



European Chemicals Update

Q1 2017

Inside this Issue

2 Highlighted Sub-Sectors: The Global Polyurethane and Polycarbonate Markets

Market Introduction and Key Trends
Interview with Frank H. Lütz, CFO at Covestro

7 Quarterly Market Review

Key Raw Materials
Ifo Survey German Chemical Industry
Economic Environment

10 M&A Transaction Review

Announced Deals
Strategic Alliances and Collaborations

12 Public Trading Analysis

Sub-Sector Summary
Sub-Sector Focus: Industrial Specialty
Company Trading Statistics

15 Upcoming Events

The Global Polyurethane and Polycarbonate Markets

Market Introduction and Key Trends

This edition of the Duff & Phelps European Chemicals Update features a snapshot of the polyurethane and polycarbonate markets.

Polyurethane Market

Polyurethane (PUR) is one of the most versatile and durable plastic materials. It is used in several sectors and industries, including building and construction, automotive parts, appliances, thermal insulation, furnishings (mostly in the form of flexible foams), electronic components, coatings, adhesives, packaging, apparel, marine products and medical equipment.

The global polyurethane market size accounted for 15.2 million tons (mt) in 2015, and it is estimated to grow at a CAGR of 4% between 2015 and 2020, reaching a total demand level of 18.5 mt.

High demand for lightweight and durable materials has driven growth in recent years. Construction was the dominant end market with over 30% volume share in 2015, and this trend is likely to continue in the upcoming years. Furniture and interiors are also consuming PUR in bedding, upholstery, seating and other applications.

The fast-growing consumer electronics sector in emerging economies is also providing profitable prospects for manufacturers. Encapsulation of electronic components in miniaturized and wearable electronics, along with other products such as circuits and sensors, are also driving growth.

Selected key players are BASF, Cangzhou Dahua, Covestro, Dow Chemicals, Fujian Meizhouwan, Huntsman, Mitsui Chemicals, Shell, Tosoh Corporation, Trelleborg Group and Wanhua Chemical Group.

Polycarbonate Market

Polycarbonate (PCS) is a naturally transparent amorphous thermoplastic that is particularly useful when products require impact resistance and/or transparency. They are commonly used for diverse applications such as automotive

components, electronics (25% of total market revenue), construction, optical media, packaging, plastic lenses in eyewear and medical devices.

The global polycarbonate demand in 2015 was 3.8 mt and it is estimated to increase at a CAGR of 4% between 2015 and 2020, rising total demand to 4.7 mt.

Until 2013, the electronics application segment dominated the overall polycarbonate market. However, the automotive sector is expected to emerge as the fastest growing segment in the upcoming years due to the increasing demand for lightweight vehicles.

Selected key players in the polycarbonate market are Asahi Kasei Chemicals, Covestro, Idemitsu Kosan, Mitsubishi, Sabic Innovative Plastics, Teijin and Trinseo.

Applications		
Polyurethane		Polycarbonate
Apparel	Automotive parts	Appliances
Flexible foams	Building and construction	Consumer goods
Furnishing	Coatings and adhesives	Eyewear
Thermal insulation	Electronic components	Medical devices
Marine products	Packaging	Optical media

Source: Zion Research, Transparency Market Research, Grand View Research, Covestro public information

Selected Transactions

Covestro agreed to sell spray polyurethane foam business to Accella

February 2017



Covestro LLC has agreed to sell its North American spray polyurethane foam system house to Accella Polyurethane Systems LLC, the U.S.-based leading manufacturer of custom formulated polyurethane systems, and polyurethane-based recycled rubber products. Accella is a portfolio company of Arsenal Capital Partners.

Source: Company Information, Capital IQ

Sumitomo Chemical announced the acquisition of the remaining 50% of Sumika Styron Polycarbonate

January 2017



Trinseo and Sumitomo Chemical have signed a definitive agreement for Trinseo to sell all of its 50% share in its Sumika Styron Polycarbonate (SSPC) joint venture to Sumitomo. The Japan-based company produces polycarbonate resins and serves customers and markets throughout Asia.

Source: Company Information, Capital IQ

Nanjing Hong Bao announced the acquisition of an 88% stake in Xiong Lin Xin Cai Liao

December 2016



Nanjing Hongbaoli Corporation, the Chinese chemical company, signed an agreement to buy an 88% stake for USD 92m in Dongguan Xionglin New Material Technology, the Chinese polyurethane material company in which Nanjing Hongbaoli already indirectly owns a 12% stake.

Source: Company Information, Capital IQ

The Global Polyurethane and Polycarbonate Markets

Interview with Frank H. Lutz, CFO of Covestro



Frank H. Lutz
CFO, Covestro

Frank H. Lutz has been CFO of Covestro since 2014 and was appointed the company's Labor Director in September 2015.

Born in Stuttgart, Germany, in 1968, Lutz studied economics and business administration at the University of St. Gallen in Switzerland.

After holding various positions at Goldman Sachs and Deutsche Bank, he was Senior Vice President for Finance and later CFO at German vehicle and equipment manufacturer MAN.

In 2013, Lutz was appointed to the Coordination Council of the Aldi Süd group of companies, where as CFO he had responsibility for the German retailer's finances. Lutz then joined Bayer MaterialScience, now Covestro.

Covestro completed a highly successful IPO in December 2015 and its share price has more than doubled since the initial offering. What do you consider are the main drivers for the positive share price development?

There are several aspects that explain the very satisfactory development of Covestro's share price over the past 18 months.

First, the overall environment during the IPO marketing process was nervous and therefore challenging; the Volkswagen emissions scandal started 2 weeks prior to the IPO, and Huntsman, one of our main competitors in the U.S., issued a profit warning. Therefore, Covestro started with a relatively low offering price which, in hindsight, did not reflect the company's true value.

"We delivered what we promised, and that is the main message."

Second, we communicated a very clear strategy, which focused on an increased utilization of our existing assets. Prior to the spin-off, Bayer had invested significantly, so we started with significant overcapacity, which we had to grow into. This helps us now since we do not have to invest as much as was required in the past. We also realized cost savings by assessing our internal processes and tailoring them to Covestro.

For me, the employees are the main driver of the whole development. There is such an enthusiasm amongst our people here at Covestro, being an independent company now, that everything can be boiled down to their engagement and what they have done over the past 18 months.

We delivered what we promised, and that is the main message. We even over-delivered and were able to consistently announce significantly better quarterly results than the consensus forecasts. We also saw a re-rating of Covestro in the market as our multiples continuously increased. Over the past 18 months, industry-wide multiples also increased but at a lower level compared to Covestro multiples. In my opinion, that was reasonable since we had to close a gap.

Going forward, there is still upside potential. Our cash flows are above industry average, and you could also argue that therefore there should be an above-industry-average rating.

What strategic initiatives has Covestro implemented to continue its positive development?

We are extremely happy with what we have achieved so far. Nevertheless, we have to keep improving, and we will be especially focused on business processes.

To a large extent, we inherited business processes from Bayer which we intentionally did not change during the carve-out process due to the potential instability. We are now redefining key business processes (especially in IT and accounting), and we are also defining our own business model for services we used to receive from Bayer.

Therefore, one of the significant promises we made was a profitability enhancement program of EUR 420m until 2019. About EUR 270m of that will be realized from asset optimization, but EUR 150m will result from cost optimization due to business process re-engineering.

During the first year, we will only notice limited effects because there are also some one-time costs associated with that, but the full potential will be realized in the years 2018 and 2019.

The Global Polyurethane and Polycarbonate Markets

Interview with Frank H. Lutz, CFO of Covestro

Another main driver for the future development is the growth story you communicated. Which macro trends has Covestro identified as main drivers for future performance to exceed GDP growth?

I am always hesitant to talk about macro trends, but we are one of the companies which really can prove that it essentially serves nearly all macro trends. So, when we are talking about urbanization, increasing mobility, energy efficiency — these are all areas where our products are needed.

Either our products face more demand due to a growing industry or our products increasingly replace other more heavyweight materials. For example, polyurethanes or polycarbonates can provide the same structural features as metal or glass, but at a significantly lower weight.

