



Economy

Value Creators: the best performing chemical companies revealed by a TSR analysis

Pages 8-9

THE NEWSPAPER FOR THE
CHEMICAL AND
LIFE SCIENCE MARKETS

Trade

Chemical Connections: how liberalized chemicals trade underpins global value chains

Pages 10, 20



Reinventing Chemistry

The End of One Era and the Beginning of Another

The years following World War II were very kind to chemistry. The research universities and the chemical industry—one of the most beneficial partnerships our technologically sophisticated society has seen—developed the forms that we know. Industrial chemistry became a core part of the industrial world; academic chemistry explained how atoms and molecules made reality happen.

During this time complex organic synthesis, quantum chemistry, laser spectroscopy, production of polyolefins, organometallic chemistry, molecular beams, medicinal chemistry, and countless other areas developed and flourished. The range of commercial and scientific opportunities was very large.

This prolific era is over, and chemistry is now facing classes of opportunities, and obligations to society, that are even more interesting, but entirely different. They will re-

quire—I believe—a new structure for the field, and raise a fundamental question: „What must chemistry be in the future?“ It has been the field of science that studied atoms, bonds, molecules, and reactions. And 50 years from now? Will it still be the study of molecules and what they do? Or will it deal with complex systems that involve molecules, in any form—in materials science, biology, geology, city management, whatever—„chemical“ or not?

Chemistry Blended the Practical and Conceptual

This postwar era simultaneously developed academic chemistry—to analyze and understand complexity—and industrial chemistry—to produce the chemicals used by society. The two are sometimes described as separate, and even antagonistic. Far from it! The interchange between them—albeit usually unplanned and often haphazard—provided extraordinary benefits to both. This stimulating exchange of information between academic and

industrial laboratories continued until the 1980s, and then slowed.

Since the 1990s, the chemical industry has focused on process improvement and on short-term product development, rather than to contribute actively to the development of new areas of large-scale chemistry. In the past two decades, the chemical industry has introduced few fundamentally new products. The changes that forced large companies out of long-term research are relatively straightforward to understand: the goals of capitalism and the public markets, and incentives for senior management, both favor investments in which financial returns are expected to be short-term. Research is generally a long-term investment. In the face of pressure for profitability, much of industry has chosen to emphasize the management of existing businesses, rather than to try to create new ones: research in the chemical industry is now often considered as an expense, rather than an investment.



Prof. George M. Whitesides, Harvard University

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NEWSFLOW

M&A-News:
Ashland sells the car-care products of its Valvoline business to Niteo.

Mylan tries to escape its pursuit by Teva.

More on Page 2 and 3

Pharma:
Moberg has acquired Balmex from Chattem for \$3.9 million.

Daiichi Sankyo has unloaded its entire 8.9% stake in Sun Pharmaceutical, raising \$3.2 billion.

More on Page 3

Investments:
A. Schulman plans to invest €5-7 million to build a new masterbatch plant in Turkey.

Lanxess has started production at its new EPDM rubber plant at Changzhou, China.

More on Page 15 and 18

People:
Merck has named Udit Batra to lead the life science business after the integration of Sigma-Aldrich.

More on Page 19

Dow and Olin in \$5 Billion Asset Merger

In a tax-efficient Reverse Morris Trust transaction valued at \$5 billion, Dow Chemical has agreed to separate a significant part of its chlor-alkali and derivatives businesses and merge them with chlor-alkali specialist Olin.

The merged company incorporating Dow's US Gulf Coast chlor-alkali and vinyl, chlorinated organics and global epoxy businesses would have revenues of almost \$7 billion, more than double Olin's current sales. Pro forma EBITDA would be around \$1 billion based on 2014 figures and excluding synergies. Olin expects annualized cost synergies of at least \$200 million within three years.

In the transaction expected to close this year following regulatory approval, Dow shareholders would receive 50.5% of Olin shares, with



Andrew Liveris, CEO, Dow

existing Olin shareholders owning about 49.5%. Olin would continue to be headed by CEO Joseph Rupp and a senior management team made up of Dow and Olin employees. Three new members nominated by Dow would join the existing nine directors on Olin's board.

With Dow an important anchor customer of Olin as it grows the acquired business, the relationship is planned to include several long-term supply, service and purchase agree-

ments to support downstream products aligned with Dow's market focus. Separately, the companies have agreed a 20-year capacity rights contract calling for Dow to supply ethylene from its US Gulf Coast grid. Dow would receive payments up-front and Olin ethylene at „co-investor, integrated producer economics.“

“We have jointly created a solid foundation for success for Olin, driven by the benefits of greater scale, an enhanced ability to capitalize on globally advantaged cost positions backed by US shale gas economics, technology advantages, broader market access and significant envelope integration,” Dow CEO Andrew Liveris, said.

With this transaction, Dow stands to exceed its target to divest \$7 billion to \$8.5 billion of non-strategic businesses and assets, Liveris added. (eb)

Continues Page 6

Shell to Buy UK's BG Gas Group

Energy and petrochemicals giant Shell has announced plans to acquire UK oil and gas exploration company BG Group in a cash and share transaction valued at £47 billion.

The deal would give investors a premium of about 50% to the closing price of BG Group's shares on April 7, the date the plans were announced. BG Group is the UK's third largest energy company, employing 5,200 people in 24 countries.

Shell CEO Ben van Beurden, commented: „BG will accelerate Shell's financial growth strategy, particularly in deep water and liquefied natural gas (LNG), two of Shell's growth priorities and areas where the company is already one of the industry leaders. It will also



Ben van Beurden, CEO, Shell

be a “springboard for a faster rate of portfolio change, particularly in exploration and other long-term plays,” he added.

Combining the two businesses is expected to further develop the Anglo-Dutch group's competitive position in the LNG market, including the core growth regions of Asia and the Atlantic basin. Total LNG capacity following the merger is expected to be 45 million t in 2018, compared to Shell's 26 million t in 2014.

The acquisition of BG would boost Shell's proven oil and gas reserves by 25% and its production capabilities by 20%. The deal would also give it enhanced positions in competitive new oil and gas projects, particularly in Australia's LNG market and in Brazilian deep water oil exploration.

Shell said it expects to realize annual pretax savings of \$2.5 billion by 2018, comprising \$1 billion of operating cost savings and a \$1.5 billion reduction in exploration expenditure. If the deal goes through, BG shareholders will own approximately 19% of the combined group. (eb)

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CONTENT



Front Page	Chemicals	11 – 14	South African Analytical Lab Optimizes Pipetting	16
Reinventing Chemistry	Surfactants in a Globalizing World	11	<i>Monika Alder Novotni, Hamilton Bonaduz</i>	
The End of One Era and the Beginning of Another <i>Prof. George M. Whitesides, Harvard University</i>	The Requirement for More Sustainable and Effective Materials Ensures a Demand for Innovation and Technological Development <i>Interview with John Hibbs, CESIO</i>		Quality and Efficiency in Pharma Manufacturing	17
Market & Companies	No Compromise on Performance	12	Part 2: PAT Can Turn Batch Processes into Continuous Processes <i>David Humphrey, ARC Advisory Group</i>	
Current and Future Trends for Pharma Logistics	Reinventing Sustainable Value Creation	13	Strategy & Management	18
Pharma Management Radar Survey Finds Optimism but also Expectations To Cut Costs <i>Dr. Josef Packowski and Andreas Gmür, Camelot Management Consultants</i>	Why the Chemical Industry Must Decouple Economic Growth from Ecological Footprint <i>Prof. Thomas Müller-Kirschbaum, Henkel</i>		Intellectual Property in China's Chemical Industry	18
Value Creators	Roles Under REACH	14	Companies Will Have to Prevent, Detect and Respond to IP Loss to Access Growing Market <i>Nick Blank, Blackpeak Group; Dr. Kai Pflug, Management Consulting – Chemicals</i>	
BCG's Total Shareholder Return (TSR) Analysis Reveals Best Performing Chemical Companies <i>Yves-Pierre Willers, Andreas Gocke, The Boston Consulting Group</i>	REACH Demands that Competitors Work Closely Together — Certain Tasks Still Challenge Industry <i>Dr. Susanne Kamptmann</i>		People · Events · Publications	19
US Companies Point to Increase Federal Regulations as Barrier to Growth	Production	15 – 17	At A Glance	20
9 <i>Lawrence D. Sloan, SOCMA</i>	Industrial Water Management	15	Index	20
Chemical Connections	New Challenges in Chemical Purification	16	Imprint	20
10 How Liberalized Chemicals Trade Underpins Global Value Chains <i>Servet Gören, CEFIC</i>	By Reducing Its Thirst for Water the Process Industry can Conserve Resources and Cut Cost <i>Dechema</i>			
	Ion Exchange Resins Lead the Way to Comply with High EU Standards <i>Alexander Lane, Dow Chemical</i>			

SABIC in Shale Gas Deal With Unnamed US Supplier

Saudi Arabian petrochemical giant SABIC has signed a deal to import shale gas from the US for use at its Teesside complex in the UK, acting chief executive Yousef Abdullah al-Benyani told the news agency Reuters.

The executive did not reveal the name of the gas supplier, saying no agreement on disclosure had yet been reached.

Benyani said the timing and other details of the project, which he described as the first use of shale gas exported from the US Gulf in Britain, are planned to be announced during the third quarter. The gas will meet the company's "full demand" for the next ten years and is renewable beyond ten years, he added.

Former CEO Mohammed Al-Mady, who left the company in February to become president of Saudi Arabia's Military Industries Corp, had previously said SABIC was interested in importing US shale gas to upgrade its Teesside cracker.

Benyani said SABIC is still considering a proposal to build a plant to convert crude oil directly into chemicals, bypassing the refinery step. The proposal was originally announced by Saudi oil minister Ali al-Naimi early last year. Asked if talks had been held with companies to develop the project, Benyani told Reuters that, "ideally SABIC would like to do the project by itself." Any partner "would need to make an important contribution and help to spread risks." (dw) ■

Düsseldorf-based German consumer chemical specialist Henkel said it plans to acquire Novamelt, a privately owned company based at Wehr in southern Germany, to further enhance its competence in the area of hotmelt adhesives. Financial terms of the acquisition, which is subject to anti-trust approval, are not being disclosed. Closing is subject to anti-trust approval. In addition to its German base, the company with 100 employees has a US production site at High Point, North Carolina, as part of a 51:49 joint venture.

