

European Chemicals Update

Q2 2016

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The Global Specialty Silica Market

Specialty Silica Market Introduction and Key Trend

This edition of the Duff & Phelps European Chemicals Update features a snapshot of the specialty silica market.

Specialty silica such as precipitated silica, fumed silica and colloidal silica are used in various applications including rubber, plastics, agriculture and feed, food & beverages, as well as oral care.

The global specialty silica market is estimated to account for USD 5.6bn in 2016, and expand at a CAGR of 5.8% in terms of value between 2016 and 2026.

In its application, end markets specialty silica serves numerous purposes, for instance as a matting agent in personal care products, a clarification agent for beer and an impurity remover in food and beverages. In plastics, specialty silica is used during the polymerization process as an anti-blocking agent to prevent polymer layers from sticking to each other. Over the last years, the use of specialty silica as a performance additive in green tires has increased considerably, a trend that is expected to fuel global demand.

In volume terms, global demand for specialty silica is expected at 3,200 KT by the end of 2016.

The global market for specialty silica is driven by several trends. First, increased use of green tires leads to increasing application of precipitated silica in the automotive sector. The use of specialty silica in the production of tires improves rolling resistance and traction, making the vehicle more fuel efficient and safer without foregoing the overall lifecycle of tires.

Second, increased use of specialty silica in consumer electronics bolsters demand. Colloidal silica provides high gloss finish for flat surface electronic devices such as mobile phones. In addition, silica gel is used in electronic products to absorb moisture.

Third, increased application of specialty silica in consumer care as an abrasive agent is also anticipated to determine future demand.

Fourth, regulatory approval from various authorities such as the FDA and US department of agriculture regarding its use in food & beverages is expected to increase usage.

However, the specialty silica market is highly dependent on its end-use industries, some of which show cyclical behavior. In such circumstances, maintaining continuity in revenue and profit generation is expected to be one of the major challenges for specialty silica industry leaders.

Selected key players in specialty silica market are Akzo Nobel, Cabot, Evonik, Nalco, PPG, Qingdao Makall, Solvay and Wacker Chemie.



Source: Future Market Insights – Specialty Silica Market 2015; Grand View Research – Specialty Silica Global Industry Report

Selected Transactions

Speyside Equity has acquired Opta Minerals

April 2016



Speyside Equity has completed the acquisition of Opta Minerals, a Canada based company engaged in producing a range of industrial products, including silica sand.

Total purchase consideration:

~EUR 40.0m (6.6x EBITDA)⁽¹⁾

Source: Capital IQ

(1) Based on 2015A EBITDA

(2) Based on 2014A revenue

Industrias Químicas del Ebro has completed the acquisition of PeroxyChem

January 2016



Industrias Químicas del Ebro has acquired PeroxyChem, a Spain based company engaged in the manufacturing and supply of hydrogen peroxide, peracetic acid and silicates.

Total purchase consideration:

~EUR 17.0m (1.2x Revenue)⁽²⁾

Source: Capital IQ

Apax has completed the acquisition of Azelis

May 2015



Apax has completed the acquisition of Azelis, a Belgium based company engaged in the distribution of specialty chemicals, including fillers for the rubber industry such as silica, carbon black and pigments

Revenue of Azelis:

~EUR 944m (2013A)

Source: Company Information, Capital IQ

The Global Specialty Silica Market

Interview with Dr. Christian Wildmoser, Partner at CVC Capital Partners



Dr. Christian Wildmoser
Partner, CVC Capital Partners

Dr. Christian Wildmoser is a partner at CVC Capital Partners and is involved in CVC's global activities in the chemicals sector. He focuses on private equity activities in Germany, Austria and Switzerland.

Dr. Wildmoser joined CVC Capital Partners in 2000 as Senior Managing Director and was promoted to Partner in 2008.

Since 2008, he had been a member of the Supervisory Board of Evonik Industries AG, from which he resigned effectively during Evonik's annual shareholder's meeting on May 18, 2016.

Before joining CVC, Dr. Wildmoser served as Chief Executive Officer at Helarb Management.

Dr. Wildmoser studied economics and received his Ph.D. from the University of Vienna, Austria.



CVC Capital Partners is a leading private equity and investment advisory firm with offices in Europe, Asia and the US.

CVC manages capital on behalf of over 300 institutional, governmental and private investors worldwide. Since its inception, CVC has secured commitments of more than USD 71bn in funds.

CVC's major investment focus lies in global industrial and service businesses. The target minimum equity investment is USD 150m for its European funds and USD 50m for its Asian funds. Its current portfolio includes over 45 investments from a variety of sectors, including stakes in major chemicals companies, such as Evonik and Univar.

In 2015, the M&A trends in the European chemicals industry were driven by an increased focus on portfolio realignments – to shift from lower-value commodity upstream businesses towards more specialty-downstream sectors. How do you see these trends influencing the M&A dynamics in the European chemicals market and what additional trends do you expect going forward?

I expect the high M&A activity in the specialty chemicals sector to continue. These companies are especially appealing compared to commodity-focused businesses. The current market environment, with historically low oil prices, hampers penetration of, and revenue generation from, petroleum-based commodities.

In addition, the chemicals industry appears to be under pressure when considering recent share price developments, since it is a competitive industry with high operating leverage.

Lanxess, Evonik and BASF are trading below their share prices from one year ago. Hence, portfolio improvements will remain a major topic for future development. The joint venture initiated by Saudi Aramco and Lanxess is a good example of an upstream player attempting to expand downstream the value chain.

I expect these realignments to continue in the future.

A similar strategic pattern seems to apply to the Dow Chemical – DuPont deal.

Yes, exactly and this transaction serves as a good example to demonstrate several topics. Conglomerates were on both ends of the transaction.

At the time of the deal announcement, DuPont was already in the process of focusing on its agricultural, nutrition and high-end specialty business through various transactions, such as the Chemours spin-off. Subsequent to the commodity spin-off, DuPont made significant progress.

On the contrary, after Dow Chemical acquired Rohm and Haas, market circumstances did not allow it to exit its commodity business entirely.

Market conditions changed and commodity prices, such as ethylene, recovered. In retrospect, it was a solid decision of Dow Chemical to hold on to its commodity business. Nevertheless, Dow Chemical made only minimal progress towards focusing on specialty chemicals. As a result, the deal between Dow Chemical and DuPont may create value for both by creating three highly focused leading companies with critical scale in agriculture, material science and specialty products.

The Global Specialty Silica Market

Interview with Dr. Christian Wildmoser, Partner at CVC Capital Partners

What are your expectations regarding the European chemicals industry?

The developments in the European market are very difficult to predict. There are market rumors about the agricultural businesses of BASF and Bayer and the market effects of the pending ChemChina Syngenta takeover.

These developments force all market players to review their own positions, including Evonik, DSM, AkzoNobel, Solvay and BASF. Bottom line is, the chemicals M&A landscape in Europe is very dynamic and may provide the foundation for major transactions in the future.