This is true for a lot of industries by the way, not only in automotive but also in the construction industry, where insulation becomes increasingly important, in the household appliances industry, as well as electronics. Just to give you an example: in a traditional combustion engine car you will find about 4 to 5 kg of Covestro products; in an electric vehicle, it is about 5 times this amount.

So would you consider automotive as one of your key end markets?

It is one end market, but I would not call it a key end market. The real benefit is that we are not too dependent on one single industry. Automotive accounts for roughly 20% of sales and the construction, electronics, furniture, textiles and footwear markets are all segments that are also of significant importance to us. We have — from an industry exposure perspective — kind of a natural hedge situation, so we are not too dependent on one single industry.

Given the recent changes in the political landscape, most notably in the U.S. and the UK, and given Covestro's international exposure, what do you consider the main challenges and opportunities in this new political climate?

As a truly global company, it is our opinion that protectionism is not a solution. We are big advocates for open economies, but on the other hand, we also maintain a local presence with local production facilities in all major markets.

This is related to the products we are manufacturing because even though our products can be transported, it doesn't make too much economic sense to have them travel over long distances. Therefore, having local production in specific regions is essential to us.

“Polyurethanes or polycarbonates can provide the same structural features as metal or glass but at a significantly lower weight.”

We operate three big production hubs: one in the U.S. for the Americas, one in Europe for EMEA and one hub in Shanghai covering APAC. But of course, it is important to us to be able to deliver products for example from Shanghai to Thailand, the Philippines, Malaysia or Korea. Simply wherever there is demand.

In terms of sales, EMLA remains the most important region before NAFTA and APAC, with the latter driving growth. What geographic end markets do you consider the most relevant for Covestro's growth strategy?

It was an intentional decision to be present in all those regions, so we are extremely happy with that. Asia certainly promises the highest growth rates at the moment, but you have to be cautious because 10 or 15 years ago that would probably have been the U.S. The growth rates you are currently seeing in China and other Asian countries are higher than in the more traditional

markets in Europe and the U.S. The general theme for us is that we target to grow above GDP.

All past Bayer investment decisions in the chemical production facilities were investments that afterwards paid off because the markets showed good growth rates. Nevertheless, if you look at our investment history over the past 10 years, you will see that the biggest investments were made in Asia.

Is that growth also driven by the Covestro sustainability theme?

Definitely. Use China as an example: The automotive industry is more developed than in any other country. Just look at the number of electric vehicles already on the streets.

Every country, especially developed countries, is facing the topic of environmental impact. Wherever you see the topic of pollution or energy efficiency, you will sooner or later come in touch with our product solutions around PUR and PCS.

Following the theme of sustainability, one key element of Covestro's current strategy is to “embed sustainability in every element.” Could you provide insights into specific sustainability actions Covestro has initiated?

Sustainability is not only about lightweight products, it is also about processes and production. In December 2014, we opened a TDI production facility in Dormagen, Germany, which uses gas phase phosgenation, a proprietary technology we developed, which reduces energy consumption by more than 30%, in some areas up to 60%. Another example from the production area: Last quarter, we delivered the first products to one of our customers where 20% of the carbon derived from crude oil is being replaced by carbon produced from CO₂. This new process is used in our flexible foam business, specifically for polyether polyols.

The Global Polyurethane and Polycarbonate Markets

Interview with Frank H. Lutz, CFO of Covestro

What are the main targets for Covestro investments, and what areas are you focusing on?

First of all, we want to maintain our market position, which means the biggest trigger event for an investment is capacity shortage. I would say the whole industry, not only Covestro, is doing that in a much smarter way now than 10 years ago.

The idea of investing EUR 1.5bn into a new world-scale production facility is not necessarily always the right solution; it is more about doing it in a smarter way, using existing production capacity and “de-bottlenecking” it with limited investments.

Could you elaborate on your R&D CAPEX share since you were talking about sustainability, new products, and driving innovation?

We intentionally keep the R&D budget separate from the CAPEX budget, but we clearly commit to a significant amount. Currently, it is about 2.2% of total annual sales, and we feel that this amount is also necessary as R&D is of significant importance to us. We need to innovate, and innovation is more than R&D — innovation also concerns business and production processes.

The market for polyurethanes (i.e., its precursors the isocyanates MDI and TDI) has been in disarray recently with significant spikes in MDI and TDI prices. Could you give us your perspective on how we got into this situation and how it is going to play out?

We saw these spikes particularly in Asia, whereas in Europe and in North America, the price development was more stable. There was an upward trend, but the price situation did not shift as dramatically as it did in Asia. And we also need to keep in mind that Asia was coming from extremely low prices at the beginning of 2016, so you can assume that there was also a significant degree of speculation coming from traders.

The price increase was also driven by a significant demand for isocyanates as well as some planned and unplanned capacity outages in 2016. However, planned and unplanned outages are part of our industry.

“Planned and unplanned outages are part of our industry.”

Hence, I am not sure if 2016 was an exceptional year in terms of outages. However, we are seeing that the overall industry is using up more of the existing capacity and therefore market reactions happened, especially at the end of 2016, where we saw some spikes, which came down again in the meantime — at least to some extent.

Covestro considers inorganic growth through bolt-on acquisitions to boost R&D and focus on high-margin businesses. Could you elaborate on your M&A strategy?

After the IPO, we imagined it would take a while for us to even think about M&A as an independent company. But we have progressed faster than initially planned, so we now do have the financial flexibility to consider acquisitions.

We have a strong market position in PUR and PCS, which means acquisitions of a certain size would be harder to execute, but that does not mean that we would not consider smaller potential acquisitions in the area.

Bolt-on is exactly the right term. It is focused on processes and products and clearly not on backward raw materials integration. We rather look into acquisition opportunities that are in spaces where we are already active.

Before we went public, we completed a technology add-on acquisition in the south of Germany with a company that is focused on carbon fiber reinforced polycarbonates. These are the kind of acquisitions that I can also imagine in PUR and PCS.

In other areas, especially in CAS, the situation is different. The industry is not as consolidated as it is in PUR and PCS, and therefore the opportunity to do acquisitions that will help us to strengthen certain areas is much bigger. That is something we are looking at, but our shareholders should not expect any major acquisitions in the near future since we are also going to grow the segment organically.

So far, it has been extremely important to us that we build up credibility in the financial markets, and we are also going to do that with our M&A strategy.

We thank you for this interview.

This interview was conducted on February 6, 2017.

The Global Polyurethane and Polycarbonate Markets

Company Description: Covestro

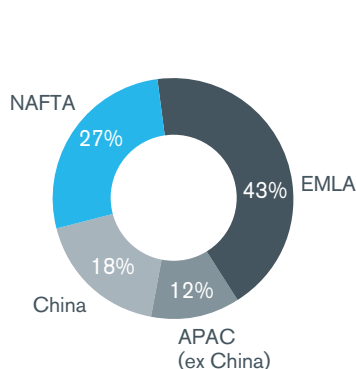


Headquartered in
Leverkusen, Germany

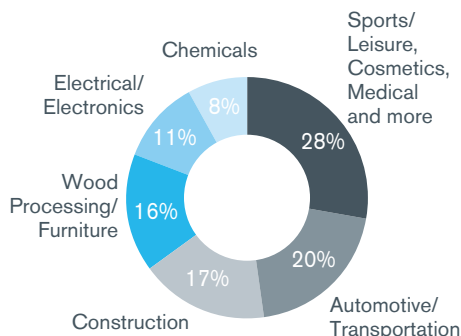


Publicly Available Financials (2016)	
Sales	€11.9bn
EBITDA	€2.0bn
EBITDA Margin	16.9%
Net Financial Debt ²	€1,499m
NFD/EBITDA	0.7x
Free Operating Cash Flow ³	€1,367m
CapEx	€419m
Employees (in FTE)	15,579