With annual sales of around €50 million in 2014, Novamelt manufactures a wide range of specialty

hotmelt adhesives used most widely in self-adhesive labels and tapes. Its UV-curable hotmelts in particular are claimed to withstand even high temperatures and heavily changing weather conditions.

"Targeted investments in complementary leading technologies are an integral part of our global strategy," said Csaba Szendrei, senior vice president, Packaging and Consumer Goods Adhesives at Henkel. "Novamelt's solutions perfectly fit to our existing pressure sensitive adhesives business," he added.

Henkel's Adhesive Technologies business unit reported sales of more than €8 billion in 2014. (dw) ■

Proxy Advisory Firm Backs Hedge Fund's Criticism of DuPont

Nelson Peltz, the activist shareholder owner of hedge fund Trian Fund Management, which is pressing for DuPont to split into two companies, has gained a powerful backer in proxy advisory firm Institutional Shareholder Services (ISS).

Without naming any names, the firm on Apr. 27 recommended that DuPont shareholders give seats on the board to some of Trian's proposed new directors. Altogether, the fund has nominated four, including Peltz.

Trian, which currently owns 2.7% of the US chemical producer, wants to see it group its agriculture, nutrition and health and industrial biosciences units into one higher-growth company, while separating out its more cyclical businesses.

ISS said it believed some of Trian's criticisms of DuPont may be warranted. Especially, it said it be-

lieves operating efficiency has room for improvement, as the board and management "are not communicating well with shareholders."

In response, DuPont's management said it strongly believes that ISS "reached the wrong conclusion" in failing to recommend that shareholders vote on for all 12 of its "highly-qualified and experienced director nominees" rather than only eight.

"By ignoring the success of our transformative strategy and the value-destructive nature of Trian's break up agenda, as well as dismissing the fact that the addition of Trian's nominees would remove critical experience from DuPont's board," the chemical giant said ISS "demonstrates a fundamental lack of understanding of our business and the needs of a global science company." (dw) ■

IMCD Buys India's Kushalchand

Dutch specialty chemicals distributor IMCD has acquired Kushalchand Sons in India. The family-owned business, based in Mumbai, distributes specialty ingredients to India's fast-growing processed food industry. Financial details were not disclosed.

IMCD said the purchase will provide a platform for it to further strengthen and expand its activities in the country's food market. Kushalchand, which has revenues of about

€9 million and employs 18 people, will be integrated into IMCD India.

Mr. Amit Hirani, former owner of Kushalchand and the new business director of IMCD India, comments: "IMCD and Kushalchand share a common strategy through providing the Indian food industry with a wide range of key ingredients from world leading manufacturers. This synergy will enable IMCD to further strengthen their presence on the Indian market." (eb) ■

US specialty chemicals producer Ashland has agreed to sell the car-care products of its Valvoline business to Niteo, a subsidiary of private equity firm, Highlander Partners. The deal includes the manufacturing and distribution assets in Hernando, Mississippi. Financial terms were not disclosed.

Car-care products represent less than 4% of Valvoline's sales which were \$2 billion for the year ended Dec. 31, 2014. They include the brands Car Brite, Eagle One and Pyroil. Also included in the sale are

Valvoline-branded and private-label maintenance chemicals sold into the do-it-yourself (DIY) sector.

Sam Mitchell, Ashland's senior vice president and Valvoline's president, said the proceeds from the sale of the non-strategic asset will be reinvested in generating more rapid, profitable growth within the company's core lubricants business.

Jeff Hull, managing partner of Highlander and chairman of Niteo, said the Valvoline assets will provide the foundation for a "strong buy and build platform." (eb) ■

PPG Buys Automotive Materials Supplier Revocoat

US-based PPG Industries has completed the acquisition of Revocoat from the Axson Group. Financial details were not disclosed. Headquartered in France, Revocoat is a global supplier of sealants, adhesives and damper products for the automotive industry. It employs more than 500 people and operates eight manufacturing facilities and one R&D center.

The addition of Revocoat to the automotive coatings business strengthens PPG's global automotive adhesive and sealants product and technology offerings, said Cindy Niekamp, PPG's senior vice president, automotive original equipment manufacturer (OEM) coatings. (eb) ■

Mylan Said to Prepare Poison Pill Potion Against Teva

US-managed generics drugmaker Mylan, now domiciled in the Netherlands, is said to be preparing a "poison pill" defense to escape its pursuit by Israeli generics giant Teva.

Teva has offered \$40.1 billion to acquire its smaller rival, which itself is pursuing a smaller player, Perrigo. Analysts have speculated that Mylan's grab for Perrigo was a tactic to help fend off Teva. Perrigo has now rejected Mylan's nearly \$29 billion takeover bid.

The Israeli drugmaker's offer is contingent on Mylan not completing the proposed deal with Perrigo. In its first reaction to the hostile takeover bid by Teva, the board of the Dutch-based drugmaker has unanimously rejected the more than \$40 billion offer.

After a comprehensive review conducted in consultation with its financial and legal advisors, the board said it had concluded the approach "did not meet any of the key criteria that would warrant Mylan departing from its successful and longstanding standalone strategy and consider engaging in discussions to sell the company."

In a letter sent on Apr. 27 to Teva CEO, Erez Vigodman, the Mylan board's executive Chairman, Robert J. Coury, said the board had "unanimously determined that Teva's proposal grossly undervalues Mylan, and would require Mylan's shareholders to accept what we believe are low-quality Teva shares in exchange for their high-quality Mylan shares."

In moving its headquarters out of the US, through a \$5.3 billion deal to acquire parts of Abbot Labs' generics portfolio, Mylan not only escaped US corporate taxes, reports say. Through the relocation, the drugmaker is now able to benefit from anti-takeover defenses anchored in Dutch law.

The poison pill Mylan will be able to leverage foresees the board creating an independent foundation that can exercise a call option agreement set up between itself and the company, diluting the rights of ordinary shareholders.

The foundation would have the right to exercise the call option if it feels it is in the best interest of the company. This would free management to pursue alternative plans.

Teva meanwhile has been pressing ahead with its quest for Mylan, announcing that it could "promptly" divest some of its operations to obtain regulatory clearance. The company said it planned to work with antitrust authorities to assure that the deal can be completed by the end of 2015; however, it did not reveal which operations it might be prepared to divest.

Citing people familiar with the matter, the news agency Reuters said some of Mylan's top investors, including Paulson and Co – a New York-based hedge fund that owned around 3% of Mylan at the end of 2014 – have encouraged the company's board to consider the proposal.

Teva said the acquisition of Mylan would create an entity with more

than \$30 billion in annual revenue, add to earnings in the first year and eventually generate \$2 billion in annual savings.

The purchase of Mylan would also help the Jerusalem-based group expand its offering of harder-to-produce medical products such as soft-gel caps, topical and inhalant technologies and injectables, while increasing its portfolio of treatments for the nervous system.

Teva has come under pressure through the emergence of generic competition for its multiple sclerosis drug Copaxone, as well as from new oral treatments.

A merger of Mylan and Teva would create a generics giant with annual sales of around \$30 billion and market capitalization of around \$100 billion. It also would be the biggest pharmaceutical industry deal so far this year and the second largest of the past 12 months, following the takeover of Botox manufacturer Allergan by generics rival Actavis.

The latter deal followed a failed hostile takeover attempt by Canadian pharmaceutical producer Valeant in cooperation with activist investor Bill Ackman's Pershing Square Capital Management. Market speculation has it that Valeant and Novartis' generics arm Sandoz may be interested in acquiring Perrigo.

Sandoz is currently embroiled in a patent dispute with Teva over a generic MS drug that would compete with Copaxone. (dw)

Braskem Reevaluating West Virginia Cracker

Brazilian chemical giant Braskem is reviewing plans to build a world-scale ethane-fed cracker and downstream polyethylene plants in Parkersburg in the US state of West Virginia.

Speaking in New York at a meeting of Société de Chimie Industrielle, Fernando Musa, CEO of Braskem America – which also oversees European operations – said that in light of receding crude oil prices the company would not build a US cracker to go on stream before the year 2020. Most of the engineering work for the planned facility's first phase already has been completed.

While Braskem believes the project is still interesting, especially as feedstock from the nearby Marcellus Shale gas fields is easily accessible and 40% of US demand for PE within 500 miles of the proposed facility, he said the cost advantage of a US-based ethane cracker over a naphtha-fed unit has sunk from \$600 million a year ago to only around \$150 million at present.

As another cost factor, the Brazilian executive also pointed to the long availability of ethylene, as in the wake of the shale euphoria, many new plants were brought on

stream, and many of these are not entirely back-integrated.

Braskem is still contemplating whether to build new polypropylene plants in the US, where availability is still tight, or debottleneck existing plants. Much depends on the availability of propylene feedstock in the right quantity at the right location, Musa said.

The Brazilian petrochemical group currently has five PP production facilities in the US – at Marcus Hook, Pennsylvania; Kenova, West Virginia; La Porte, Freeport, and Seadrift, Texas. (dw)

CCS to Be Commercialized at Grangemouth

The UK and Scottish governments plan to invest more than €5 million in engineering and feasibility studies for a Carbon Capture and Storage (CCS)-equipped coal gasification power plant in Grangemouth, Scotland. What makes the Caledonia Clean Energy Project somewhat unique, its backers say, is that the governments do not intend to directly subsidize the facility being built by Summit Power, based at Seattle, Washington, in the US.

Recent reforms in the UK electricity market reform, combining an Emissions Performance Standard (EPS) and the Contract for Difference (CfD), are said to make such low carbon investments increasingly attractive. Jonas Helseth, director of Bellona Europa, a Brussels-based nonprofit organization that supports environmental improvement projects throughout the EU, said the Grangemouth CCS project

"is evidence that the UK government's steps to promote CCS are working."