Significant M&A opportunities for corporates and private equity will arise in the course of these industry-shaping transactions. Regulators will force the involved players to sell activities before approving certain business combinations. Consequently, the portfolio landscape will be redrawn, creating significant opportunities for all parties in the sector.

What role do you expect the private equity industry to play?

Private equity has always been very active in the chemicals industry. It is an ideal partner for portfolio realignments that result in the sale of businesses, or parts thereof, which lack strategic fit or strategic interest. Nevertheless, these businesses may be perfect candidates for takeover by private equity. Private equity will remain an active player in future portfolio realignments.

With regard to your points, do you think upstream commodity businesses are of interest to private equity?

For private equity, generating return from commodity business acquisitions is difficult. One characteristic of commodity businesses is a lack of control of pricing and costs, since raw material and energy prices account for a high proportion of costs and are hard to predict.

Hence, it is demanding to acquire such businesses with a lot of leverage. A perfect example of the risk involved is the **bankruptcy of LyondellBasell** in 2009, which was a result of dropping demand and a high debt burden.

On the other hand, Apollo's acquisition of LyondellBasell, concurrently to its bankruptcy filing, provides a perfect example of a successful transaction in the commodity space and the importance of timing on transaction success.

Another successful decision of holding on to commodity businesses presents Jim Ratcliffe, founder of INEOS, whose business ran into substantial problems in the economic downturn. However, he held on to the company and succeeded, as he is a fantastic operator. But still these examples underline the challenge: In commodity chemicals, private equity has to be very cautious.

What area of the chemicals sector – commodity or specialty – does CVC prefer to invest in? What are CVC's main criteria when investing in the space?

The deal CVC completed with DSM last year was on the commodity end, with an appropriate structure and an appropriate amount of leverage, so this transaction made sense.

Generally, I think that the specialty chemicals business, which is strongly customer application driven (meaning that a large part of the company's added value stems from specific applications for customers), is better suited for private equity investors than the pure commodity businesses. For example, Flint Group (a prior portfolio company of CVC) is a large supplier of inks, plates and auxiliary products for packaging and print media industries.

Evonik acquires Air Product's Specialty and Coating Additives business

Evonik, a provider of specialty chemicals, announced the acquisition of the Specialty and Coating Additives business to complement its own portfolio and gain size and margins.

Deal size: EUR 3.3bn

EV/LTM revenue: 3.7x

Q2 2016*

Saudi Aramco and Lanxess form joint venture

Saudi Aramco, a producer of oil and gas, announced the acquisition of a 50% stake in the synthetic rubber business of Lanxess, forming a joint venture with revenues of EUR 3bn (2014A).

Deal size: EUR 1.2bn

EV/LTM revenue: 0.8x

Q2 2016

ChemChina acquires Syngenta

ChemChina, a provider of a diversified range of chemical products, announced the acquisition of Syngenta to become a leading supplier of pesticides and agrochemicals.

Deal size: EUR 42.0bn

EV/LTM revenue: 3.4x

Q1 2016*

DuPont and Dow Chemical agree to combine in merger of equals

DuPont and Dow Chemical announced an all stock merger of equals to create three publicly traded businesses active in agriculture, material science and specialty products.

Deal size: EUR 118.9bn

EV/LTM revenue: 1.6x

Q4 2015*

CVC acquires DSM's composite resins and polymer intermediates divisions

CVC acquired a 65% stake in DSM's composite resins and polymer intermediates business which operates as an independent company active in caprolactam, acrylonitrile and composite resins.

Deal size: EUR 775.0m

Q3 2015

DuPont spins off Chemours

DuPont, a global provider of a diversified range of chemical products, completed the spin-off of its performance chemicals segment.

Deal size: EUR 2.6bn

EV/LTM revenue: 0.5x

Q3 2015

Dow Chemical acquires Rohm & Haas

Dow Chemical, a supplier of diversified chemicals, completed the acquisition of Rohm & Haas to strengthen its foothold in specialty chemicals and advanced materials.

Deal size: EUR 12.0bn

EV/LTM revenue: 2.0x

Q2 2009

Bankruptcy and subsequent acquisition of LyondellBasell by Apollo

LyondellBasell, a leading plastics, chemicals and refining company, filed for bankruptcy as it was unable to repay USD 24bn in debt. In the course of its debt reorganization plan, Apollo acquired a 52% investment in LyondellBasell which it exited in Q4 2013.

Q1 2009

*Announcement date

The Global Specialty Silica Market

Interview with Dr. Christian Wildmoser, Partner at CVC Capital Partners

Under CVC's ownership, Flint operated with high leverage, which was possible due to the company's customer application based business, its low capital intensity and high cash conversion rate. Due to the nature of its business, the company fared well despite the difficult economic conditions throughout the financial crisis and its leverage.

Evonik considers its Resource Efficiency segment (approx. EUR 4.3bn in revenues in FY2015) as a growth driver. What long term trends do you see that might benefit the segment?

The Evonik investment overall went well for CVC. Obviously, there are many different trends affecting the segment, however Evonik is in an excellent market position and an innovation leader in virtually all its businesses.

In recent years, Evonik's Resource Efficiency segment has been a reliable performance driver with an EBITDA growth of over 7% in 2015 and margins which have increased to over 20%.

The Resource Efficiency segment and its sub-sectors enable the efficient use of resources. The oil additives business, for example, which includes viscosity modifiers and comparable products, facilitates a more efficient operation of construction equipment. Crosslinkers play an important role in the manufacturing of wind turbine blades as they are required to prevent composites from disintegrating while spinning.

The silica, together with the silanes business, amounts to approx. 35% of the segment's revenue. One major end market is the tire industry, and its move towards the use of green tire. While the growth of the overall tire industry roughly conforms to GDP growth, green tire is rapidly gaining market share.

The materials used for green tires contain less carbon black and more specialty silica. The challenge is to reduce rolling resistance to make it more energy efficient and less fuel consuming without negatively affecting braking characteristics. Therefore, the industry requires materials that can achieve both and Evonik provides the required silica.

For the car industry, as for any other industry, regulators and governments across the world seek to increase energy efficiency in an effort to combat climate change. This trend is just starting and bears significant potential for future growth.

Of course, high oil prices create an additional incentive to promote energy efficiency, however this is a strong structural trend even without the additional incentive. And in terms of innovation and quality of its products, Evonik is one of the leading players. A major reason for sustained growth and recession resistance of the silica business is its broad range of applications, including end markets in food, beverage as well as the coatings industry.

What is Evonik's strategy as a market leader to capitalize on these trends?

A major characteristic of Evonik and driver of its success is its great innovative spirit. The firm has the R&D capacities to innovate in all applications.

There is a lot of incremental innovation at Evonik. In addition, Evonik also generates step-change innovation, such as the development of pharma polymers for targeted drug release and silica-silane technology for green tires.

Furthermore, Evonik's global setup in silica and silanes makes it one of the few companies – if not the only one – which is in a position to serve customers globally in these product areas. In terms of Evonik's growth strategy, there are various relevant end markets such as Europe, Asia, US, and South America. The growth in Asia is probably strongest but Evonik operates in a number of different markets. Right now the company is expanding its global footprint, adding a production facility in Brazil and possibly adding capacities in the US.