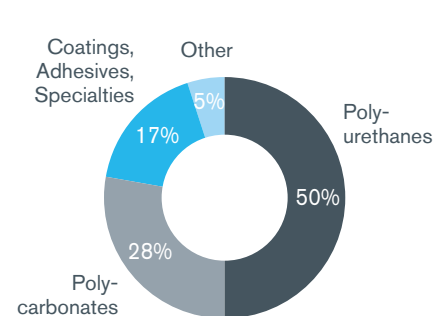
Sales Breakdown by Geography



Sales Breakdown by End Market



Sales Breakdown by Segment



Business Units

	Polyurethanes	Polycarbonates	Coatings, Adhesives, Specialties
Global Position	Global #1 (3,470kt)	Joint Global #1 (1,480kt)	Global #1
Sales 2016	EUR 5.9bn	EUR 3.3bn	EUR 2.0bn
EBITDA Margin 2016	14.9%	21.3%	24.5%
Key Applications	<ul style="list-style-type: none"> Rigid foam: <ul style="list-style-type: none"> > Building insulation > Cold chain > Automotive parts Flexible foam: <ul style="list-style-type: none"> > Furniture > Bedding/mattresses 	<ul style="list-style-type: none"> Automotive parts IT and electrical equipment, electronics Construction (windows, roof, structure) Consumer products, medical and other applications 	<ul style="list-style-type: none"> Surface coatings Adhesives and sealants Elastomers Specialty films

1 Includes total nameplate capacity for PUR and PCS at year end for 2016

2 Excluding obligations for pensions and other post-employment benefits

3 Operating cash flow less cash outflows for additions to property, plant, equipment and intangible assets

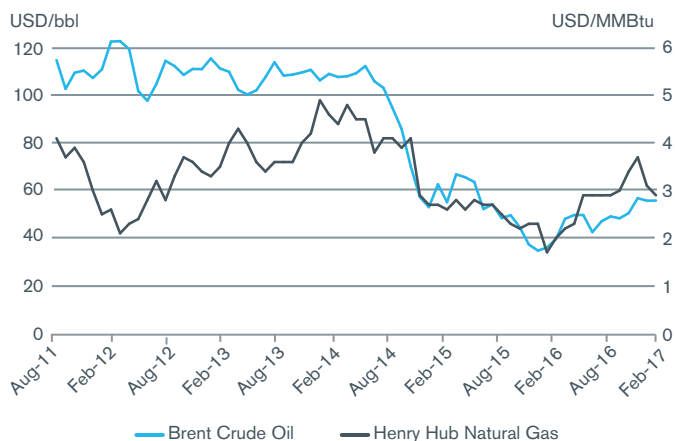
Source: Covestro public information

Quarterly Market Review

Key Raw Materials

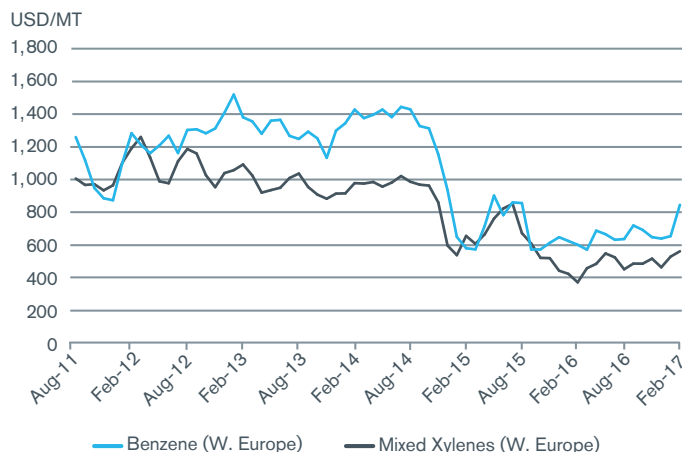
Petrochemicals

Feedstock



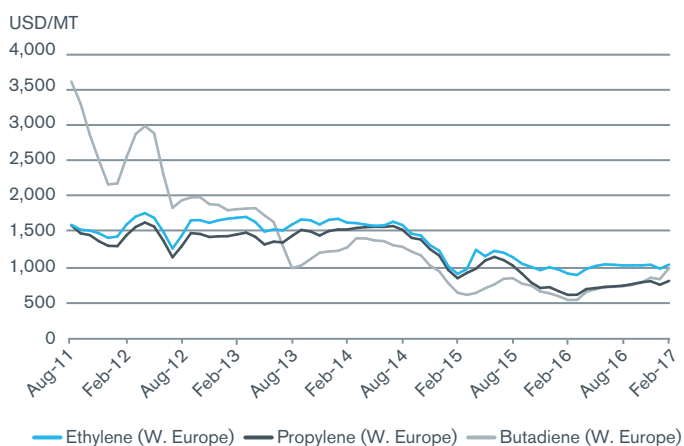
Source: Bloomberg as of February 15, 2017

Aromatics



Source: Bloomberg as of February 15, 2017

Olefins



Source: Bloomberg as of February 15, 2017

Key Observations

- In November 2016, the OPEC and several non-OPEC countries, including Russia, reached an agreement to cut oil output in an effort to drain a glut that has depressed prices for over 2 years.
- Since the OPEC deal in November, crude prices have moved in a tight \$5 band; the OPEC cuts, however, have spurred a speculative move into crude oil that has pushed prices toward the top of their recent ranges which might prompt a correction.
- In February, the OPEC confirmed compliance of participating nations with the agreement, with output curbs above 90% and oil inventories expected to decline further this year.
- The prices of natural gas are expected to grow in 2017 due to the increasing demand of liquefied natural gas (LNG), the use of which is also rapidly increasing in emerging markets, where domestic output trails strong demand growth.

Source: Bloomberg, Business Insider, Reuters

Raw Materials Wrap-Up

Product	Unit	Type	Delivery	Source	Date					Change	
					Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	q-o-q	y-o-y
Naphtha	USD/MT	1 Mo Fwd	CIF NW Europe	Bloomberg	381.2	364.9	417.3	419.4	486.1	15.9%	27.5%
Methanol	EUR/MT	Spot	FOB Rotterdam	Polymerupdate	204.5	167.5	198.0	211.5	320.0	51.3%	56.5%
Acrylic Acid	USD/MT	Spot	DDP W Europe	Tecnor Orbichem	1,230.0	1,170.0	1,217.0	1,228.0	1,276.0	3.9%	3.7%
Adipic Acid	USD/MT	Contract	DDP W Europe	Tecnor Orbichem	1,523.0	1,538.0	1,764.0	1,739.0	1,703.0	(2.1%)	11.8%
Caustic Soda (liquid)	USD/MT	Spot	DDP W Europe	Tecnor Orbichem	539.0	543.0	584.0	583.0	559.0	(4.1%)	3.7%
Chlorine (liquid)	USD/MT	Spot	DDP W Europe	Tecnor Orbichem	237.0	242.0	244.0	244.0	229.0	(6.1%)	(3.4%)
Ammonia	USD/MT	Spot	FOB Black Sea	Green Markets	300.0	265.0	250.0	165.0	260.0	57.6%	(13.3%)
Urea (prill)	USD/MT	Spot	FOB Black Sea	Green Markets	264.0	195.0	190.0	185.0	220.0	18.9%	(16.7%)