Summit will spend 18 months undertaking detailed research and feasibility studies with the ultimate objective of designing, siting, financing and building the new 570 megawatt coal-gasification power plant Scottish power plant. Fitted with CCS technology, it will attempt to capture up to 90% of its CO₂ emissions. (dw)

Solvay Creates Business Unit for Specialty Chemicals

Solvay has established a new global business unit for rare earths, specialty chemicals and fluorine. The fluorine business was formerly part of Solvay's aroma performance business unit with net sales of nearly €30 million last year.

Solvay said the move was to simplify and improve the efficiency of its overall group structure.

The Special Chem unit, with annual sales of about €850 million in 2014 and 3,100 employees worldwide, will be headquartered in Seoul, South Korea. It will be led by Hua Du and reported within the advanced materials operating segment.

Roger Kearns, member of Solvay's executive committee, said:

"With its increased scale and enhanced innovation capabilities, Solvay Special Chem is better positioned to capture growth opportunities and will focus on leveraging our technology and market position in auto-catalysts and fluor specialties to drive new growth in targeted markets, namely in automotive and electronics." (eb)

Total Spending €600 Million on Refinery Conversions

Total has revealed plans to revamp and upgrade two of its five refineries in France to meet the demands of new markets and restore profitability.

The oil and petrochemicals giant is spending €200 million to turn the La Mède facility in the south into France's first biorefinery. As one of the biggest in Europe, the upgraded plant will be able to meet the growing demand for biofuels, it says. Crude oil processing here will be phased out up to the end of 2016.

At Donges, near Nantes, Total will spend €400 million to convert its refinery to produce low-sulphur fuels in line with the latest EU specifications and to "capture profitable markets."

Conversion of the facilities will take place without layoffs or personnel transfers to other group sites, the group stressed.

CEO Patrick Pouyanné pointed to the need to realign refinery operations and products in Europe to the meet the needs of changing markets

and react to a decline in profitability, which Total blames on overcapacity and heightened competition from players in Asia and the Middle East as well as US companies with access to cheap shale oil and gas.

Total said there is no need to convert the refineries at Gonfreville in Normandy, Grandpuits in the Paris region and Feyzin near Lyon, as these have state-of-the-art operations and are still profitable despite the deteriorating refinery climate. (dw)

EU Commission Accuses Gazprom of Antitrust Violations

The European Commission has charged Russian gas giant Gazprom with abusing its dominant market position in central and eastern European gas markets and violating the EU's antitrust rules.

If it can prove competition violations, the Commission can impose fines of up to 10% of Gazprom's global turnover. It has given the company 12 weeks to respond to the allegations.

In particular, Competition Commissioner Margrethe Vestager

said, the EU believes Gazprom "may have built artificial barriers preventing gas from flowing from certain central European countries to others, hindering cross-border competition."

"Keeping national gas markets separate also allowed Gazprom to charge prices that we, at this stage, consider to be unfair," she said.

The Commission says Gazprom used oil-linked formulas to favor some countries and penalize others. In its view, the company has hin-

dered competition in the gas markets of Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia.

In a statement, the gas giant called the objections unfounded, saying the company "strictly adheres to all the norms of international law and national legislation in the countries where it conducts business."

Russia supplies an estimated one-third of the EU's gas requirements. (dw)

US Chemical Activity Barometer Suggests 2015 Gains

The Chemical Activity Barometer (CAB) of the American Chemistry Council (ACC) was up 0.1% in April, as measured on a three-month moving average, the US chemical producers' association said.

Having reached an index of 98.1, last seen in January 2008, ACC said the CAB – reflecting production, equity prices and product prices, along with other indicators – remains 2.6% ahead of the year-ago figure. This, it says, suggests that gains in business activity will continue into the fourth quarter.

"All of the major production-related indicators are up and we

might continue to see a strengthening. Construction-related chemistries have been adversely affected by bad weather so far this year, but we expect an improvement as we get further into spring," said Kevin Swift, the association's chief economist.

"The data on plastic resins and polymers for packaging suggest that retail sales should continue to be strong as well," Swift added.

The activity barometer is derived from a composite index of chemical industry activity and, as the industry has been found to consistently lead the US economy's business cycle, it

can be used to determine turning points and likely trends in the wider economy.

US chemical producers also remain upbeat on their shale gas cost advantage, despite recent steep declines in the price of crude oil.

Speaking at a recent Responsible Care conference held by the American Chemistry Council, the industry association's CEO Cal Dooley pointed to the ongoing investment boom across the country, which he said gives the industry the chance to reestablish itself as a leading global supplier of energy and feedstocks (dw)

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Current and Future Trends for Pharma Logistics

Pharma Management Radar Survey Finds Optimism but also Expectations To Cut Costs

A wind of change is in the air when it comes to logistics in the pharmaceutical industry. Although most companies are still quite optimistic with regard to the current business climate, there seems to be a rising awareness of the important role logistics might play in current and future challenges such as price pressure. And new service offerings “beyond the pill” also could affect logistics substantially: The majority of industry players are currently executing focus initiatives in various fields of logistics, including organization, process and network setup. At the same time, however, there is still some room for optimization with regard to various strategic changes in logistics to further increase competitiveness.

This is the picture that emerges from the fifth Camelot Management Consultants Pharma Management Radar survey, a biannual survey that examines the general climate in the pharmaceutical industry and takes an in-depth look at a varying current management topic. In a one-week period between January and February, more than 20 executives from globally active pharmaceutical companies based in 16 countries and spread over four continents participated in the online survey. Companies with a business model predominantly characterized by developing and/or commercializing innovative medicines (“Innovators”) comprised the majority of respondents; roughly one-fifth were participants from companies predominantly active in the generics segment (“Generics”). Panel participants represent almost two-thirds of the global Top 20 pharmaceutical companies. The focus topic of the fifth Pharma Management Radar is pharma logistics.

The executives’ view of the business climate for the pharmaceutical industry has essentially remained as positive as it had been in the Pharma Management Radar Survey conducted one year earlier. This particularly applies to the Generics executives, all of whom rate the business climate as “good” or at least “mostly good,” whereas the share of pessimistic Innovators has slightly increased year-over-year.

These mood differences are also reflected in the outlook on the economic developments during the next 12 months: While all participating Generics are optimistic, more than one in four Innovators fear that the business climate will “remain just as bad” or “deteriorate.”

This type of pessimism has gained relevance over the last 12 months, which might be seen as a sign of still-growing competitive pressure on some Innovators due to expiring patents and increasing regulatory requirements.

In accordance with their general industry outlook, most respondents are optimistic with regard to their own business development. More than 90% expect their sales performance to improve while 96% are confident of being able to raise EBIT



dropped dramatically in terms of investment attractiveness (from 50% to 17%) since last year. For Southern Europe, the situation looks equally bad—it has not improved during the last 12 months.

last year. In addition, more than 40% of respondents are nervous about political risks in growth markets, which is of course due to the political and economic developments in Russia/Ukraine, Southern Europe and other emerging markets.

Given these problems, it is not surprising that more than half of respondents consider cost reduction the most important industry trend. Securing supply reliability, which is vital for business success, is the second top trend while the continuing trend toward outsourcing is also reflected in this ranking. Another measure to cope with increasing competitive pressure is the creation of additional revenue sources. Subsumed under the term “beyond the pill,” these services do not yet belong to the top priority trends for the next 12 months in logistics, but they are considered a priority trend with an interesting perspective for the medium-term future.

Service-Related Trends to Become More Important

When asked about market trends influencing logistics organization and setup, the majority of respondents see increased challenges in products requiring active temperature control and traceability both in 2015 and during the next three to five years. Security requirements and measurements against counterfeiting as well as pressure to reduce logistics costs are also expected to become more important or even significantly more important both with regard to the near- and the medium-term fu-

ture. Some considerable movement can be observed, however, when it comes to service-related trends. The relevance of additional patient-specific services such as prescription management, consulting services, product kits, as well as the importance of home-care services, is expected to be much higher by 2020 than during the next year.

One trend to be observed within pharma logistics is the move toward regional logistics organization —

to concentrate on their core business. While for the Generics mere financial considerations also play a very important role for logistics outsourcing, other major drivers for the Innovators are the qualification and specialization of service providers and the flexibility they offer.

Given the expectation that pharmaceutical companies, especially Innovators, will increasingly offer additional services in the medium-term future, logistics strategies will have to align closer with manufacturing and commercial strategies. So far, however, little more than 10% of respondents have a regular process with clear global roles and responsibilities in place when it comes to the alignment between logistics distribution strategy and manufacturing strategy. Regarding the integration with commercial strategy, there is even more room for optimization.

It seems, however, that this problem has been realized, as intra-company collaboration is widely considered a subject for logistics focus initiatives in the next two or three years. The survey found that at the moment, there is a lot of movement in other areas of pharma logistics: Approximately two-thirds of the respondents have currently ongoing initiatives to change logistics organization and process setup

Logistics will play an increasingly important role for coping with future challenges in the global pharmaceutical value chain.
Dr. Josef Packowski, Camelot Management Consultants

(earnings before interest and taxes) in 2015. When it comes to where this growth is expected, both the European debt crisis and the military conflict in the Ukraine are clearly reflected in the pharmaceutical industry’s demand expectations: Russia and Southern Europe perform extremely poorly in this respect. In contrast, expectations have further brightened up for various emerging markets—especially China and Eastern Europe. In the mature markets of Germany and the UK, the Generics see a considerably better perspective for themselves than the Innovators, which may be due to the rising cost pressure in these countries’ health-care systems.

These expectations are also reflected in many of the pharmaceutical industry’s regional investment plans for the next 12 months. China is clearly considered the most important market while Russia has

We have seen already a shift in the organization of logistics: from a local approach to a regional/global one.
Andreas Gmür, Camelot Management Consultants

especially with regard to Europe, where this was the top answer. Generally, however, the traditional model of local logistics organization still plays a major role, while the opposite concepts, i.e., global responsibility for logistics or an end-to-end responsibility for complete supply chains segmented by product/channel groups, are applied rather seldom.