The combination of these factors – great innovative strength, diverse end markets, and a strong global presence – provides the ideal hedge against regional and industry-specific risks. This is the reason for Evonik's stable performance even in turbulent times.

Dr. Wildmoser, we thank you for this interview.

This interview was conducted on April 20th, 2016.

Supplement by Dr. Wildmoser on May 20th, 2016:

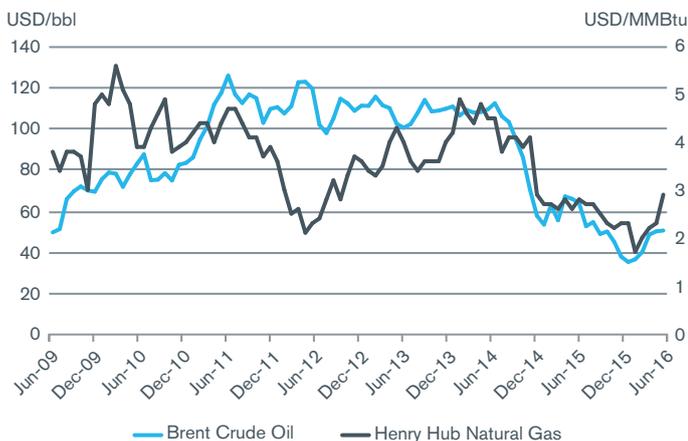
The acquisition of the Specialty & Coating Additives business of Air Products (Q2 2016) illustrates Evonik's successful execution of its strategy by adding complementary products in Resource Efficiency and Nutrition & Care, expanding its geographic presence in North America and Asia as well as adding innovative capabilities to Evonik's portfolio.

Quarterly Market Review

Key Raw Materials

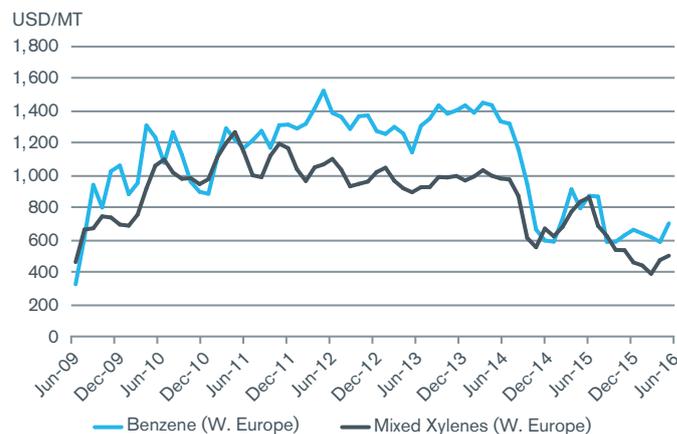
Petrochemicals

Feedstock



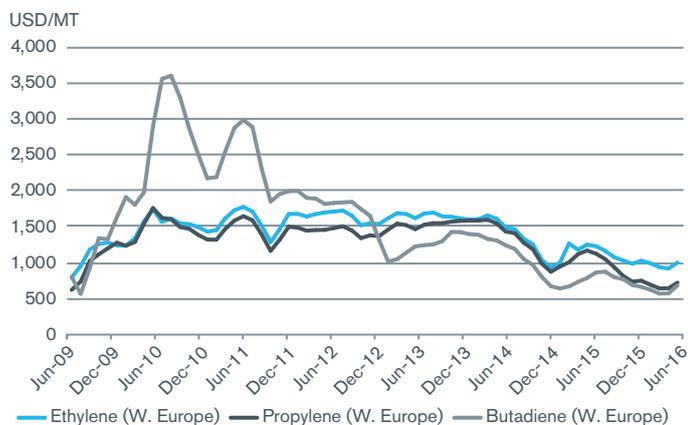
Source: Bloomberg as of June 30, 2016

Aromatics



Source: NEXANT, Bloomberg as of April 30, 2016

Olefins



Source: NEXANT, Bloomberg as of April 30, 2016

Key Observations

- Oil prices increased 6.2% in Q1 representing the best quarter since mid-2015 due to a weak dollar and a drawdown in crude stocks at the US futures delivery hub, although the rally faded towards the end of March as an output freeze plan by major crude exporters fails to alleviate worries of a glut and the US rig count rose for the first time since December 2015
- As oil prices generally tumble and petrochemicals capacity expands globally, lower US ethylene margins suggest a reversal of fortunes for producers that have generated record profits. In Europe and Asia, lower oil prices have brought cost relief, but this has lasted less than a year as competition drives down ethylene selling prices
- Mixed xylenes premiums are dragged down by weak gasoline blending demand

Source: Bloomberg, Reuters and S&P Global

Raw Materials Wrap-Up

Product	Unit	Type	Delivery	Source	Date					Change	
					Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	q-o-q	y-o-y
Naphtha	USD/MT	1 Mo Fwd	CIF NW Europe	Bloomberg	524.1	416.5	381.2	364.9	417.3	14.4%	(20.4%)
Methanol	EUR/MT	Spot	FOB Rotterdam	Polymerupdate	303.0	252.0	204.5	167.5	198.0	18.2%	(34.7%)
Acrylic Acid	USD/MT	Spot	DDP W Europe	Tecnon Orbichem	1,537.0	1,459.0	1,230.0	1,170.0	1,217.0	4.0%	(20.8%)
Adipic Acid	USD/MT	Contract	DDP W Europe	Tecnon Orbichem	1,767.0	1,599.0	1,523.0	1,538.0	1,764.0	14.7%	(0.2%)
Caustic Soda (liquid)	USD/MT	Spot	DDP W Europe	Tecnon Orbichem	570.0	556.0	539.0	543.0	NA	0.7%	5.0%
Chlorine (liquid)	USD/MT	Spot	DDP W Europe	Tecnon Orbichem	244.0	244.0	237.0	242.0	NA	2.1%	2.5%
Ammonia	USD/MT	Spot	FOB Black Sea	Green Markets	400.0	400.0	300.0	265.0	250.0	(5.7%)	(37.5%)
Urea (prill)	USD/MT	Spot	FOB Black Sea	Green Markets	295.0	285.0	264.0	195.0	190.0	(2.6%)	(35.6%)