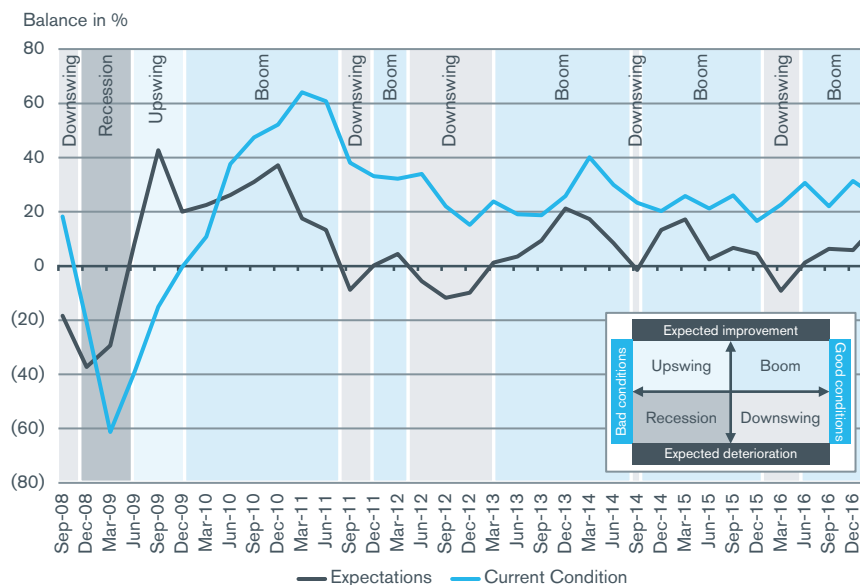
Source: Bloomberg

Definitions:
 MMBtu - 1 Million British thermal units
 Bbl - Barrels
 MT - Metric tons

Quarterly Market Review

Ifo Survey German Chemical Industry

German Chemical Industry | Business Cycle



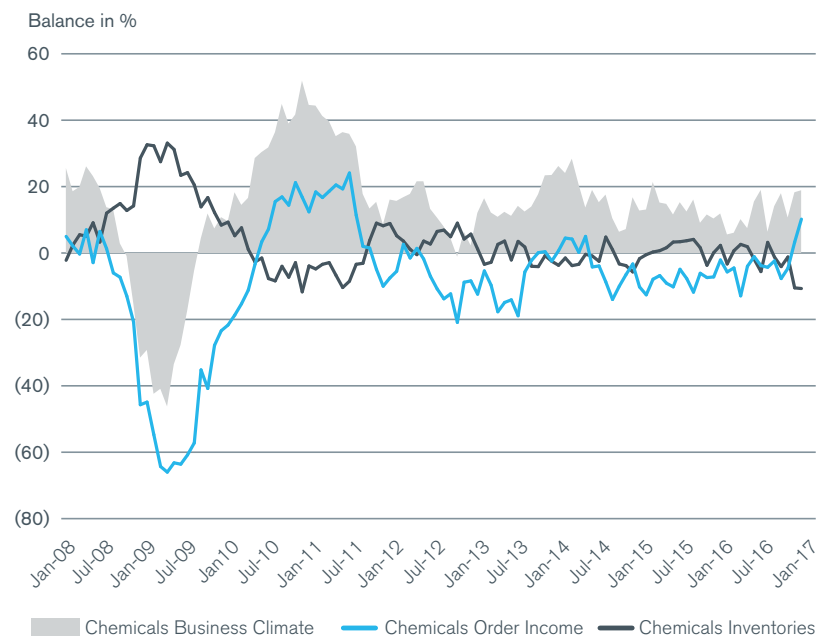
Source: Ifo Institut für Wirtschaftsforschung, Bloomberg as of February 15, 2017

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

Key Observations

- January conditions have dropped month-on-month by 2 percentage points (p.p.), a slight decrease after a large improvement of 11.4 p.p. in December.
- A value of 29.4% means by definition that the German chemical industry is still in good shape, and relatively close to its 12-month maximum value of 31.4% reached in December 2016.
- Since 2014, the Ifo survey has been characterized by too pessimistic expectations. These low expectations reflect an uncertain outlook of the chemical industry in Germany despite its good current condition.

German Chemical Industry | Business Indicators



Source: Ifo Institut für Wirtschaftsforschung, Bloomberg as of February 15, 2017

Explanatory note

The Ifo Business Climate Index is based on ca. 7,000 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 6 months. They can characterize their situation as “good,” “satisfactory” or “poor” and their business expectations for the next 6 months as “more favourable,” “unchanged” or “more unfavourable.” The balance value of the current business situation is the difference between the percentages of the responses “good” and “poor,” the balance value of the expectations is the difference between the percentages of the responses “more favourable” and “more unfavourable.” 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

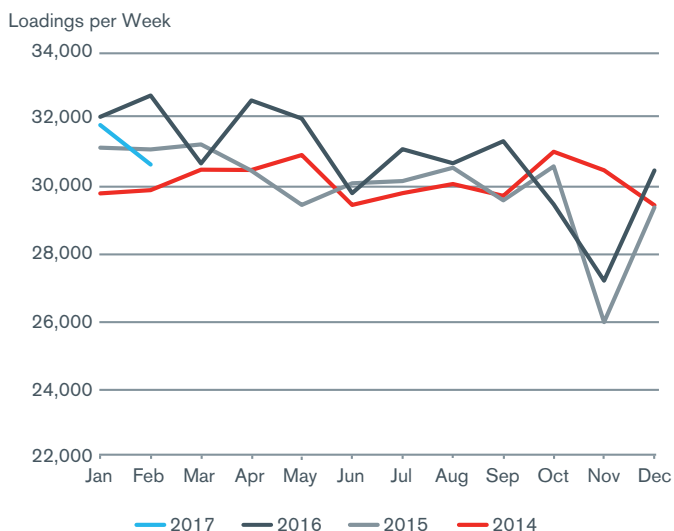
Key Observations

- Chemicals business climate level considerably improved in January compared to its November level of 10.7%, almost reaching the 2016 maximum of 19%.
- Order income was positive in January and also December 2016, but had been negative for the entire year 2015 and first eleven months of 2016.
- Inventory levels decreased significantly in December 2016, and more slightly during Q4 2016, implying lower stock levels are being kept due to sales increases since September 2016.
- A positive order income level indicates that chemical customers are steadily placing more orders.

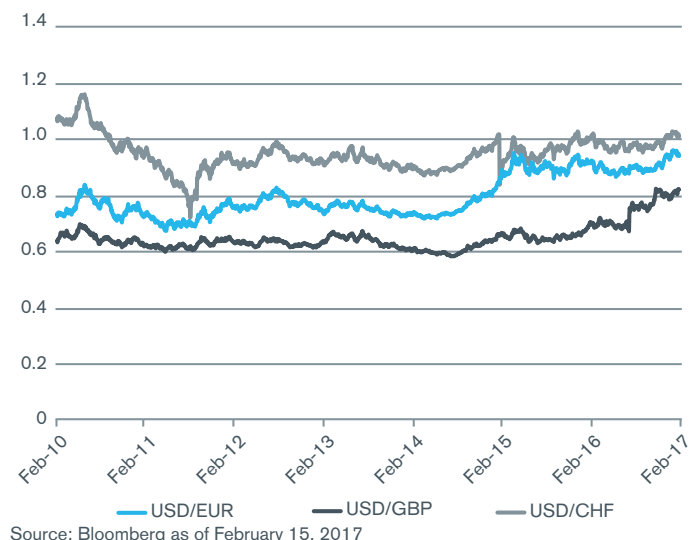
Quarterly Market Review

Economic Environment

US Weekly Railcar Chemicals Loadings

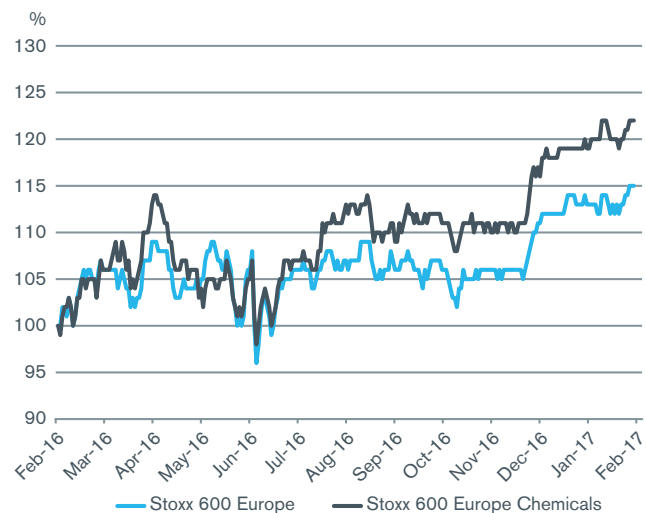


Currency Trends

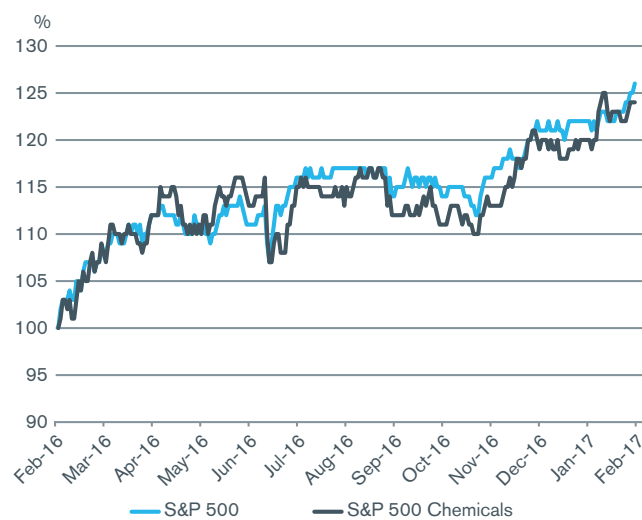


Stock Indices: LTM Development in Europe and USA (Rebalanced)