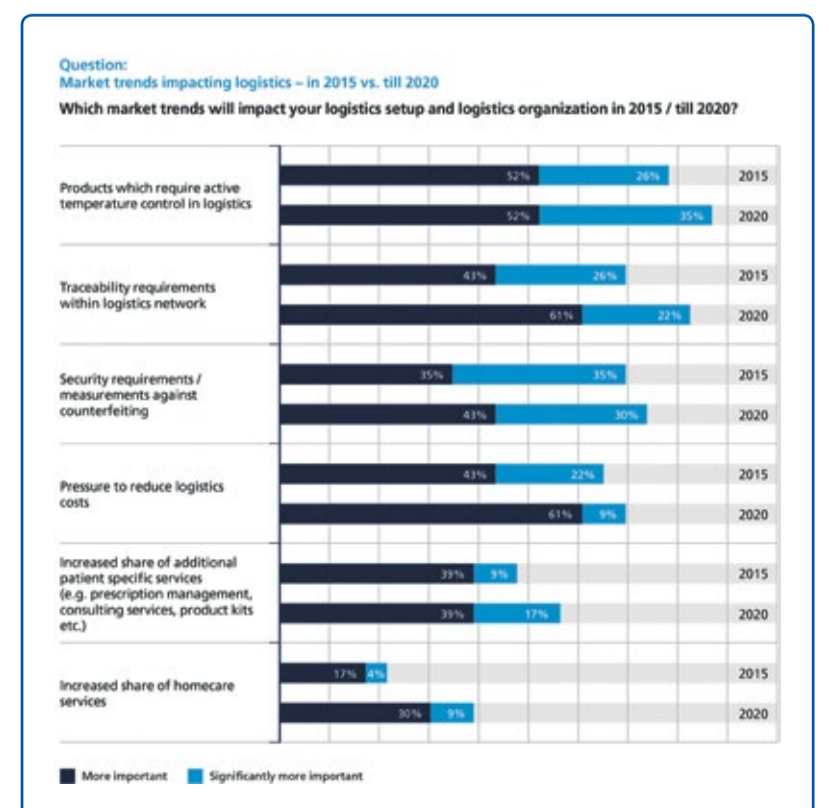
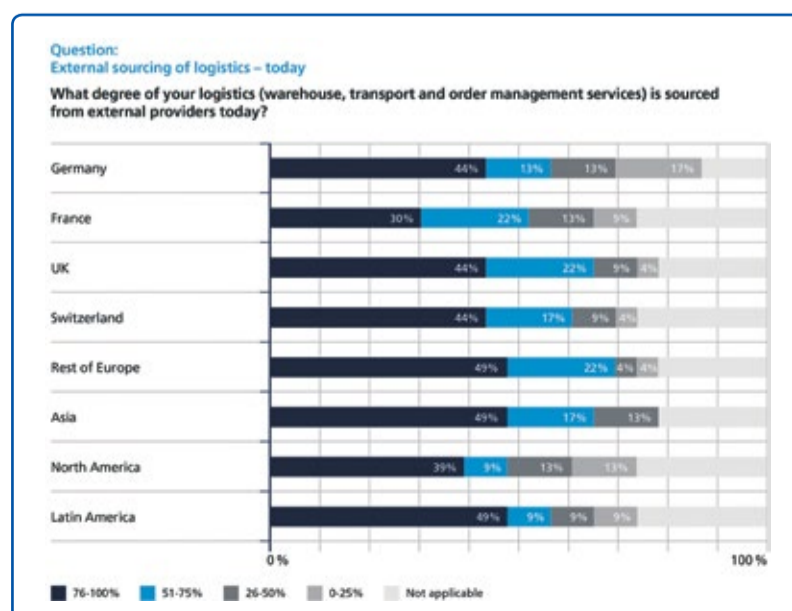
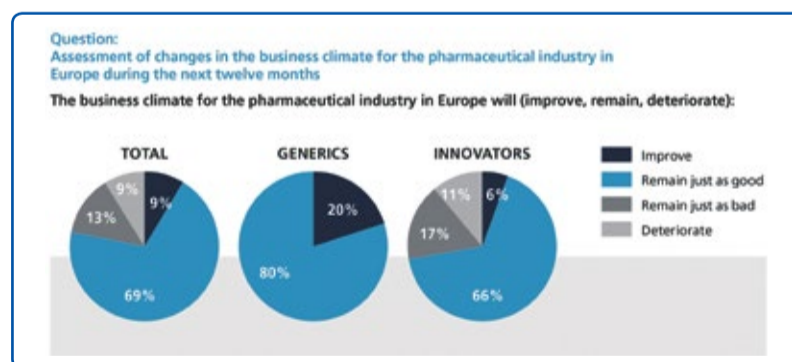
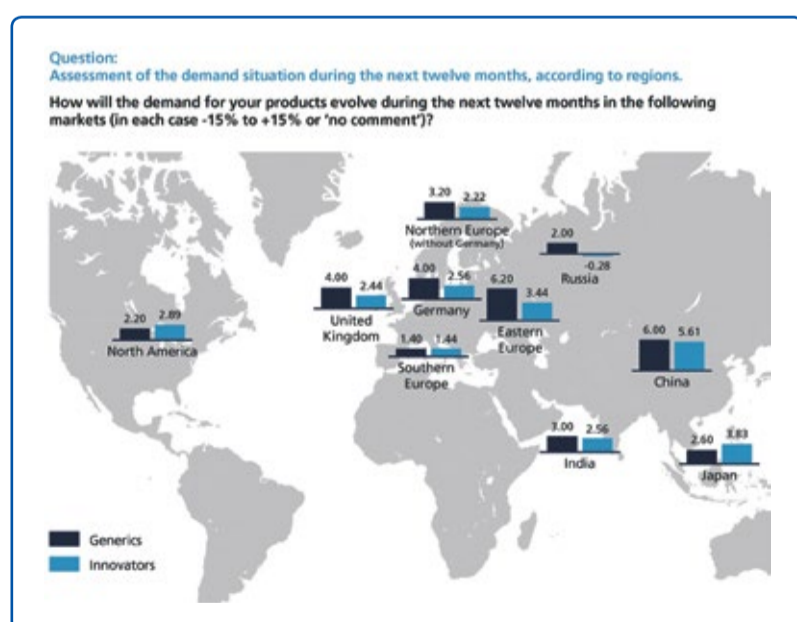
In accordance with the general sourcing trends, external support has become a matter of course with regard to logistics as well. For nearly all regions of the world, at least four in 10 respondents say that they have outsourced the biggest share (more than 75%) of their warehouse, transport and order-management services. When extending the scope to the year 2020, the respondents do not leave any doubt that the outsourcing trend in logistics will continue. As main drivers for this development, most respondents name the avoidance of investments into low value-added services in order

— which again indicates a possible move away from a strictly local setup to a more regional or even global logistics focus.

Dr. Josef Packowski, managing partner, and Andreas Gmür, partner and head of logistics practice, Camelot Management Consultants, Mannheim, Germany

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DuPont to Buy Microbiological Specialist Taxon Biosciences

DuPont has announced plans to buy California biotech company Taxon Biosciences, specialized in microbiomes for development of biological crop products.

Terms of the deal, set to close during the second quarter, were not disclosed.

Taxon's products for pest control and plant quality will help DuPont create new seed, leaf and soil products for row crops, fruits and vegetables, the US chemical giant said.

Frank DeGennaro, director of DuPont Biologicals, added that the "broad intellectual property holdings" of the company founded in 2000 will "complement and enhance

our in-house microbial discovery programs."

Testing of Taxon products is expected to begin this year, and DuPont expects the first products to be launched within five years.

DuPont's agrochemicals arm generated more than \$1 billion in annual sales of biologicals in 2014.

Many global agrochemical and seed market leaders, including DuPont's US rival Monsanto and Germany's Bayer, are also pursuing bolt-on acquisitions to broaden their biological products for plants. Experts forecast growth rates of 10-15% for this market segment, which currently counts around \$2 billion in annual sales. (dw) ■

Swedish drugmaker Recipharm has acquired \$2 million worth of preferred stock in Synthetics and has promised to buy an additional \$2 million of the stock, contingent on the US metal coordination chemistry specialist achieving certain milestones expected during 2016. In connection with the investment, Recipharm's Carl-Johan Spak, executive vice president, technology and development has joined Synthetics' board of directors.

Additionally, the two companies have signed a joint development agreement, giving Synthetics access to Recipharm's expertise in drug development, marketing and manufacturing in exchange for a royalty payment on certain compounds. ■

The pharmaceutical firms first began collaborating in 2013 with the signing of a joint marketing built around Synthomer's drug delivery technology for metal coordination of pharmaceutical APIs.

Synthetics CEO Ken Slepicka said his company is "delighted" to join Recipharm in helping advance promising molecules to market. He added that the agreement and financial support "will help us further advance several of our current projects to commercialization."

Spak said the transaction expands Recipharm's footprint in the US and builds on the existing joint marketing agreement with Synthetics. (dw) ■

Daiichi Sankyo Unloads Entire Stake in Sun Pharma

In a pre-negotiated share sale agreed a year ago, Japan's Daiichi Sankyo has unloaded its entire 8.9% stake in India's mammoth generics producer Sun Pharmaceutical Industries, raising 200 billion rupees (\$3.2 billion).

Indian media reported that Dilip Shanghvi, Sun Pharma's founder, was among the buyers of the Daiichi shares. The sale closes the final chapter of the Japanese drugmaker's 2008 acquisition of India's Ranbaxy, which was acquired in full by Sun in March of this year.

Observers of the deal said Daiichi Sankyo profited from the 80% increase in the value of its Sun shares since the Ranbaxy deal was

announced, allowing it to recoup almost all of the rupee-denominated original acquisition price.

In buying Ranbaxy, Daiichi Sankyo had hoped to cash in on the generics boom, but instead found itself having to write down \$3.7 billion half a year later when the extent of the US Food and Drug Administration's sanctions against the company for manufacturing irregularities became public.