Source: Bloomberg

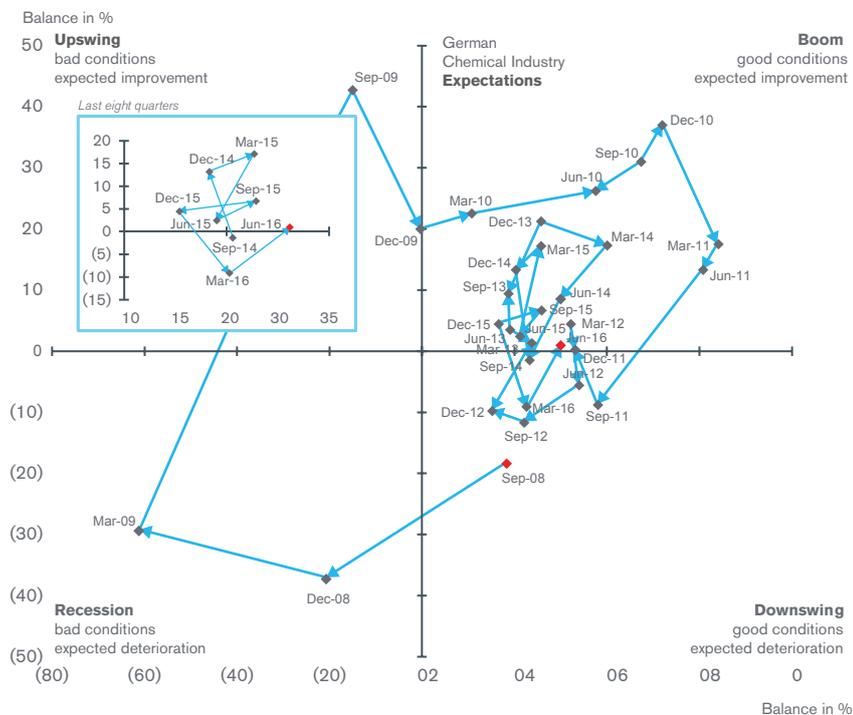
Definitions:

MMBtu - Million British thermal units
 Bbl - Barrels
 MT - Metric tons

Quarterly Market Review

Ifo Survey German Chemical Industry

German Chemical Industry | Ifo Business Cycle Clock

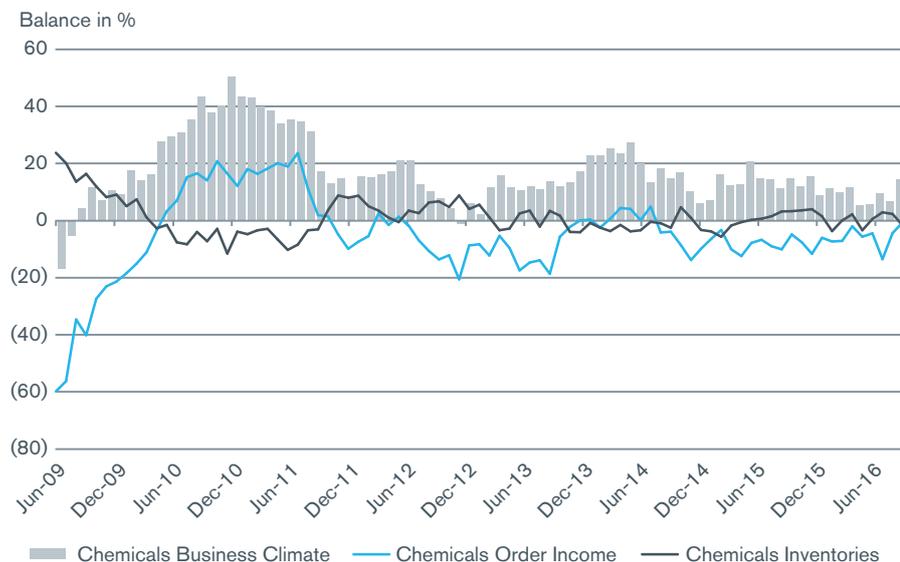


Source: Ifo Institut für Wirtschaftsforschung, Boomerang as of June 30, 2016

Key Observations

- March conditions have improved month-on-month by 4.6%, which has been a recovery from a large 9.5% drop in February. A value of 22.6% means by definition that the German chemical industry is still in good shape, and relatively close to its 12 months maximum value of 27.5% reached in January 2016
- Expectations deteriorated from minus 6.1% in February to minus 9.2% in March 2016, thereby reaching their minimum value of the past 12 months
- The downward trend in expectations since December 2015 reflects the uncertain outlook of the chemical industry in Germany despite its good current condition

German Chemical Industry | Ifo Business Indicators



Source: Ifo Institut für Wirtschaftsforschung, Boomerang as of June 30, 2016

Key Observations

- Chemicals business climate level improved slightly in March compared to its February level, while still being well below its one year maximum of 16.1% in September 2015
- Order income was negative in March 2016 (as it has been for the entire year 2015 and Q1 2016) with only minor changes in the last months
- Inventory levels deteriorated (increased) in March compared to February, implying higher stock levels than could have been sold, with high fluctuation since September 2015
- A negative order income level indicates that chemical customers are hesitant to place orders

Explanatory note

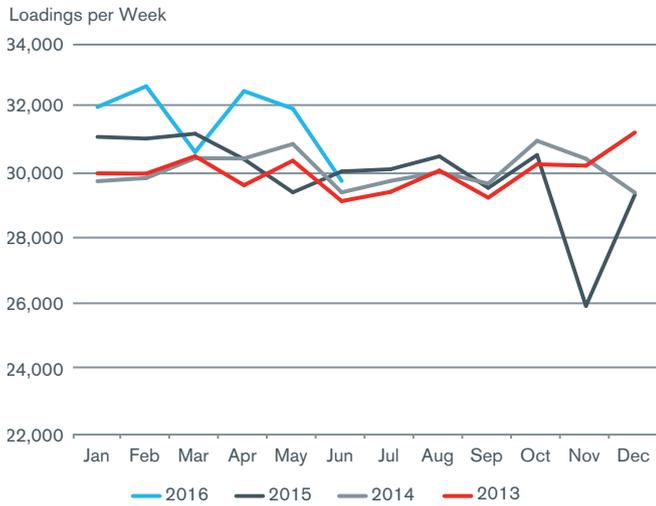
The Ifo Business Climate Index is based on ca. 7,000 monthly survey responses from firms in manufacturing, construction, wholesaling and retailing. The firms are asked to give their assessments of the current business situation and their expectations for the next six months. They can characterise their situation as "good", "satisfactory" or "poor" and their business expectations for the next six 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