Europe: STOXX 600



USA: S&P 500

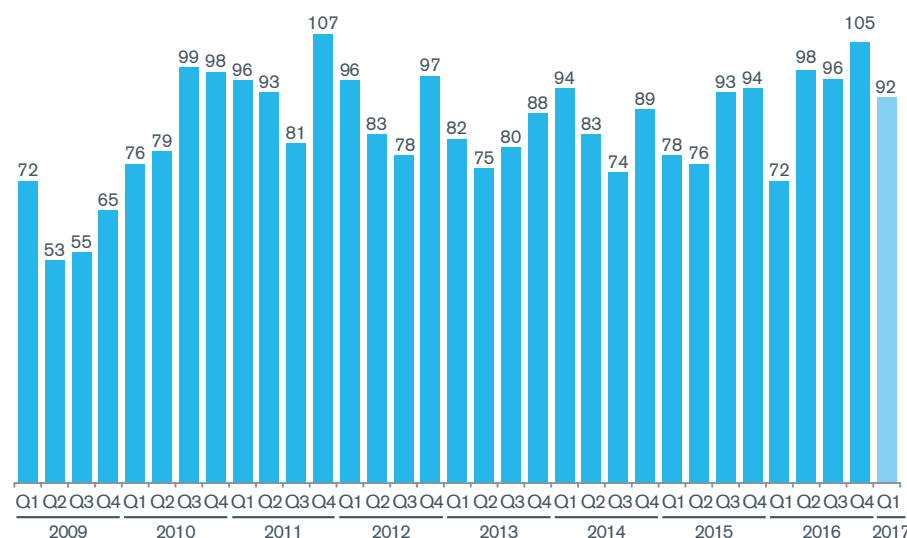


M&A Transaction Review

Announced Deals

European M&A Quarterly Trend

Number of Announced Transactions



Source: Capital IQ

Key Observations

- Transaction values in Q1 2017 are available for 18 transactions (out of 92), summing up to a total value of EUR 752.8m.
- Top 10 transactions from Q3 2016 to Q1 2017 (see table below) have a combined value of EUR 104.2bn.
- The announced acquisition of Monsanto by Bayer for a total consideration of EUR 57.0bn was the largest transaction by value in H2 2016; the transaction has not yet been completed.
- Screening includes transactions with target, buyer or seller from Europe.
- Announced transactions include bids made, letters of intent, definitive agreements and registered offerings (definition by Capital IQ).

Top 10 European Deals Announced from Q3 2016 to Q1 2017

Announced	Acquirer	HQ	Target	HQ	Target Business Description	Stake Acquired	Enterprise Value (in EURm)	LTM Revenues (in EURm)	LTM EBITDA (in EURm)	LTM EBITDA Margin	EV/LTM Revenue	EV/LTM EBITDA
14-Sep-16	Bayer	DE	Monsanto	US	Monsanto is a multinational agrochemical and agricultural biotechnology corporation.	100.0%	57,036.6	12,020.8	3,324.4	27.7%	4.7x	17.2x
20-Dec-16	Praxair	US	Linde	DE	Linde operates as an industrial gases and engineering company.	100.0%	40,742.7	17,630.5	3,946.8	22.4%	2.3x	10.3x
25-Sep-16	LANXESS	DE	Chemtura	US	Chemtura develops performance-driven engineered industrial specialty chemicals for industrial manufacturing customers.	100.0%	2,198.1	1,512.1	265.4	17.6%	1.5x	8.3x
7-Dec-16	Blackstone	US	Solvay Acetow	DE	Solvay Acetow manufactures cellulose acetate for cigarette filters and supplies cellulose acetate flakes.	100.0%	~1,000	-	~143	-	-	~7x
19-Dec-16	CCL Industries	CA	Innovia Group	UK	Innovia is a producer of specialty, high-performance, multi-layer, surface-engineered BOPP films for label, packaging and security applications.	100.0%	807.1 ⁽¹⁾	407.1 ⁽¹⁾	110.7 ⁽¹⁾	27.2%	2.0x	7.3x
9-Dec-16	Evonik Industries	DE	Silica Business Unit of Huber Engineered Materials	US	The Silica Business Unit of Huber Engineered Materials manufactures silica for industrial applications.	100.0%	587.3	~280 ⁽²⁾	~56 ⁽²⁾	20.0%	2.1x	10.5x
6-Dec-16	Kansai Paint	JP	Helios Group	SI	Helios Group manufactures paints and coatings.	100.0%	577.5	-	-	-	-	-
20-Jul-16	Bostik	FR	Den Braven Sealants	NL	Den Braven Sealants manufactures sealants, foams, aerosols and other adhesives for use in construction industry and a range of industrial applications.	100.0%	485.0	350.0 ⁽²⁾	~44 ⁽²⁾	12.5%	1.4x	11.1x
7-Nov-16	Bridgepoint	UK	Agro Business of Sapec Group	PT	Sapec's Agro Business is a developer of crop protection products and specialty crop nutrition solutions.	100.0%	456.0	-	39.5 ⁽³⁾	-	-	11.5x
10-Feb-17	Elementis	UK	SummitReheis	US	SummitReheis manufactures and markets antiperspirant actives for antiperspirant sticks, roll-ons, clear gels, aerosols, creams, soft solids, wipes, pump sprays and foot sprays.	100.0%	337.0	125.4 ⁽²⁾	26.2 ⁽²⁾	20.9%	2.7x	12.9x

Transactions ordered by value

Includes announcements until March 31, 2017. Figures converted using exchange rate as per announcement date, unless stated otherwise.

Source: Capital IQ, Mergermarket, Company Information

(1) Exchange rate used: 1.4 CAD/EUR; Financials represent 2017E figures

(2) Financials represent 2016E figures

(3) LTM figure as of June 30, 2016

M&A Transaction Review

Strategic Alliances and Collaboration

R&D

AkzoNobel signs cooperation agreement on bio-based polymer technology with Itaconix

January 2017

The framework joint development agreement aims to explore opportunities for the production of bio-based polymers. AkzoNobel will pursue the development and commercialization of bio-based polymers, and Itaconix will contribute a proprietary polymerization technology to turn itaconic acid, obtained from sugars through fermentation, into polymers.

Source: AkzoNobel press release as of January 27, 2017

Merck announced research collaboration with Domain Therapeutics in immuno-oncology

January 2017

The collaboration and licensing agreement aims to co-develop adenosine receptor antagonists and explore their potential in immuno-oncology. Merck will support research activities and gain worldwide rights to Domain Therapeutics' next generation of adenosine receptor inhibitors, complementing Merck's existing immuno-oncology pipeline.

Source: Merck press release as of January 23, 2017

Syngenta and DuPont Crop Protection announce publication of a new joint patent for herbicide development

December 2016

Collaboration on the project started in 2015 and has resulted in the joint patent entitled "Substituted cyclic amides and their use as herbicides," focusing on the development of a new herbicide chemistry class. The new herbicide has entered into the pre-development stage and is expected to be launched in 2023.