Noting that Sun Pharma has a record of acquiring troubled drugmakers and returning them to profit, media reports quoted Shanghvi as saying the company's priority is to regain the trust of US regulators. (dw) ■

AbbVie and Puerto Rico Announce \$30 Million Expansion

AbbVie is expanding an existing site in Puerto Rico at a cost of \$30 million, adding to its capacity for biotechnology.

The proposed expansion will take place in AbbVie's site located in the northern municipality of Barceloneta, already home to two of the company's state-of-the-art facilities.

According to Stephen Muldoon, vice president of engineering and operations, the company is focused on "providing a significant impact on patients."

Puerto Rico Industrial Development Company (PRIDCO) is promoting the expansion with incentives for job creation and infrastructure.

"AbbVie's expansion in Barceloneta is very important for us, as this site is one of the world's most advanced biopharmaceutical facilities, contributing to our island's growing reputation as a biotech hub," said Puerto Rico governor Alejandro García Padilla.

The US drugmaker established its first manufacturing facility on the island in 1969. (dw) ■

Sartorius Stedim Biotech Buys BioOutsource

French biopharmaceutical industry contract supplier Sartorius Stedim Biotech (SSM) has acquired BioSource, a privately owned Glasgow, Scotland-based biotech firm for an undisclosed sum. The Scottish company, in the market since 2007, employs 85 people and has annual sales of about €9 million.

BioOutsource provides contract testing services to clients in the global biopharmaceutical sector to monitor safety and quality of biological drugs and vaccines and also offers services to the biosimilars industry, where its

assays are used in the early stages of drug comparison and comparability as well as for lot-release testing of modern therapeutics.

Aubagne-headquartered SSM said the acquisition will "help develop its service offering through the drug development pathway."

The French company with annual sales of €683.5 million has its own manufacturing and R&D sites in Europe, North America and Asia and a global network of sales offices. Its key manufacturing and research site is in Germany. (dw) ■

Moberg Buys OTC Brand Balmex From Sanofi

Sweden's Moberg Pharma has acquired US over-the-counter drugmaker Balmex from Chattem, the US consumer healthcare division of French pharmaceutical producer Sanofi, for \$3.9 million in cash.

The acquisition sum is roughly in line with the more than \$4 million annual sales of the OTC specialist, whose portfolio includes products used for diaper rash. The brand will be sold through Moberg's current OTC channel in the US, primarily in chain drugstores, as well as hypermarket chain Walmart and at specialty toy retailers.

"Adding Balmex to Moberg Pharma's US portfolio is a great fit, within our core area of topical dermatology," said Moberg CEO Peter Wolpert.

He said the company is "continuously evaluating opportunities to further leverage its US sales and marketing infrastructure," and this deal contributes immediately to sales and earnings as well as the long-term financial goal of delivering profitable growth and an EBITDA margin of 25% from 2016. (dw) ■

BASF Sues Umicore over Alleged Patent Breach

A US court has given Belgium's Umicore, one of the leading providers of cathode materials for batteries, until Apr. 17 to reply to allegations by BASF that the company breached patents for nickel-cobalt-manganese (NCM) cathode raw materials used in lithium-ion batteries for electric cars and portable electronic devices.

The German chemical giant, which filed suit in a federal court in Wilmington, Delaware, as well as with the Federal Trade Commission (FTC), licensed the patents from Chicago-based Argonne National

Laboratory in 2009. Argonne is participating in the suit.

Along with breaching its patents, BASF accuses Umicore of selling the battery technology to another firm. It also asserts that the company threatened to sue a customer considering a switch to the Ludwigshafen group as its supplier of battery components. BASF claims that Umicore's action has cost it billions of dollars in potential sales and deprived it of the ability to compete as a supplier for electric car platforms expected to launch in 2016 and 2017. (dw) ■

Evonik Inaugurates €1 Million Super Absorbers Center

German chemical producer Evonik has inaugurated a new €1 million application technology center for superabsorbent polymers in Krefeld, Germany.

Evonik said the enlarged laboratory strengthens its position as an innovative solutions provider for superabsorbent polymers, allowing implementation of the newest test methods, which will further strengthen product knowledge and target-oriented innovation efforts.

The new facility is equipped for the evaluation of superabsorbent polymers and hygiene articles, such

as the new EDANA mannequin test for incontinence articles.

For the first time, the company said, this test allows the application of realistic in-use conditions to the standardized lab evaluation. It is also open to customers for training and testing sessions.

"Our customers will directly benefit from an even further improved technical service," said Norbert Westerholt, head of Evonik's Baby Care Business Line. Evonik's superabsorbent polymers business employs more than 600 people worldwide. (dw) ■

A. Schulman Adds Masterbatch Capacity in Belgium

US plastics compounder and distributor A. Schulman has added a new PET compounding unit at its Bornem masterbatch plant in Belgium.

While not disclosing either investment cost or capacity figures, the company said the additional capability will "significantly increase" output and reinforce its position as a supplier of masterbatches for the European food sector.

In its first phase, the new line will be dedicated primarily to the production of additive concentrates and white PET masterbatch.

"This investment is indeed aligned with current megatrends and addresses the needs of the packaging market," said Heinrich Lingnau, vice president and general manager Europe, Middle East and Africa.

Schulman markets its PET products under the "PolyPet" brand name. In other news, the US company has launched a registered public offering of \$110 million aggregate liquidation preference of Cumulative Perpetual Convertible Special Stock, subject to market and other conditions. (dw) ■

SiVance Opens Lab for Silane and Silicone Technologies

Belgium's SiVance, a subsidiary of Milliken & Company, has opened a new research and development laboratory at its R&D and manufacturing campus in Gainesville, Florida.

SiVance said the new center, part of a planned series of investments targeting current and future customer needs in markets such as electronic semiconductors, contact lenses, coatings and light-emitting diodes (LEDs) will enhance its abil-

ity to quickly develop and scale new silane and silicone technologies.

The lab is also planned to speed process development for custom manufacturing of specialty silanes, silicones and other chemistries.

"This state-of-the-art facility is a major milestone in our continuous investment strategy for the business, which was initiated following Milliken's acquisition of SiVance in 2011," said SiVance vice president, Saikat Joardar. (dw) ■

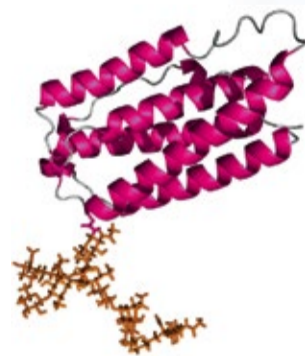
UCB to Sell Established Brands in India to Dr. Reddy's

Belgium's UCB has agreed to sell its established brands in India, including its franchises in the areas of allergies and respiratory disorders, to Dr. Reddy's Laboratories for the equivalent of about €118 million. About 350 members of staff will transfer from UCB to Dr. Reddy's.

Alok Sonig, senior vice president and India business head of Dr. Red-

dy's Laboratories, said the acquired portfolio would accelerate his company's presence in the high growth areas of dermatology, respiratory and pediatrics with market leading brands like Atarax, Nootropil, Zyrtec, Xyzal and Xyzal M.

Mark McDade, UCB's chief operating officer, said the sale will allow the company to focus on its neurology portfolio in India. (eb) ■



Interferon β -1a is a glycosylated 166 amino acid protein and an approved drug substance to treat multiple sclerosis.

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Reinventing Chemistry

Continued Page 1

This choice of direction has had several consequences:

1) It has ended (or constrained in scope and character) the unique and mutually beneficial intellectual partnership between industrial and academic chemistry that characterized the 1960s to 1980s.

2) It has increasingly limited the number of jobs for chemists in industry, and made a career in industrial chemistry less attractive for students choosing what to study.

3) It has limited the options for chemistry to explore new areas, since many of these areas require the kinds of resources and skills in large-scale project management that only industry can provide.

The narrowed focus of industry on maintaining profitability in commoditized product lines, in a business environment in which costs due to regulation (especially environmental regulation) and safety are increasing, has had another important effect. It has made the chemical industry seem relatively uninterested and uninvolved in research whose outcome might have social benefit rather than financial return. The disinterest in social return has placed the chemical industry increasingly in the position of appearing to be a necessary, valuable, but not necessarily attractive part of the industrial economy. That strategy may not be the best for it in the long term.

Although academic chemistry has migrated into new fields (biochemistry, materials science, and computational chemistry are examples), and academic departments have proliferated, the historical core disciplines have drifted more toward "iteration" and "improvement" and away from "discovery."

Nothing Goes on Forever

The depletion of the vein of new ideas and commercial opportunities that marked the end of the postwar period was inevitable: nothing goes on forever. And the issue is certainly not that society has run out of problems for chemistry to solve. In fact, I would argue the opposite: that chemistry may now be the most important of the sciences in its potential to impact society. The science and technology that developed in this period will continue as the foundation of whatever the field becomes, but the most urgent opportunities now lie in new directions.

These new opportunities are, however, much broader in scope and greater in complexity than the simpler, previous problems, and require new structures and methods. To deal efficiently with these prob-



One of the new constructions of humankind is the "megacity". An example of such a metropolitan area with a total population of ten million people or more is Chongqing in China. Managing these ensembles requires both knowledge and technology to solve problems at every level, among which are: mass transport of people, water, food, construction materials, power, heat, pollution, and waste; control of disease; management of education, self-governance, rumor, unrest, and crime. Based on its experience with modeling large numbers of interacting molecules and particles, chemistry may have more to offer to the science of sociology and related areas concerned with large numbers of interacting people than one might expect.

lems, academic chemistry will need to integrate "solving problems" and "generating understanding" better. Industry must either augment its commodity- and service-based model to re-engage with invention,

service business model leaves it unarguably essential, but not exciting. Does this mean the field is over?

No. It is not over. In fact, a look at the problems facing society, and the requirement for the skills of chem-

Table 1 contains examples of challenges. Some are obvious. Some are "inevitable," in the sense that it is certain that the problem is real and will be addressed somehow. (The only question is "How?") Some come simply by assuming that common wisdom is wrong. Some are purely my personal opinion and their connections with "chemistry", as it currently defines itself, may, for some, not be immediately obvious.