Quarterly Market Review

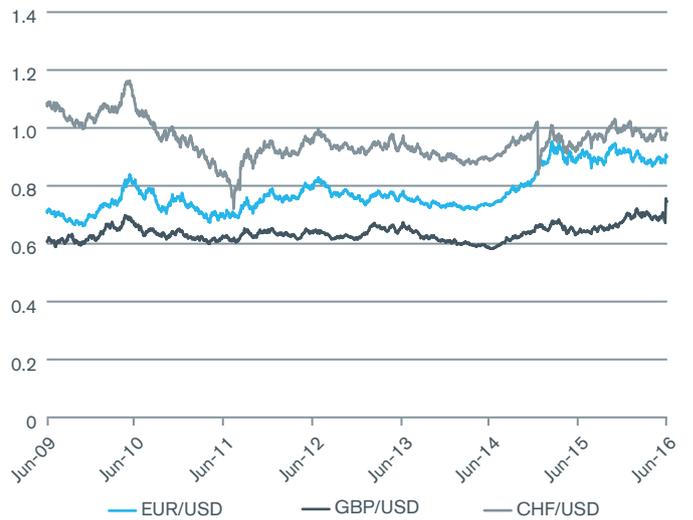
Economic Environment

US Weekly Railcar Chemicals Loadings



Source: Association of American Railroads, Bloomberg as of June 30, 2016

Currency Trends



Source: Bloomberg as of June 30, 2016

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

Europe: STOXX 600



Source: Bloomberg as of June 30, 2016

USA: S&P 500



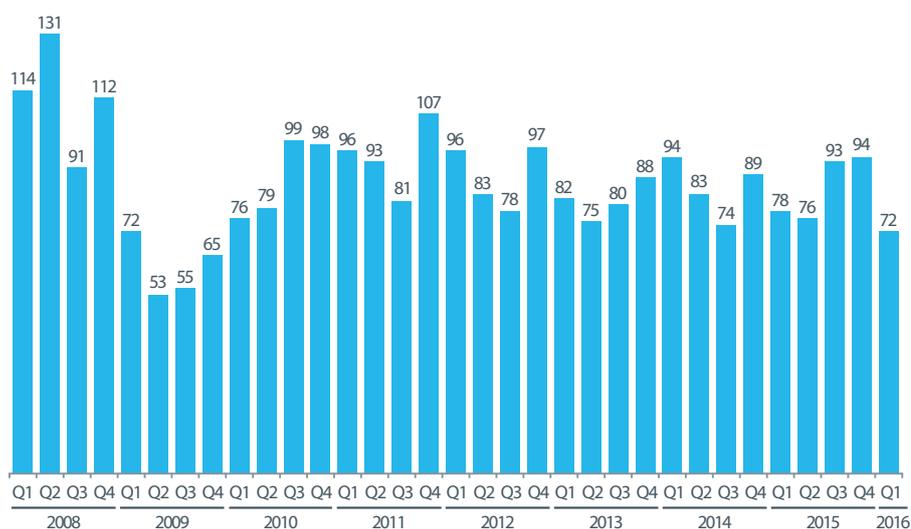
Source: Bloomberg as of June 30, 2016

M&A Transaction Review

Announced Deals

European M&A Quarterly Trend

Number of Announced Transactions



Source: Capital IQ

Key Observations

- Transaction values in Q1 2016 are available for 15 transactions (out of 66) summing up to a total value of EUR 44.2bn
- Top 10 transactions in H1 2016 have a combined value of EUR 47.8bn, Top 10 transactions are listed below
- The acquisition of Syngenta for a total consideration of EUR 42.0bn was the largest transaction by value in H1 2016
- 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 in H1 2016

Announced	Acquirer	HQ	Target	HQ	Target Business Description	Stake Acquired	Transaction Value (in EURm)	Revenues (in EURm)	LTM EBITDA Margin	EV / LTM Revenue	EV / LTM EBITDA
3-Feb-16	China National Chemical	CN	Syngenta	CH	Syngenta is a leading agricultural company and engages in the discovery, development, manufacture, and marketing of a range of products designed to enhance crop yields and food quality.	100.0%	42,039.0	12,275.5	20.7%	3.4x	16.5x
6-May-16	Evonik Industries AG	DE	Air Products – Performance Materials Division	US	Air Products' Performance Materials Division is a producer of specialty & coating additives.	100.0%	3,327.5	910.7	23.2%	3.7x	15.7x
15-Feb-16	Allnex Belgium	BE	Nuplex	NZ	Nuplex is a manufacturer of resins used in paints, coatings and structural materials.	100.0%	717.0	955.5	9.5%	0.8x	7.9x
17-Feb-16	Akzo Nobel	NL	BASF Coatings Division ⁽¹⁾	DE	BASF's Coatings division is a producer of automotive coatings, automotive refinishes, industrial coatings and decorative paints.	100.0%	475.0	300.0	-	1.6x	-
16-Mar-16	INEOS ⁽¹⁾	CH	Inovyn ChlorVinyls	GB	Inovyn ChlorVinyls is a manufacturer of chlorovinyl chemicals.	50.0%	335.0	-	-	-	-
25-Apr-16	Lanxess	DE	Chemours – Clean and Disinfect Business	US	Chemours' Clean and Disinfect Business is a provider of cleaning and disinfection solutions including disinfectants, oxone and chlorine dioxide.	100.0%	204.0	101.3	-	2.0x	-
20-Mar-16	Synthomer	GB	Hexion Performance Adhesives & Coatings	US	Hexion Performance Adhesives & Coatings is a manufacturer of dispersions, additives, powder coatings and specialty monomers.	100.0%	200.1	340.7	8.1%	0.6x	7.2x
27-Apr-16	Avery Dennison	US	Mactac – European Business	BE	Mactac's European Business is a manufacturer of high-quality pressure-sensitive materials.	100.0%	200.0	147.0	-	1.4x	-
14-Apr-16	Calgon Carbon	US	CECA – Activated Carbon and Filter Aid Business	IT	CECA's Activated Carbon and Filter Aid Business is a provider of wood-based activated carbon, reactivation and mineral-based filtration.	100.0%	145.5	93.2	16.3%	1.6x	9.6x
1-Apr-16	Kingenta Ecologic Engineering ⁽²⁾	CN	COMPO	DE	COMPO is a manufacturer of potting soils, fertilizers and plant care products.	100.0%	116.0	254.2	5.6%	0.5x	8.2x

(1) Acquisition of the remaining 50% stake in the Joint Venture Inovyn by Ineos from Solvay

(2) Revenue and EBITDA figures are calculated based on target financials as of year-end September 9, 2015

Includes announcements until May 31, 2016. Figures converted with exchange rate as per announcement date, respectively

Source: Capital IQ, Mergermarket, Company Information

M&A Transaction Review

Strategic Alliances & Collaboration

R&D

Sanofi and DiCE announce R&D partnership

March 2016

The five-year global collaboration aims to discover potential new therapeutics for up to 12 targets. The collaboration provides funding in excess of USD 50m in equity upfront, target exclusivity, technology access fees and research services. In addition, Sanofi invests up to USD 184m in research, clinical and regulatory milestone payments per target, and royalty payments based on any future annual net sales of each compound developed by Sanofi.

Source: Sanofi press release as of March 16, 2016

Evonik enters into research partnership with Institute of Chemical Technology, Mumbai

February 2016

The research partnership includes the provision of scholarship funds for master's degree and PhD students, collaboration in R&D projects in the field of chemical science, financial support for internships for bachelor, master and PhD students and the sponsorship of lectures. Evonik's expansion of innovation activities supports its growth strategy in economically attractive regions.

Source: Evonik press release as of February 3, 2016

Quartet Medicine announces strategic partnership with Merck

January 2016

The partnership supports Quartet Medicine in the development of novel small molecule drugs modulating the tetrahydrobiopterin (BH4) pathway. Under the terms of the agreement, Quartet will receive up to USD 20m to advance its lead program through phase 2a clinical proof-of-concept for the treatment of chronic pain. In return, Merck obtains an exclusive option to purchase Quartet.