Source: Joint press release of Syngenta and DuPont as of December 19, 2016

Operations

BASF strengthens collaboration with Grolman in Europe

February 2017

The parties strengthen their exclusive collaboration in Europe in the marketing of amine-based curing agents for the professional processing of epoxy resins, used in floor coatings, corrosion protection varnish and composite materials. Grolman expands the marketing of the BASP specialty chemicals under the Baxxodur® brand to France, Norway, Sweden, Finland and Denmark.

Source: Joint press release of BASF and Grolman as of February 7, 2017

Air Liquide strengthens its long-term partnership with ArcelorMittal in France and Benelux

January 2017

The companies signed two long-term renewal contracts for the supply of oxygen, nitrogen and argon to ArcelorMittal's production sites in the industrial port areas of Fos-sur-Mer and Dunkirk in France. Air Liquide also strengthens its position in Belgium by signing a new long-term supply contract with ArcelorMittal to support the growth of its industrial gas need and will extend its pipeline network in Benelux.

Source: Air Liquide press release as of January 9, 2017

Merck and MD Anderson Cancer Center enter strategic collaboration

January 2017

The 3-year strategic collaboration aims to advance the development of investigational cancer therapies by accelerating the development of investigational oncology/ immuno-oncology compounds. Merck is the first company to gain access to MD Anderson's APOLLO platform, a research platform that standardizes the long-term collection of patients medical history and data derived from tissue samples.

Source: Merck press release as of January 9, 2017

Linde to supply to Evonik's methionine complex in Singapore

January 2017

Linde signed a long-term contract to supply methane and hydrogen to Evonik's second world-scale methionine complex in Singapore. Linde was already supplying a range of gases to Evonik's first methionine complex in Singapore. For this second contract, Linde will invest, build and operate a new gas production and supply facility that will be fully integrated with Evonik's production complex for DL-methionine.

Source: Linde press release as of January 11, 2017

Solvay and Aquantic Concept Group AS signed a joint global collaboration and development agreement for aquaculture operations

February 2017

The parties decided to strengthen their already existing relationship and to extend it globally. The agreement covers three areas: safety, market development and business strategy. This contains development of new innovative concepts, including a technology platform for the aquaculture industry.

Source: Joint press release of Solvay and Aquantic concept group as of February 8, 2017

Solvay and United Chemical Company to examine new hydrogen peroxide production capacity in Kazakhstan

February 2017

Both companies examine the construction of new hydrogen peroxide capacity to supply hydrogen peroxide primarily to address the needs of Kazakh companies and customers in other Central Asian countries.

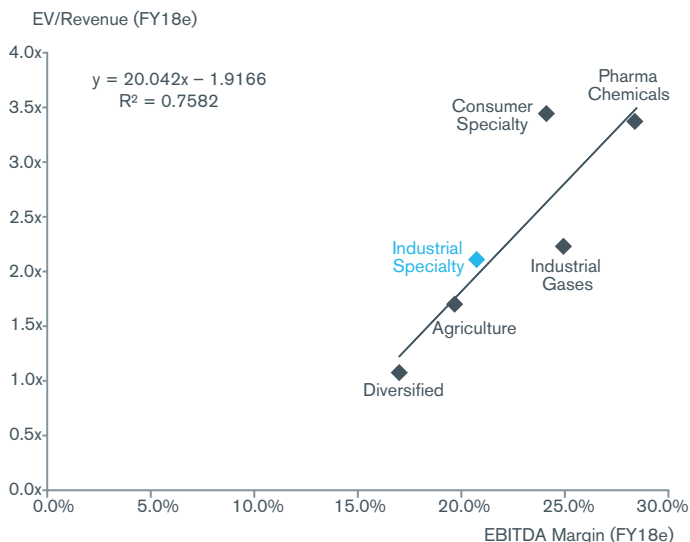
Source: Dogmatics press release as of February 3, 2017

Public Trading Analysis

Sub-Sector Summary

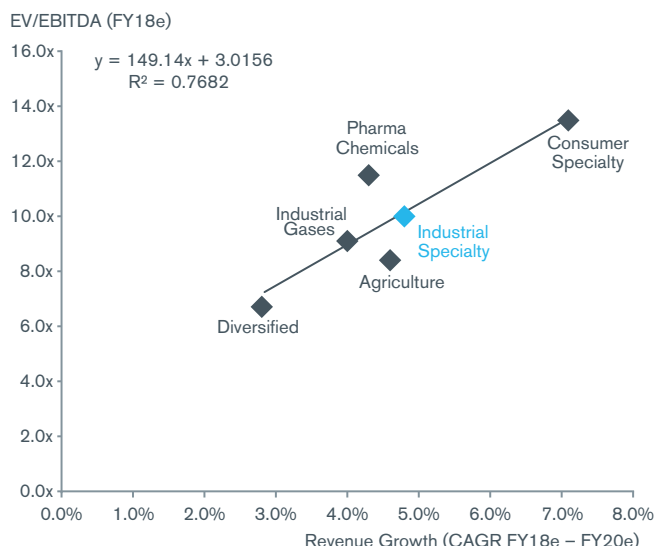
Regression Analysis

EV/Revenue vs. EBITDA Margin



See page 14 for constitution of Sub-Sectors
 Data point in blue is this edition's highlighted Sub-Sector (see page 13)
 Source: Capital IQ as of February 15, 2017

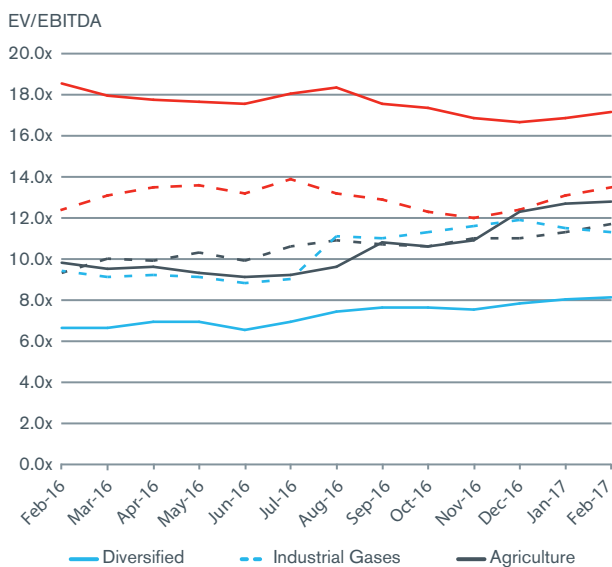
EV/EBITDA vs. Revenue Growth



See page 14 for constitution of Sub-Sectors
 Data point in blue is this edition's highlighted Sub-Sector (see page 13)
 Source: Capital IQ as of February 15, 2017

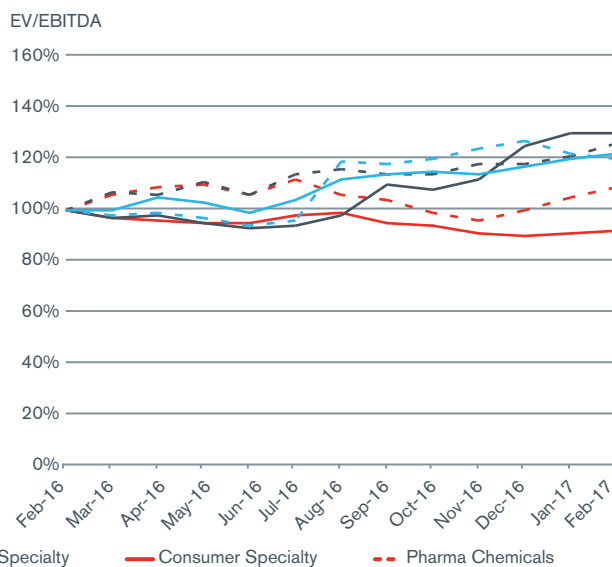
Sub-Sector Trading Multiples (EV/EBITDA)