Setting Priorities for the Future

For the foreseeable future, many of the most important problems for society (and perhaps for government) will require chemistry, although not necessarily the kind of chemistry now popular in the research universities. Stabilizing the environment, managing energy, providing affordable healthcare, generating jobs, protecting societies in unsettled times: all are extraordinary challenges,

opportunities (and obligations), but they are also evanescent: if chemistry does not accept them, other fields will. For large chemical companies, short-term financial return will continue to dominate strategy. Will it be possible to combine the academic enthusiasm for obligation-free funding, government's need to solve problems, and industry's focus on profitability?

Change Leaders

If chemistry needs to change—from the style developed in the period post-WW II to that needed to solve very different types of problems—who should lead the change?

Universities should, ideally, lead in changing the structure of chemistry, not because they are more competent than industry or government, but because they are less constrained, and because one of their jobs is education, and education is the future. Many useful types of change would

Research in the chemical industry is now often considered as an expense, rather than an investment.

or face the prospect of settling into a corner of an industrial society that is comfortable, but largely irrelevant to the flows of technology that change the world.

In the new era, both academic and industrial chemistry (ideally with cooperation from government) would benefit from abandoning distinctions between science and engineering, between curiosity-driven understanding and solving hard problems, and between chemistry and other fields, from materials science to sociology.

What's Next?

Coming out of this extraordinary era of the 50s to the 80s, chemistry has a certain intellectual and organizational style. The perception—by society, and probably by most chemists—is that chemistry is less exciting than biomedicine, brain science, "social engineering", studies of climate change, astronomy, and a number of other fields. The increasing evolution of the chemical industry toward a commodity-and-

istry that can be applied to the solutions of these problems, indicates exactly the opposite. But the structures that served so well in the past will not do equally well in the future.

One change is that some of the chemical "opportunities" are now urgent necessities. Academic scientists are uneasy when faced with "time-lines" and "deliverables." Some of the problems facing society (for example, climate change, management of energy production and use, lowering costs of healthcare and distributing its benefits) must, in fact, be attacked immediately, and finding approaches to their solution is urgent.

Other, seemingly less urgent, enigmas (for example, understanding the molecular basis of life) will be entirely based on curiosity. While there are many problems to which chemistry is the discipline offering the most plausible expertise, how will the participants (research universities, industry, government, and interestingly, in the future, foundations) set priorities? Who will do what, in what order? How long will it take?

Chemistry, Public Understanding, and a Sense of Style

If someone asks: "what does chemistry do?" "better glue" is not an arresting answer. Let me sketch a conversation I have had on various occasions—in one form or another. The person next to me says, "What do you do?" I answer "I'm a chemist." S/he responds: "Chemistry was the one course in high school I flunked. What is it that chemists do, anyway?" I have tried two types of answers.

One is: "Well, we make drugs. Like statins. They are inhibitors of a protein called HMG-CoA reductase, and they help to control cholesterol biosynthesis and limit cardiovascular disease." (This answer usually ends the conversation.)

The second is: "We change the way you live and die." The second answer works better.

Emerald Kalama Wins First OK for Dutch Benzoic Acid Unit

Emerald Kalama Chemical has received preliminary approval to build a second benzoic acid purification and finishing process at its facility at Rotterdam, the Netherlands. A building permit is expected later this year, and the expanded output of 100,000 t/y is expected to be in the market by in Q4 2016. The project is the US company's seventh multi-million-dollar investment in the past several years at the Dutch site acquired from DSM Composite Resins in 2010, the company said.

The added purification and finishing capacity will support growing demand for the company's high purity Kalama and Purox brands of benzoic acid flakes, sodium benzoate granules and liquid benzoic acid, which it provides to the market and utilizes for the production of downstream products, notably K-FLEX non-phthalate plasticizers and coalescents. (dw)

Japanese plastics and fibers group Kuraray is expanding into bio-based barrier materials with the acquisition of Australia-based Plantic, one of the leading global producers of bio-based barrier film used in food packaging.

Plantic, founded in 2001, produces bio-based barrier materials using a patented polymer technology based on high-amylose starch. The acquisition of the Australian company will enable Kuraray to provide barrier materials which meet the in-

Kuraray Expands into Bio-based Barrier Materials

creasing global demand of bio-based food packaging materials, it said.

Kuraray said its global sales network will help develop Plantic's bio-based barrier business in Europe, US and Asia, where demands in terms of improved freshness, reduced food loss and waste can be met with the use of the environmentally friendly material.

By developing new markets, the Japanese group said it expects to achieve revenue of 10 billion yen (€78 million). (dw)

Invista Brings Terrin Polyols to Europe

Invista is now producing Terrin polyols at its plant in Vlissingen, the Netherlands, as well as in the US. The site produced its first commercial volumes in late 2014, as well as completing its registration under EU REACH legislation. Invista also produces aliphatic Terrin and aromatic Terate polyols in Wilmington, North Carolina, US.

"By expanding production of the Terrin family of polyols into Europe and utilizing an existing Invista manufacturing facility, we are able

to be (in principle) easily accomplished: combining different departments (chemistry, biochemistry, chemical engineering, materials science), broadening education, and changing the criteria for tenure to give credit for collaborative research are among them. Others may be more difficult. For example, there is growing agreement (at least in the US), that graduate research groups in many areas of science (including chemistry) need some form of restructuring.

The big chemical companies are essential to the production of chemical products and hydrocarbon fuels that require handling large amounts of materials, energy, and capital. They have settled into a strategy of technically sophisticated improvements to existing processes and products. Industries that do not change when technology shifts dramatically sometimes disappear—companies that produced steam engines, film for silver halide photography, and adding machines are examples—but Society will continue to need sulfuric acid, concrete, and polyethylene film.

The largest chemical companies will not disappear, but a future producing commodities at declining margins is not exciting. More importantly, these enormous, technically sophisticated companies have unique skills in managing technically demanding and dangerous processes on very large scales, in controlling flows of heat and materials, and managing capital: it would be a great loss if those skills were not applied to managing water resources, atmospheres, and megacities. Society (and their own stockholders) would be much better for it if they were to choose to explore avenues for growth, rather than to settle into a retirement that is irrelevant to channeling the streams of technology that will shape the future world.

Conclusion

In short, chemistry must expand its mission from "molecules," to "everything that involves molecules." For academic chemistry, this expansion will provide fresh intellectual and practical challenges, and fulfill its ethical obligations to the taxpayers who pay the bills. For industrial chemistry, the expansion of scope would open the door to new commercial opportunities, and to future growth. For government and for Society, it would build some of the capability needed to solve problems that currently seem insoluble.

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This article is based on an essay Prof. Whitesides published in Wiley's journal *Angewandte Chemie International Edition*, Vol. 54, 2015. The complete essay and references are available on Wiley Online Library via the following link: <http://onlinelibrary.wiley.com/doi/10.1002/anie.201410884/abstract>.

Chengdu Rongsheng Pharmaceutical Goes Digital with MES

The Rongsheng pharmaceutical production plant at Chengdu in China's Sichuan province has entered into the digital age. The contract signed in June 2011 between Chengdu Rongsheng Pharmaceutical Co. and Siemens has been successfully completed. It covered the different phases of implementing a Manufacturing Execution System (MES) at the Rongsheng Chengdu plant.

Compliance with FDA Requirements

After the implementation and successful go-live of phase I in December 2012, and of phase II in September 2013, the MES system was used in parallel with the paper-based flows and systems, in compliance with FDA requirements for GMP (Good Manufacturing Practices), until August 14. Starting in August

2014, the MES now ensures exclusively electronic operations and FDA 21 CFR Part 11 compliant workflows with electronic records and electronic signatures.

The project covers the entire blood products factory of Rongsheng, including production planning, equipment status management, process monitoring and manufacturing declaration of finished goods to the warehouse. It meets GMP regulations in terms of production procedure standardization and lean manufacturing management. It also supports strict control requirements of effective production procedure in compliance with GMP specifications. Over 50 work orders and 1,000 tasks are carried out on a daily basis.

Implementation of Siemens Industry Software

In order to ensure smooth implementation, the project was split up

into two stages. The implementation includes completely integrating the data at the PCS layer with the ERP layer, as well as real-time communication. The result is a three-layer structure of automation, MES and ERP, the foundation of the digital factory.

The project strictly follows GMP requirements. Implementation and validation of the entire project are completed in compliance with GAMP5 guidelines through a collaboration between different Rongsheng teams (QA, manufacturing, IT) and the Siemens Industry Software organization in China and France. All aspects and steps of the implementation from the Unique Requirement Specification, Functional Specification, Design Specification, to Factory Acceptance Test, Site Acceptance Test to Installation Qualification and Operational Qualification, were meticulously carried out, carefully following validation guidelines.

Improving GMP Production Quality

For the purpose of patient safety, pharmaceutical quality assurance, and data integrity, the project encompasses real-time electronic batch records, electronic signature, batch design, execution and review by exception, full audit trail and genealogy. It ensures that there is no cross-contamination between batches. Further, it ensures that only equipment that meets the requirements in terms of sterilization or cleaning and calibration is used. The MES system controls the release of production quality parameters. It also releases production schedules and plans, and controls the expiry date, accuracy and genealogy of materials. It significantly decreases risks due to manual operations in the production process and improves production compliance through strict process control, the use of electronic instructions and bar code technology.

Ashland Invests in Specialty Chemicals Expansion

Ashland Specialty Ingredients is investing about \$89 million over the next three years to increase production of specialty chemicals at its facility in Hopewell, Virginia, US. The majority of the investment will be spent on raising production of two key product lines - Natrosol hydroxyethylcellulose (HEC), used as a thickener in latex paints, and Klucel hydroxypropylcellulose (HPC), used to enable time-release delivery in pharmaceutical tablet

binders and coatings, among others.

