strong></td>
<td><strong>17.7x</strong></td>
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**Pharma Chemicals**

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Company Name</strong></td>
<td><strong>31-Oct-22</strong></td>
<td><strong>Low</strong></td>
<td><strong>High</strong></td>
<td><strong>% of High</strong></td>
<td><strong>2022</strong></td>
<td><strong>EV</strong></td>
<td><strong>Margin</strong></td>
<td><strong>LTM</strong></td>
<td><strong>FY2022E</strong></td>
<td><strong>LTM</strong></td>
</tr>
<tr>
<td>Bayer AG</td>
<td>53.2</td>
<td>43.9</td>
<td>68.0</td>
<td>78%</td>
<td>52,284.6</td>
<td>88,909.6</td>
<td>49,857.0</td>
<td>14,056.0</td>
<td>13,425.9</td>
<td>28.2%</td>
</tr>
<tr>
<td>Lonza Group Ltd.</td>
<td>520.6</td>
<td>441.2</td>
<td>787.2</td>
<td>66%</td>
<td>38,621.3</td>
<td>38,664.7</td>
<td>5,859.5</td>
<td>1,300.3</td>
<td>1,976.7</td>
<td>22.2%</td>
</tr>
<tr>
<td>Novozymes A/S</td>
<td>53.1</td>
<td>47.4</td>
<td>73.3</td>
<td>72%</td>
<td>14,683.7</td>
<td>15,582.4</td>
<td>2,265.2</td>
<td>737.4</td>
<td>833.6</td>
<td>32.6%</td>
</tr>
<tr>
<td>Merck KGaA</td>
<td>165.0</td>
<td>153.1</td>
<td>231.5</td>
<td>71%</td>
<td>71,738.3</td>
<td>81,902.3</td>
<td>20,952.0</td>
<td>5,981.0</td>
<td>6,949.9</td>
<td>28.5%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
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<tr>
<td></td>
<td><strong>27.9%</strong></td>
<td><strong>16.2x</strong></td>
<td><strong>14.2x</strong></td>
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</tbody>
</table>

Source: Capital IQ as of October 31, 2022; includes the most actively traded European chemical companies for respective covered sectors
Venture Capital Activity Review

Announced Funding Rounds

European Venture Capital (VC) Funding Trend

Number of Announced VC Funding Rounds

VC Stage Split

Source: Pitchbook, rolling data as of October 31, 2022
Note: Accelerator/Incubator includes angel (individual), equity crowdfunding and grants
Venture Capital Activity Review

Announced Funding Rounds

**Selected Startups That Received VC Funding**

<table>
<thead>
<tr>
<th>Company</th>
<th>Funding Details</th>
<th>Funding Raised to Date</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econic</td>
<td>Raised USD 12.5 mn of Series D Venture Funding from PTT Global Chemical, GC Ventures, OGCI Climate Investments and Other Existing Investors</td>
<td>USD 39.3 mn</td>
<td>Founded in 2011, Econic is developer of a catalytic technology designed to offer manufacturing polymers from waste CO₂, The Company's technology aids in the production of polyurethanes and polycarbonates that reduce the reliance on expensive fossil fuels, enabling clients to turn scientific research into a business advantage while delivering environmental gains. The funding will support the company through the commercialisation of its catalyst and process technology, which enables CO₂ to be used in the production of polymers.</td>
</tr>
<tr>
<td>MOA Technology</td>
<td>Raised USD 44.5 mn in Series B Financing From New Investor Lansdowne Partners and Other Existing Investors</td>
<td>USD 63.7 mn</td>
<td>Founded in 2017, MOA is a developer and operator of a crop proprietary protection discovery platform intended to offer sustainable herbicide chemistries with new modes of action from both natural and synthetic sources. The investment will advance MOA’s pipeline of new crop protection products designed to increase the resilience and security of the world’s food production system by tackling the urgent global problem of weed resistance.</td>
</tr>
<tr>
<td>GF Biochemicals</td>
<td>Raised USD 16.1 mn of Series A Venture Funding in a Deal Led by Sofinnova Partners</td>
<td>USD 16.1 mn</td>
<td>Founded in 2008, GF Biochemicals is a producer of levulinic acid at a commercial scale intended to create sustainably safe chemicals from biomass. The funds will be used to build strategic partnerships to access new sectors, increase investment in research and development to support new products, support the development of the company's own manufacturing facility, extend the existing large portfolio of patents owned, attract top talent for sales and marketing teams across the United States and Europe.</td>
</tr>
<tr>
<td>Elicit Plant</td>
<td>Raised USD 18.1 mn From ECBF, Bpifrance, Aquiti Gestion-NACO fund, Credit-Agricole Charente Perigord Expansion and Other Historical Investors</td>
<td>USD 18.5 mn</td>
<td>Founded in 2017, Elicit Plant is a developer of an agricultural biotechnology designed to control the exogenous intake of phytosterols in field crops to reduce stress on cultivated plants. The Company will use the funding to advance international growth and R&amp;D programs for its phytosterol-based solution that addresses water stress and allows farmers to respond to climate change challenges.</td>
</tr>
</tbody>
</table>

Note: Includes startups with the highest VC activities in the past 12 months based on Pitchbook as of October 31, 2022. All trademarks, trade names or logos referred to herein are the property of their owners.

Source: Company information, Pitchbook
Upcoming Events

Q4 2022 to Q3 2023

20th Berenberg European Conference 2022
12/05/2022 to 12/08/2022 | London, UK
https://berenbergcm.dealogic.com/iconference1/Conferences/Conference

The 20th Berenberg European Conference 2022 provides a platform to the companies to present their corporate strategy, current trends and challenges. Along with the main presentations, companies will host small group and one-on-one meetings. In addition, there is special event “Private Company Day” the day after the conference.

The participants include ~200 companies from diverse sectors and various geographies.

Events Ticker

Logichem Chemical Supply Chain Conference
03/14/2023 to 03/16/2023 | Rotterdam, Netherlands
https://logichem.wbresearch.com/

European Coatings Show 2023
03/27/2023 to 03/30/2023 | Messezentrum, Germany

Making Pharmaceuticals Milano 2023
03/28/2023 to 03/29/2023 | Milan, Italy
https://www.makingpharma.it/

Chemuk 2023
05/10/2023 to 05/11/2023 | Birmingham, UK
https://www.chemicalukexpo.com/

Chemspec Europe 2023
05/24/2023 to 05/25/2022 | Messe Basel, Switzerland
https://www.chemspeceurope.com/

Food Ingredients Europe
11/28/2023 to 11/30/2023 | Frankfurt, Germany

Note: Please refer to the web pages for updates on events. All trademarks, trade names or logos referred to herein are the property of their owners.
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