LTM Actual



Source: Capital IQ as of February 15, 2017

LTM Rebased



Source: Capital IQ as of February 15, 2017

Definitions:

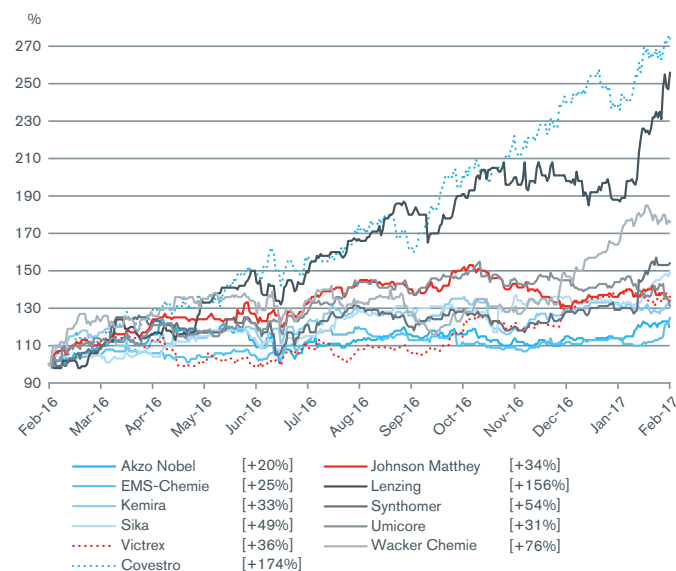
- Enterprise Value
Market Capitalization + Total Debt + Preferred Equity + Minority Interest - Cash and Short Term
- EBITDA
Earning Before Interest, Taxes, Depreciation and Amortization
- LTM
Last 12 Months

Public Trading Analysis

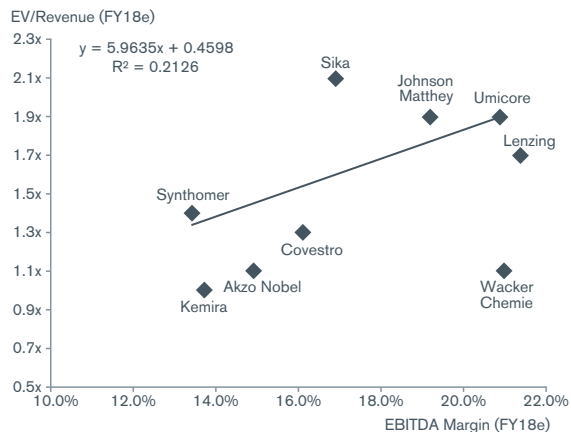
Sub-Sector Focus: Industrial Specialty

Share Price Development and Regression Analysis

Industrial Specialty

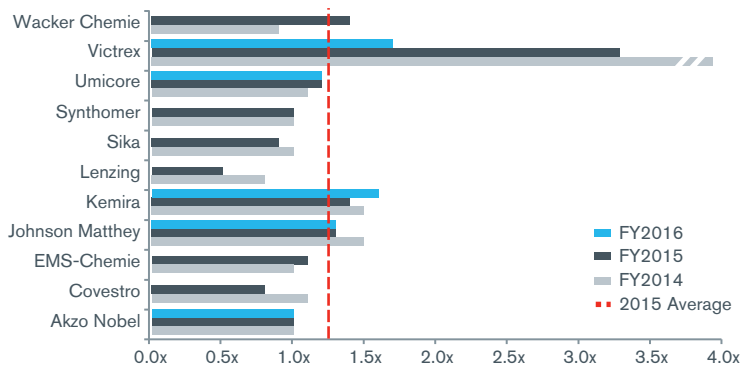


EV/Revenue vs. EBITDA Margin

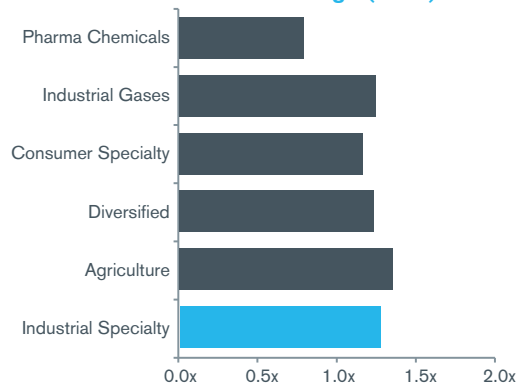


Capex/Depreciation

Industrial Specialty

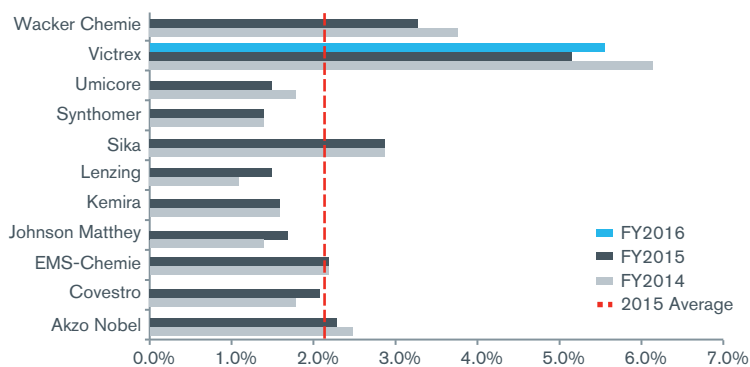


Chemicals Sub-Sector Average (FY15)

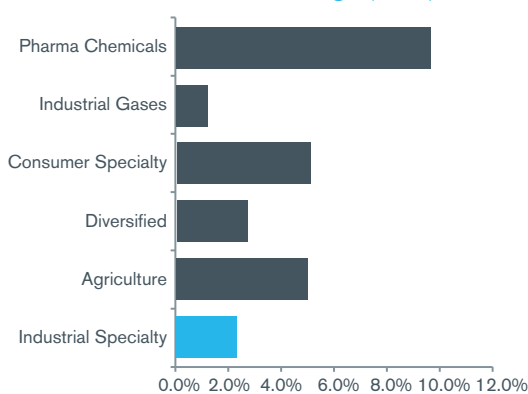


R&D Expenditures in % of Sales

Industrial Specialty



Chemicals Sub-Sector Average (FY15)



Source: Capital IQ, Bloomberg as of February 15, 2017

Public Trading Analysis

Company Trading Statistics

EUR in millions
(except for per share data)