Source: Quartet Medicine press release as of January 6, 2016

Operations

Dotmatics and eMolecules announce partnership to deliver next generation intelligent chemical sourcing

April 2016

Under the partnership, eMolecules' comprehensive collection of chemicals is offered within the Dotmatics Platform. It enables users to select chemical compounds for sourcing, enhancing drug discovery or chemistry research.

Source: Dogmatics press release as of April 19, 2016

Clariant and South Korean Biospectrum agree strategic partnership

April 2016

Clariant signed an agreement to acquire a 17% share in BioSpectrum. Clariant will become an anchor shareholder and leverage its global sales and innovation network to market BioSpectrum's product portfolio of active ingredients. The partnership will combine biospectrum's research strength with Clariant's formulations expertise and global presence.

Source: Clariant press release as of April 12, 2016

Air Liquide strengthens its partnership with MPCC in China

April 2016

As part of the agreement, Air Liquide will invest approx. EUR 40m in a new air separation unit. Expected to start operations in the second quarter of 2017, the new unit will supply industrial gases including oxygen and nitrogen and will have a total capacity of 850 tonnes of oxygen per day. The unit will be owned and operated by ALMPCC, the joint venture of Air Liquide and MPCC.

Source: Air Liquide press release as of April 12, 2016

Kolon Plastics and BASF set up joint venture

March 2016

The 50:50 joint venture will be located in Korea and manufacture polyoxymethylene, an engineering plastic used in industrial, transportation, construction and consumer markets. It will have an annual capacity of 70,000 metric tons and start operations in the second half of 2018.

Source: BASF press release as of March 16, 2016

PCT enters into collaboration and license agreement with Hitachi Chemical

March 2016

As part of the agreement, Hitachi purchased a 20% equity stake in PCT for USD 19m. PCT has licensed its cell therapy technology and know-how to Hitachi for cell therapy manufacturing in certain Asian territories. Under the license agreement, Hitachi makes upfront milestone payments of USD 6m. In addition, PCT and Hitachi agreed to explore the establishment of a joint venture in Europe.

Source: Caladrius Biosciences press release as of March 14, 2016

ICL and Albemarle enter into long-term supply agreement

February 2016

Both companies agreed on the supply of polymeric flame retardants which will be manufactured at ICL's facilities in the Netherlands and in Israel using technology licensed from a subsidiary of Dow Chemical. Albemarle will supply ICL with bromine for the production of GreenCrest which is a sustainable alternative of hexabromocyclododecane flame retardants currently used.

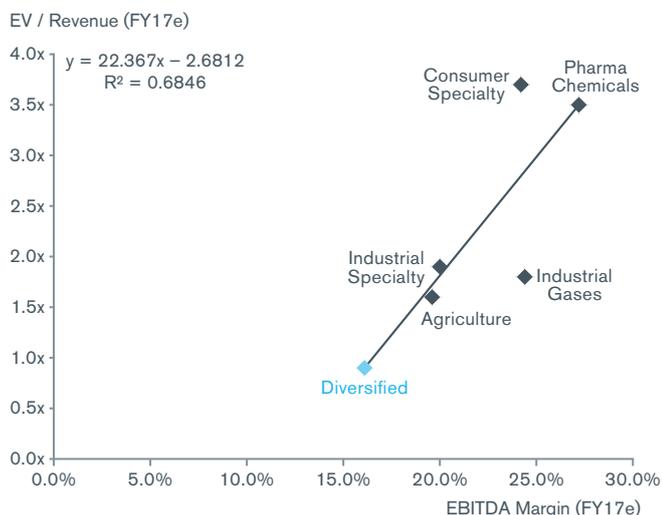
Source: ICL press release as of February 24, 2016

Public Trading Analysis

Sub-Sector Summary

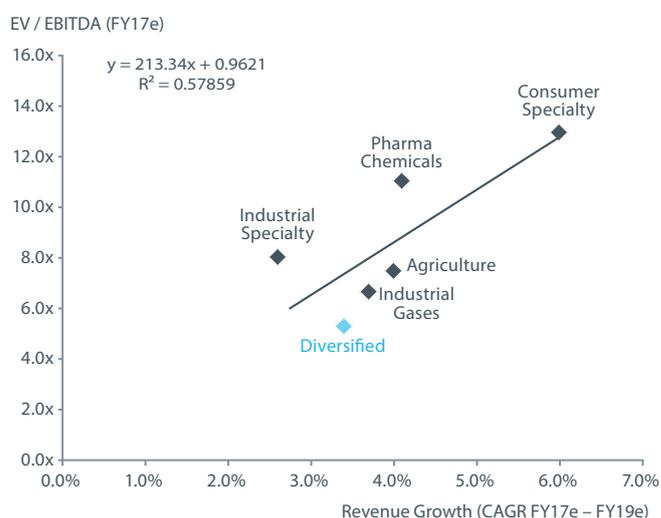
Regression Analysis

EV / Revenue vs. EBITDA Margin



See page 13 for constitution of Sub-Sectors
 Data point in blue is this edition's highlighted Sub-Sector (see page 12)
 Source: Capital IQ as of June 30, 2016

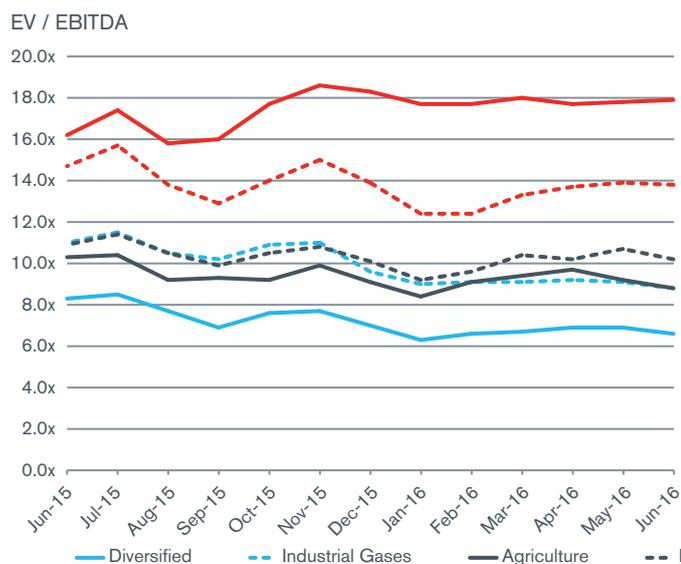
EV / EBITDA vs. Revenue Growth



See page 13 for constitution of Sub-Sectors
 Data point in blue is this edition's highlighted Sub-Sector (see page 12)
 Source: Capital IQ as of June 30, 2016