Capacity for Natrosol will be expanded by 4,700 t/y, or 40%, and that for Klucel by about 50%. Work is expected to start in mid-2015. As a result of the expansion, Ashland expects to add around 17 new jobs to the plant's current total of 237. The state of Virginia will support the investment with a \$700,000 grant as well as other benefits and services. (eb)

Roquette Commissions Isosorbide Plant

French family-owned group Roquette has started up a second production plant for its plant-based material, isosorbide. Roquette said the facility in Lestrem, Pas-de-Calais, is the world's largest isosorbide production unit with a capacity of 20,000 t/y.

The new plant uses the group's patented process based on sorbitol that can produce isosorbide grades

with a purity of above 99.5%. Roquette's isosorbide is sold under the brand name Polysorb and is used in performance plastics such as polyester, polycarbonate, and polyurethane, and curable resins. It can also substitute for bisphenol A in polycarbonate, and standard plasticisers such as the phthalates used in PVC. (eb)

Bayer CropScience to Invest at Evonik's Alabama Site

Bayer CropScience plans to locate a plant that would supply production of its Liberty brand glufosinate-ammonium herbicide at Evonik's US site in Mobile, Alabama.

Troy Wayman, vice president of economic development for the Mobile chamber of commerce, told an Alabama business promotion website the Bayer group company will spend \$120 million on the project, which will go on stream before the end of 2015 and benefit from local investment incentives. Initially, Wayman said, the Monheim, Germany-based agrochemicals producer had intended to build an integrated facility worth just under \$400 million, which would have produced its own starting material. However, as the expected investment cost ballooned to \$500 million, Bayer decided to co-locate.

Evonik, one of Alabama's largest foreign investors, will supply starting materials for the herbicide. Actual production of the finished crop protection agent will take place at other Bayer plants.

Wayman said co-location arrangements linking international chemical producers are becoming more common. In 2013 the development board approved a tax abatement for BASF Corporation, US subsidiary of the Ludwigshafen, Germany, chemical giant to co-locate an \$84.3 million facility at Evonik's Mobile site.

In August 2014, Evonik announced plans to invest \$113 million at Mobile to create a chemical park that would attract co-location projects. The expansion is expected to be completed in mid-2017. (dw)

New Reactor Ups Arkema's Brazilian Coating Resin Output

Arkema's Coating Resins business has expanded its acrylic resin manufacturing capacity at Araçariçama, Brazil, by 60% through the installation of a new reactor. With the start-up, the French chemical producer said it has "improved virtually every aspect" of its latex production in Brazil, including manufacturing, logistics and shipping, storage, filtration and the capabilities of the reactor itself, which will enable manufacturing of new product chemistries in the region.

"These improvements will enable us to begin migrating production capabilities and product lines currently available in other parts of the world to the facility in Brazil," said Eric Schmitt, president of Arkema Quimica Ltda. Brazil.

Products manufactured at the plant will now include a "much wider

range of chemistries," including 100% acrylic, styrene acrylic, vinyl acrylic, the company's vinyl VeoVa and polyvinyl acetate (PVA), Schmitt said.

As production ramps up, Arkema said it will begin introducing new products based on demand and market potential. Products initially added will include a high scrubbing styrene acrylic resin for use in architectural coatings; a 100% acrylic ideally suited for fast-dry traffic paints; a styrene acrylic latex for use in mortars and grouts, tile adhesives and waterproofing membranes, as well as cement-based skim coats, gap fillers and in decorative concrete applications; and a high solids acrylic pressure sensitive adhesive for label applications. (dw)

Huntsman Increases Specialty Amine Capacity

US chemical producer Huntsman has announced plans to expand capacity for specialty amines at its sites in Petfurdo, Hungary, and Conroe, Texas, US, by 2016. Financial investment and capacity were not disclosed.

The company said its new multi-purpose unit at Petfurdo will add to its manufacturing portfolio, further leverage its integrated amines capability and increase existing specialty amine production capacity at the Hungarian facility by 20%.

At the Texas plant, Huntsman will add equivalent capacity and improve the flexibility of its specialty amine unit.

Over the past several years Huntsman, which claims to be the world's leading manufacturer of specialty amines, said it "has seen interest in many specialty amine product lines accelerate from users in the polyurethane foams, coatings, lubricants and detergents across the globe."

Stu Monteith, president of Huntsman's Performance Products division, said the capacity expansion leverages the company's strong manufacturing and technology base and enhances what he said is already the widest in-house manufacturing capability across the industry. (dw)

Ineos' Ratcliffe Suing Former Partner MacLean

A feud between Ineos chairman Jim Ratcliffe and former business partner Calum MacLean has taken a dramatic turn, with Ratcliffe now suing his Ineos co-founder and former righthand man who rose to prominence by micromanaging the industrial dispute at the Grangemouth, Scotland, refinery and chemical complex.

According to the London business newspaper City A.M., which broke the story, the multi-million pound lawsuit centers around MacLean's 2014 resignation as chief executive of Ineos Olefins and Polymers Europe to take the same job at Synthomer, formerly Yule Catto. The newspaper said MacLean, who was "raided" by the UK-based chemical company, subsequently lured away Ineos' finance executive Steve Bennett to become Synthomer's chief financial officer.

Ratcliffe is said to be seeking to cancel MacLean's severance package worth "tens of millions of pounds," as he believes the "poaching" of an Ineos executive violates the terms of the sign-off. Although most of the money is believed to have been already paid out, City said the Ineos chairman wants to withhold "the remaining millions."

In the meantime, Ratcliffe has confirmed having written to Synthomer - saying that hiring Bennett reflects "very badly" on the reputation of a company whose code of business asserts that the trust and confidence of suppliers and customers is one of its most important resources.

After receiving a reply, the Swiss-based entrepreneur is said to be "considering" his position - Ineos and Synthomer companies are entwined in several trading agreements. (dw)

Socar Licenses Innovene Process for Azerbaijan PE Plant

Ineos Technologies has licensed its Innovene S process for high density polyethylene to Socar Polymer, part of the State Oil Company of Azerbaijan for a 200,000 t/y HDPE plant it is building at Sumgayit, Azerbaijan.

The facility, scheduled to go on stream in 2016 in the Chemical Technology Park in Sumgayit will produce a wide range of HDPE grades to supply growing demand for high performance products. (dw)

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BCG's Total Shareholder Return (TSR) Analysis Reveals Best Performing Chemical Companies

For the second consecutive year, the Boston Consulting Group has conducted a total shareholder return (TSR) analysis of the chemical industry.

The top 10 chemical companies have excellent returns — fourth best, in fact, among the 25 industries BCG analyzed. There have been big shifts in the composition of the top-performer list compared with the year before. US and European chemical companies have come roaring back, displacing the emerging-market chemical producers that were getting the best TSRs only a few years ago.



Yves-Pierre Willers,
Boston Consulting Group



Andreas Gocke,
Boston Consulting Group

Until recently, the TSR differences among regions and subsectors followed a predictable pattern: Emerging-market chemical companies had the highest returns of all regions, and agrochemicals and fertilizers had the highest returns of all sectors. But that changed during the most recent five-year period. Although some emerging-market companies with five-year TSRs still approach or exceed 30%, there are also quite a few emerging-market companies whose five-year TSRs are negative. As a result, the average five-year TSR of emerging-market chemical companies is a dismal -2%; only Japan's average (-8%) is worse.

Strength In Maturity

The average five-year TSRs of European and North American chemical companies are much higher: 7% and 4%, respectively. Emerging-market chemical companies tend to focus on the base-chemical and basic-plastic sub-segments, leaving them vulnerable when demand cools off in those sectors. We expect all of these factors to change in the next decade, and for Asia-Pacific and Latin American players to emerge as much stronger competitors. But for now, the less mature structures and business models of chemical companies in these regions have put them at a disadvantage.

In contrast, conditions are becoming more favorable for North American chemical companies, particularly with the rise of shale gas as a resource. Shale gas, which serves as a ready form of low-cost feedstock, stands to make the entire North American chemical industry more competitive. To date, most of the shale gas benefit has been captured by petrochemical divisions of integrated oil companies that are not included in this survey, but the benefit eventually will extend to many of the more than two dozen North American companies on our list.

Europe is the region in which chemical TSRs have remained strongest. This may be because of the abundance of multispecialty companies there. At one time, companies in this subsector were among the worst performers of the chemical industry. But since 2012, the average TSR of multispecialty chemical producers has improved dramatically.

TSR-Improving Measures

Investors seem to be focusing on three developments with potentially favorable implications. One is the portfolio restructuring happening at companies such as Arkema, which divested its vinyl-product business, and Rockwood, which divested its titanium-dioxide business. These divestitures are indications that the

European companies are disciplined about shedding businesses that have yielded disappointing profits. Another is the trend toward teaming up in a multispecialty: the Rhodia-Solvay and Clariant-Süd-Chemie mergers have fueled expectations of further consolidation. The third development is the likelihood of outbound M&A: for example, Chinese investors have made moves to acquire stakes in foreign multispecialty companies or acquire them outright.

Looking more closely, we see that eight of the top 10 companies are based in developed economies, and only two have headquarters in Latin America. The top companies achieved their superior TSRs in one of four ways: through aggressive revenue growth (for example, Synthos, Mexichem and LG Chem); through feedstock-based margin expansion (Westlake and SQM); through pricing-based margin expansion (Croda); and through valuation multiple improvements resulting from improved macroeconomics (Sherwin-Williams, Eastman and W.R. Grace).

Strategic Control

A different analytic approach—viewing the top companies through three different time periods—suggests that there are two strategic points of control that chemical companies use. Either of these two strategies can give chemical companies market values that vastly exceed the replacement value of their physical assets—the clearest indication of the power of a company's business model.

The first, more common point of control is advantaged access to scarce physical assets. For instance, mining assets have been a powerful source of advantage not only in the potash industry but also in businesses as diverse as sulfur derivatives, fluorine chemistry, tungsten carbide, lithium derivatives and bromine-based flame retardants. In BCG's lists of top performers, Potash, K+S, Mexichem, Israel Chemicals and SQM have all benefited from their advantaged access to scarce resources. Other asset-based strategic points of control include standard setting (Victrex getting its specialized PEEK polymer defined as a certification requirement for some aerospace and medical applications), brands (the position Sherwin-Williams has carved out for itself in the US paint industry), easement (SABIC's access to low-cost feedstock), and scale (BASF's longtime leveraging of its Verbund structures).