Company Name	Price in EUR		52 Week in EUR		Market Cap	Enterprise Value	Revenues		EBITDA		EBITDA Margin	EV/EBITDA	
	31-Mar-17	Low	High	% of High			LTM	LTM	FY2018	LTM	LTM	FY2018	
Diversified													
Arkema SA	92.5	63.2	97.2	95%	7,003.6	8,530.6	7,535.0	1,201.0	1,376.1	15.9%	7.1x	6.2x	
BASF SE	93.1	61.6	93.2	100%	85,471.8	100,528.8	57,550.0	9,945.0	11,934.1	17.3%	10.1x	8.4x	
Clariant AG	17.7	14.6	18.2	97%	5,726.6	7,206.8	5,452.8	727.4	929.2	13.3%	9.9x	7.8x	
Evonik Industries AG	30.6	25.0	31.6	97%	14,241.9	13,213.9	12,732.0	2,095.0	2,445.6	16.5%	6.3x	5.4x	
Lanxess AG	62.9	37.3	68.8	91%	5,755.9	9,172.9	7,699.0	962.0	1,343.1	12.5%	9.5x	6.8x	
Solvay SA	114.6	79.1	117.0	98%	11,886.9	16,592.9	11,403.0	2,183.0	2,541.2	19.1%	7.6x	6.5x	
Average										15.8%	8.4x	6.9x	
Industrial Gases													
Air Liquide SA	107.1	88.3	107.2	100%	41,522.9	57,217.4	18,134.8	4,388.7	5,600.8	24.2%	13.0x	10.2x	
Linde AG	128.1	117.3	165.0	95%	29,049.8	36,960.8	16,948.0	3,784.0	4,477.5	22.3%	9.8x	8.3x	
Average										23.3%	11.4x	9.2x	
Agriculture													
Israel Chemicals Ltd. ⁽¹⁾	4.0	3.4	4.9	82%	5,062.1	8,382.6	5,080.4	883.8	1,160.7	17.4%	9.6x	7.2x	
K+S AG	21.7	15.9	24.9	87%	4,154.5	6,463.7	3,456.6	548.6	970.4	15.9%	11.8x	6.7x	
KWS SAAT AG	286.6	270.9	312.2	92%	1,887.6	2,088.1	1,097.3	195.6	188.4	17.8%	10.7x	11.1x	
Syngenta AG	413.4	337.1	415.7	99%	38,121.5	39,979.3	12,116.0	2,481.0	2,935.3	20.5%	16.3x	13.6x	
Tessenderlo Chemie NV	37.3	27.7	37.3	100%	1,606.5	1,744.4	1,590.1	195.8	244.0	12.3%	8.9x	7.1x	
Yara International ASA	36.0	27.9	39.4	91%	9,843.1	11,491.8	10,485.1	1,454.1	1,907.9	13.9%	8.0x	6.0x	
Average										16.3%	10.9x	8.6x	
Industrial Specialty													
Akzo Nobel NV	77.7	52.6	79.7	97%	19,601.7	21,334.7	14,197.0	2,191.0	2,286.0	15.4%	9.7x	9.3x	
Covestro Aktiengesellschaft	72.1	30.6	74.2	97%	14,596.2	16,254.2	11,904.0	1,852.0	2,161.5	15.6%	8.8x	7.5x	
EMS-Chemie Holding AG	545.6	430.1	549.3	99%	12,756.5	12,385.2	1,876.3	563.8	608.4	30.1%	21.9x	20.4x	
Johnson Matthey Plc	36.1	31.0	41.8	86%	6,916.4	7,964.3	12,260.7	685.3	822.2	5.6%	11.5x	9.7x	
Kemira Oyj	11.5	9.7	12.6	92%	1,753.6	2,400.5	2,365.9	281.6	344.7	11.9%	8.5x	7.0x	
Lenzing AG	157.7	65.4	169.8	93%	4,185.6	4,268.1	2,155.9	430.5	523.9	20.0%	9.9x	8.1x	
Sika AG	5,619.5	3,470.8	5,675.6	99%	14,259.5	13,871.6	5,360.2	888.2	1,062.5	16.6%	15.6x	13.1x	
Synthomer plc	5.6	3.5	5.6	99%	1,893.4	2,090.5	1,223.1	179.4	212.4	14.7%	11.6x	9.8x	
Umicore SA	53.4	41.2	58.9	91%	5,836.7	6,235.9	10,455.3	417.2	622.9	4.0%	14.9x	10.0x	
Victrac plc	22.3	14.9	23.4	95%	1,902.9	1,827.9	292.3	134.0	161.7	45.9%	13.5x	11.3x	
Wacker Chemie AG	77.0	70.6	115.2	84%	4,796.4	6,006.6	5,404.2	1,033.5	1,256.5	19.1%	5.8x	4.8x	
Average										18.1%	12.0x	10.1x	
Consumer Specialty													
Chr. Hansen Holding A/S ⁽²⁾	60.2	48.4	62.5	96%	7,906.8	8,552.4	1,006.7	329.9	401.9	32.8%	25.9x	21.3x	
Croda International plc	41.7	32.3	43.6	96%	5,434.2	5,871.5	1,454.5	387.6	472.0	26.6%	15.1x	12.4x	
Frutarom Industries Ltd. ⁽¹⁾	52.2	44.0	55.3	94%	3,090.1	3,514.7	1,086.6	200.7	255.5	18.5%	17.7x	13.8x	
Koninklijke DSM NV	63.4	47.2	64.4	98%	11,034.2	13,108.2	7,920.0	1,081.0	1,436.3	13.6%	12.1x	9.1x	
Givaudan SA	1,686.8	1,598.9	1,978.5	85%	15,518.4	16,387.0	4,348.6	913.9	1,122.4	21.0%	17.9x	14.6x	
Symrise AG	62.3	53.0	69.3	90%	8,092.5	9,593.7	2,903.2	610.0	706.0	21.0%	15.7x	13.6x	
Average										22.3%	17.4x	14.1x	
Pharma Chemicals													
Bayer AG	103.2	83.9	112.1	96%	89,269.0	104,990.0	46,769.0	10,982.0	12,572.4	23.5%	9.6x	8.4x	
Lonza Group Ltd.	148.9	142.9	178.5	99%	10,234.4	11,759.4	3,853.4	808.6	1,028.2	21.0%	14.5x	11.4x	
Novozymes A/S	37.2	29.7	45.0	83%	10,818.6	10,953.6	1,902.2	663.2	726.4	34.9%	16.5x	15.1x	
Merck KGaA	106.7	71.3	106.8	100%	46,371.4	58,047.4	13,468.7	3,717.6	4,869.6	27.6%	13.4x	11.9x	
Average										26.7%	13.5x	11.7x	

Note: Multiple calculations in local currency.

(1) Listing on the Tel Aviv Stock Exchange and reporting in USD. EV converted to EUR using an exchange rate as of March 31, 2017.

(2) Listing on the Nasdaq OMX Copenhagen and reporting in EUR. EV converted to EUR using an exchange rate as of March 31, 2017.

Source: Capital IQ as of March 31, 2017

Definitions:

Enterprise Value

Market Capitalization + Total Debt + Preferred Equity + Minority Interest - Cash and Short Term Liabilities

EBITDA

Earning Before Interest, Taxes, Depreciation and Amortization

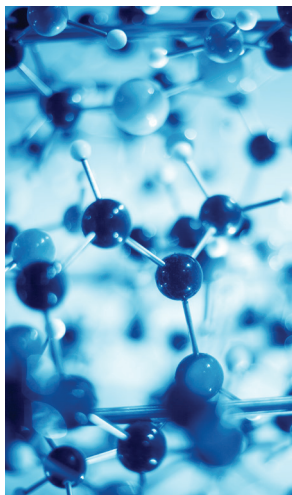
LTM

Last 12 Months

Upcoming Events

Q2/Q3 2017

Next Event



4th European Chemistry Congress

05/11/2017 to 05/13/2017 | Barcelona, Spain

<http://chemistry.conferenceseries.com/europe>

The 4th European Chemistry Congress focuses on “Exploring recent advances in chemistry, related fields and applications.”

Major scientific sessions include:

- Organic Chemistry
- Inorganic Chemistry
- Analytical Chemistry
- Materials Science
- Green Chemistry: Green Chemical Principles
- Medical Biochemistry
- Physical Chemistry
- Biological Chemistry
- Theoretical Chemistry
- Biochemistry in various fields
- Petroleum and Petrochemicals
- Nuclear Chemistry
- Polymer Chemistry
- Pharmacognosy and Phytochemistry
- Stereochemistry
- Clinical Chemistry
- Medicinal and Pharmaceutical Chemistry
- Industrial Chemistry
- Environmental Chemistry

Events Ticker

informEx

05/16/2017 to 05/18/2017 | Philadelphia, PA, United States

<http://www.informex.com>

2nd International Conference on Industrial Chemistry and Water Treatment

05/22/2017 to 05/23/2017 | Las Vegas, NV, United States

<http://industrialchemistry.conferenceseries.com>

6th World Congress on Medicinal Chemistry and Drug Design

06/07/2017 to 06/08/2017 | Milan, Italy

<http://medicinalchemistry.pharmaceuticalconferences.com/europe>

ChemCon Asia 2017

06/19/2017 to 06/23/2017 | Beijing, China

<http://chemcon.net>

2nd International Conference and Exhibition on Materials Chemistry

07/13/2017 to 07/14/2017 | Berlin, Germany

<http://materialschemistry.conferenceseries.com>

3rd International Conference on Organic and Inorganic Chemistry

07/17/2017 to 07/19/2017 | Chicago, IL, United States

<http://organicchemistry.conferenceseries.com>

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