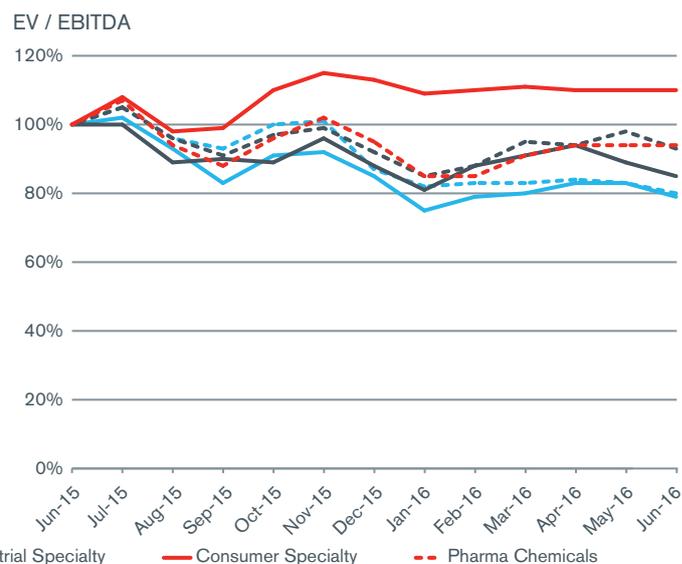
Sub-Sector Trading Multiples (EV / EBITDA)

LTM Actual



Source: Capital IQ as of June 30, 2016

LTM Rebased



Source: Capital IQ as of June 30, 2016

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 Twelve Months

Public Trading Analysis

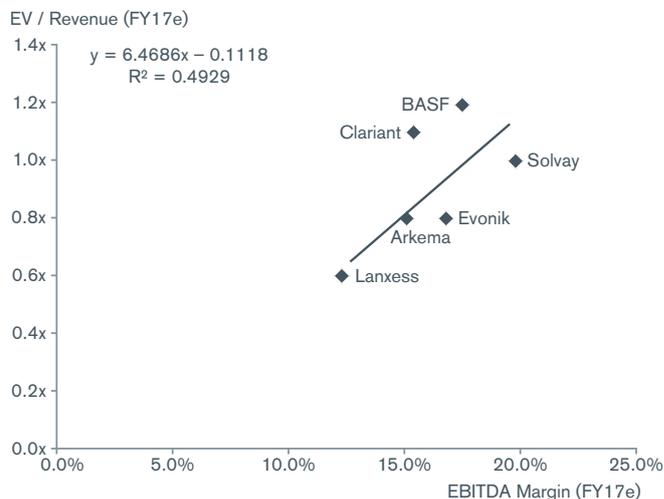
Sub-Sector Focus: Diversified

Share Price Development and Regression Analysis

Share Price Development Rebased

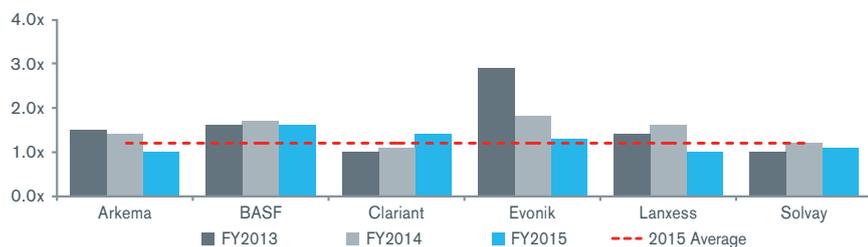


EV / Revenue vs. EBITDA Margin

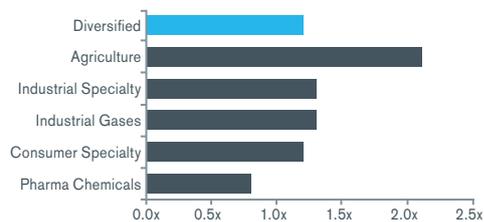


Capex / Depreciation

Diversified

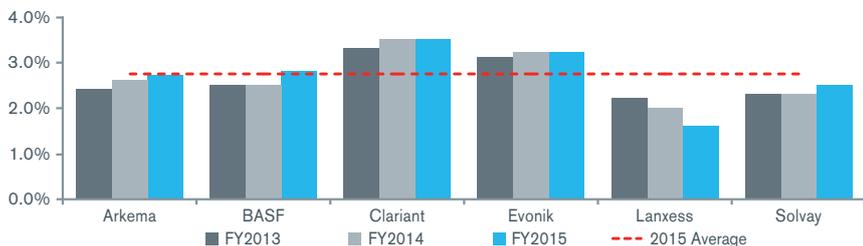


Chemicals Sub-Sector Average (FY2015)

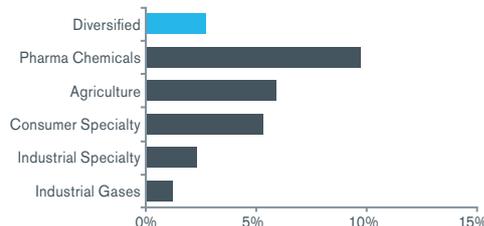


R&D Expenditures in % of Sales

Diversified

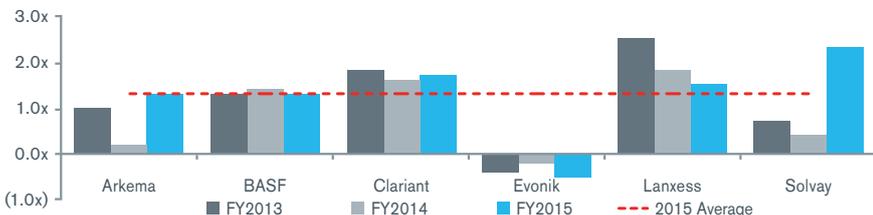


Chemicals Sub-Sector Average (FY2015)

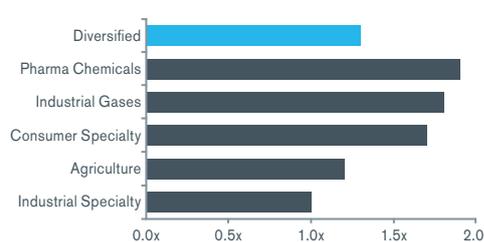


Net Debt / EBITDA

Diversified



Chemicals Sub-Sector Average (FY2015)



Source: Capital IQ, Bloomberg as of June 30, 2016

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	
	29-Jun-16	Low	High	% of High			LTM	LTM	FY2017	LTM	LTM	FY2017	
Diversified													
Arkema SA	68.1	48.2	75.0	91%	5,143.3	6,583.3	7,705.0	1,132.0	1,191.2	14.7%	5.8x	5.5x	
BASF SE	67.6	56.0	85.8	79%	62,115.8	75,492.8	64,590.0	10,048.0	10,638.6	15.6%	7.5x	7.1x	
Clariant AG	15.0	14.0	18.7	80%	4,851.5	6,082.8	5,340.3	697.1	873.4	13.1%	8.7x	7.0x	
Evonik Industries AG	26.4	24.5	37.8	70%	12,323.4	11,132.4	13,188.0	2,243.0	2,309.1	17.0%	5.0x	4.8x	
Lanxess AG	38.5	32.9	56.5	68%	3,522.6	4,786.6	7,784.0	873.0	992.7	11.2%	5.5x	4.8x	
Solvay SA	82.4	70.5	130.8	63%	8,556.4	13,522.4	11,335.0	1,978.0	2,564.7	17.5%	6.8x	5.3x	
Average										14.8%	6.6x	5.8x	
Industrial Gases													
Air Liquide SA	93.0	88.3	123.7	75%	32,249.7	39,809.1	16,573.3	4,219.2	5,553.4	25.5%	9.4x	7.2x	
Linde AG	128.1	114.0	182.1	69%	23,184.8	31,328.8	17,808.0	3,861.0	4,253.9	21.7%	8.1x	7.4x	
Average										23.6%	8.8x	7.3x	
Agriculture													
Israel Chemicals Ltd.	3.5	3.4	6.3	56%	4,476.3	7,625.9	4,624.7	965.9	1,089.1	20.9%	7.7x	7.0x	
K+S AG	18.2	17.6	39.2	46%	3,483.3	4,694.8	3,893.9	1,035.9	926.3	26.6%	4.5x	5.1x	
KWS Saat AG	286.6	236.4	314.5	94%	1,947.1	2,124.7	1,041.4	159.0	178.9	15.3%	13.4x	11.9x	
Syngenta AG	346.7	264.9	385.7	90%	31,554.4	33,706.7	12,348.2	2,522.9	2,730.1	20.4%	13.4x	12.1x	
Yara International ASA	28.4	27.5	46.3	61%	7,757.6	8,869.2	11,182.9	1,757.4	1,906.5	15.7%	5.0x	4.7x	
Average										19.8%	8.8x	8.1x	
Industrial Specialty													
Akzo Nobel NV	55.2	49.9	71.2	78%	13,678.2	15,874.2	14,698.0	2,102.0	2,272.3	14.3%	7.6x	7.0x	
EMS-Chemie Holding AG	451.3	340.7	463.3	97%	10,556.1	10,148.1	1,776.6	483.2	536.5	27.2%	21.0x	18.9x	
Johnson Matthey Plc	34.3	26.9	37.8	91%	6,568.3	7,377.1	13,549.4	725.7	756.4	5.4%	10.6x	9.8x	
Kemira Oyj	10.5	8.9	11.9	88%	1,538.7	2,196.9	2,405.2	276.9	329.3	11.5%	7.9x	6.7x	
Lenzing AG	82.3	54.2	88.0	93%	2,184.3	2,458.5	2,044.4	325.3	383.2	15.9%	7.6x	6.4x	
Sika AG	3,719.0	2,664.8	3,988.0	93%	9,445.5	9,356.2	5,048.1	760.2	908.8	15.1%	12.3x	10.3x	
Synthomer plc	3.9	3.3	4.6	86%	1,334.7	1,443.2	1,181.5	158.3	180.4	13.4%	10.2x	8.0x	
Tessenderlo Chemie NV	29.3	21.8	37.0	79%	1,258.8	1,405.6	1,589.0	176.3	237.0	11.1%	8.0x	5.9x	
Umicore SA	45.4	32.1	47.5	96%	4,910.3	5,298.5	9,704.9	426.1	559.7	4.4%	12.4x	9.5x	
Victrex plc	18.1	15.5	24.8	73%	1,540.5	1,485.4	316.4	145.7	151.2	46.0%	10.6x	9.8x	
Wacker Chemie AG	77.0	58.2	95.1	82%	3,870.9	5,170.3	5,275.6	891.8	1,136.6	16.9%	5.8x	4.5x	
Average										16.5%	10.4x	8.8x	
Consumer Specialty													
Chr. Hansen Holding A/S	57.7	41.9	62.5	92%	7,513.7	8,230.3	905.0	296.5	364.8	32.8%	27.8x	22.6x	
Croda International plc	36.7	33.2	39.7	92%	4,771.9	5,096.6	1,468.8	403.0	427.3	27.4%	14.1x	11.9x	
Frutarom Industries Ltd.	42.3	32.9	49.2	86%	2,495.2	2,907.9	822.2	146.2	229.8	17.8%	19.4x	12.7x	
Koninklijke DSM NV	51.2	38.7	57.5	89%	8,822.7	11,041.7	7,749.0	1,063.0	1,295.8	13.7%	10.4x	8.5x	
Givaudan SA	1,785.1	1,396.7	1,798.9	99%	16,405.6	17,025.4	4,042.7	851.6	1,073.4	21.1%	20.0x	15.9x	
Symrise AG	59.8	50.4	64.5	93%	7,756.3	9,262.3	2,665.5	560.8	671.6	21.0%	16.5x	13.8x	
Average										22.3%	18.0x	14.2x	
Pharma Chemicals													
Bayer AG	103.2	83.9	137.7	65%	73,598.4	90,955.4	46,386.0	10,348.0	11,455.0	22.3%	8.8x	7.9x	
Lonza Group Ltd.	148.9	111.1	158.5	94%	7,763.1	9,330.5	3,497.4	718.2	854.9	20.5%	13.0x	10.9x	
Novozymes A/S	42.3	34.0	48.9	87%	12,717.0	12,887.2	1,883.3	663.1	720.9	35.2%	19.4x	17.9x	
Merck KGaA	90.4	70.9	98.7	92%	39,312.0	51,452.0	13,468.7	3,717.6	4,379.1	27.6%	13.8x	11.7x	
Average										26.4%	13.8x	12.1x	

Note: Multiple calculation in local currency.

(1) Listing on the Tel Aviv Stock Exchange and reporting in USD. EV converted to USD using an exchange rate as of June 29, 2016.

(2) Listing on the Nasdaq OMX Copenhagen and reporting in EUR. EV converted to EUR using an exchange rate as of June 29, 2016.

Source: Capital IQ as of June 29, 2016

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 Twelve Months

Upcoming Events

Q3 2016

Next Event



CHISA 2016 PRAGUE

PRES 2016

22nd International Congress of Chemical and Process Engineering (CHISA 2016)

08/27/2016 to 08/31/2016 | Prague, Czech Republic

<http://www.chisa.cz/2016/>

The objective of CHISA 2016 is to provide engineers, scientists, researchers, technologists, students and others with a platform to present their latest results, to interchange ideas, to make new contacts, to establish new collaborations, and many more.

The conference addresses the full spectrum of chemical and process engineering practice including current trends and future challenges. Selected topics:

- Pharmaceutical engineering
- Reaction engineering, catalysis and kinetics
- Computer aided process engineering
- Fluid flow and multiphase systems
- Membrane separations

Events Ticker

China Composites Expo 2016

08/31/2016 to 09/02/2016 | Shanghai, China

www.chinacompositesexpo.com/

India CHEM 2016

09/01/2016 to 09/03/2016 | Mumbai, India

www.indiachem.in/

Specialty & Agro Chemicals America

09/07/2016 to 09/09/2016 | Charleston, SC, United States

www.chemicalsamerica.com/

6th EuCheMS Chemistry Congress

09/11/2016 to 09/15/2016 | Seville, Spain

www.euchems-seville2016.eu/

KHIMIA – Chemistry: International Exhibition of Chemistry

09/19/2016 to 09/22/2016 | Moscow, Russia

<http://www.chemistry-expo.ru/en/>

ICIF China – 15th China International Chemical Industry Fair 2016

09/21/2016 to 09/23/2016 | Shanghai, China

<http://en.icif.cn/index.html>

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