The second point of strategic control is having a superior business system. An example is Ecolab's 'Circle the Customer—Circle the Globe' strategy. The company's new products and services are based



primarily on its understanding of its customers and only secondarily on its roots of selling cleansers and other hygiene chemicals to institutions such as hotels. Other powerful business systems give companies control of intellectual property (for example, Victrex), or allow them to do more innovative application development (Croda).

How the Top Performers Created Value

Chemical companies can improve their performance in a number of ways: They can use technology, switch to a new kind of feedstock, go after a new customer segment or enter a new region, or make a business model change. Eventually, all of these show up in operational metrics—specifically, in the seven measures we believe are the most closely tied to TSR:

- revenue growth;
- margin;
- innovation and R&D;
- selling, general, and administrative expenses (SG&A);
- fixed-asset productivity;
- working-capital productivity;
- portfolio management

Revenue Growth: As with companies in other industries, there is usually a positive correlation between revenue growth and chemical company TSR. However, the correlation has been less pronounced over the past 20 years, and in some cases, other factors appear to outweigh revenue growth in determining TSR.

Indeed, a few chemical companies have achieved TSRs in excess of 10% while generating almost no growth. The companies that have done this tend to be either highly disciplined about margin management or creative about generating profits from noncritical business units.

Some companies have had low TSRs despite rapid revenue growth. Most of these have benefited from some sort of commodity price inflation, and their poor TSR performance suggests that investors are hesitant to reward companies whose revenue gains may be attributable to external trends.

Margin: The big change with respect to chemical company margins has been the improvement in Europe. European companies have be-

come much more profitable, closing what was once a big gap with their US counterparts. Portfolio transformations, the divestiture of subcritical businesses, and the shift away from the commodity business to more advanced chemical segments have all contributed to European companies' improving margins. These companies have also focused on productivity in a variety of ways, including consolidating country structures into regional structures, setting up shared services for administrative functions, unwinding complexity in the reporting matrix, and removing layers from their organizations.

In contrast, Japanese companies have continued to struggle to improve and now have the bottom of the profitability rankings to themselves.

Within the sectors, the big profit accelerator has been the world's rising need for food from the agricultural sector. Agrochemicals and fertilizers have benefited from the huge demand and from the resulting price increases. The loss of arable land combined with an increased need for agricultural output has boosted demand for productivity-enhancing chemicals. The dynamics of the food commodity boom have also benefited precursor businesses that supply active ingredients, aromatic feedstock, mining chemicals and formulation aids for fertilizer and agrochemical companies.

All other sectors have undergone some margin erosion, with base-chemical and basic-plastic companies faring the worst. These companies have had to absorb oil price increases since the Iraq war in 2002, and they lack the value-added products that would allow them to recover their increased costs.

Innovation and R&D: Theoretically, innovation is important for high-margin businesses. But as the data shows, there is not necessarily a positive correlation between R&D expenditures and TSR in the chemical industry. In fact, only one of the companies in our sample with R&D expenditures exceeding 4% of revenues achieved an above-average TSR, and that result is distorted by the fact that the company has a sizable pharmaceutical business. Indeed, many emerging-market companies with high TSRs devote

remarkably little to R&D: less than 1% of revenues.

What explains the absence of a correlation between large R&D programs and the success of a chemical company? To some extent, companies' thinking about R&D may be outmoded. Many chemical companies, including some scientific blue chips that are still magnets for the world's best chemical talent, emphasize chemical breakthroughs. This is true of many Japanese chemical companies, as well as some European and US ones. Companies in these regions all make relatively large R&D investments.

Yet it is legitimate to ask how many breakthroughs can be expected from the world's chemical labs. In most chemical segments, it is probably less important to find the next breakthrough innovation than to be creative about applying and adapting compounds that already exist.

This is not to say that R&D has lost its value — far from it. But the evidence suggests that companies should revisit the goals of their R&D programs and manage their R&D expenditures more rigorously, shifting their R&D efforts toward finding solutions and innovations for specific customers and customer segments.

Selling, General and Administrative Expenses: SG&A costs diverge widely within chemical segments, but in the past 20 years the trend in all regions and sectors has been the same: downward.

On average and across all regions, SG&A spending has come down in the past 20 years — from almost 20% to 15%. A lot of this improvement has resulted from the effective use of technology to improve productivity. This is particularly true of European chemical companies since 2000. Heavy investments in ERP and CRM—undertaken to minimize IT-related problems when fears about the Y2K bug were at their height—have allowed companies to improve the efficiency of their accounting, sales, back-office and supply-chain functions. Today, European companies have SG&A levels comparable to those of US and Japanese companies.

Companies that operate internationally can reduce SG&A costs by not maintaining the same infrastructure in every region. US com-

panies have been particularly smart in their approach to apportioning overhead, putting highly skilled managers in emerging markets that can't reasonably be expected to run on autopilot while eliminating administrative layers in more mature markets. European companies have not followed this tactic nearly as faithfully, and as a result, some of them still have layers of management that are more complex—and costly—than necessary. To the extent that they can let go of their insistence on organizational consistency, European companies may be able to get a few more percentage points of cost out of their SG&A functions.

Fixed-Asset Productivity: The chemical industry is, in general, capital-intensive, and diversified chemical companies in particular face a big challenge in allocating capital. Chemical companies have a tendency to overinvest in the activities that led to success in the past and to underinvest in activities that might be important in the future. Indeed, executives need to watch for this, as one of the ongoing impediments to value creation in the industry.

Nevertheless, in the past 20 years, the chemical industry has made strides in its overall fixed-asset productivity. Until 2000, average annual capital expenditures exceeded 10% and sometimes topped 20% in the area of base chemicals and basic plastics. In recent years, capital spending has been much more restrained. This is partly because of the thresholds that most non-Asian companies—reluctant to saddle themselves with excess capacity—have put on large-scale investments, and partly because of the move away from the 1990s mentality of investing one's way out of bad results; nowadays, the mindset is more that operations and business units must earn the right to invest. The big exception to the rule of caution in capital spending seems to be China, which is creating overcapacity in many areas relating to base chemicals as part of a move to outmaneuver Western chemical providers.

In most other areas, fixed-asset productivity has been converging,

Continues Page 9

Value Creators

Continued Page 8

not diverging. Twenty years ago, European companies' ratio of revenues per dollar of capital invested was twice that of emerging-market companies. Now, most regions' ratios are clustered around 1.5:1. In North America, however, the ratio is closer to 1:1. The good news for North American companies is that the shift reflects huge investments in shale gas, which is likely to boost the region's financial performance for years to come.

Working-Capital Productivity: Working-capital management varies widely among chemical companies. Because inventory levels are a critical part of working capital, companies that have a flexible supply chain—and therefore don't have to carry as much inventory—tend to have better working-capital ratios. Many factors determine why one company has a good supply chain while another company's is inadequate, but one significant factor is the interface between sales and manufacturing. In companies with a good sales-manufacturing relationship, the supply chain is typically better, and the working capital-to-revenue ratio is usually lower than in other companies.

The other two components of working capital are receivables and payables. European companies appear to have benefited from unification and from the move to a single currency, which have made

payment more efficient in the core European Union market. There has been no equivalent to economic unification in emerging markets or in Japan, which may explain their relatively high levels of working capital. Whatever accounts for it, working capital is a third area (after profitability and SG&A spending) in which European companies have made big strides in the past 20 years and are now virtually on par with their North American peers.

Portfolio Management: The available data does not allow for a 20-year analysis of M&A activity. Still, the 10-year data reveals a striking pattern: From 2003 through 2012, US and European companies conducted a number of transactions, but US companies concentrated mostly on acquisitions, while European companies focused more on divestitures. This difference almost certainly stems from the European industry's greater diffusion. European companies had more ill-fitting parts to shed. In emerging markets and in Japan, M&A activity of any sort has generally been more sporadic.

Although the data about US and European company M&A activity is necessarily focused on the past, we think it offers a forward-looking implication: US companies have greater skill in the risky business of adding new businesses. US chemical executives are continually scouring the landscape for companies to buy; they may be said to have an always-on approach to M&A. If, as we believe, this always-on M&A capability will be a major source of future value creation, European chemical companies, as well as those in other regions, may be at a disadvantage compared to US companies.

Best performing chemical companies

Company	Country	TSR (%)*
1. Hexpol	Sweden	101.3
2. W.R. Grace	US	75.3
3. Synthos	Poland	73.4
4. PolyOne	US	63.3
5. Ashland	US	58.1
6. Huntsman	US	54.0
7. Westlake Chemical	US	52.5
8. Arkema	France	50.7
8. Rockwood	US	47.6
9. Eastman Chemical	US	42.3

* Average annual TSR 2009-2013

More industry rankings are included in BCG's 2014 Value Creators Report.

www.bcgperspectives.com

M&A: Opportunity and Risk Ahead

Higher prices that chemical companies have been able to charge and more rigorous expense controls have left many companies with excess cash. As a result, these companies may be on the prowl for acquisitions—or looking for other ways to grow inorganically, by, for example, taking minority stakes in joint ventures.

Japanese companies provide perhaps the clearest example of a group that should be taking advantage of their financial flexibility. For senior executives at Japanese companies, the challenge will be to enter the world of outbound M&A and divestitures—a world from which they have been largely absent.

But the Japanese aren't alone in facing risks in an era of accelerating M&A. Many agrochemical and fertilizer companies face risks and will have a harder time than, say, multispecialty companies in finding adjacencies that make sense for

them. A multispecialty company that is in one type of plastics could move into another type or into hybrid materials. These companies have product boundaries that are, in a sense, permeable. Fertilizer companies typically don't.

One of the implications of this is that the quality of a company's M&A function—already important—is going to become critical in the next few years. It is inevitable that many chemical companies will acquire their way into sectors in which they don't currently have expertise. Knowing how to make these moves successfully is one capability that is going to separate the value creation leaders from the laggards.

Who Will Create Value in the Future?

It doesn't take a deep knowledge of the chemical industry to see that it has changed over the past decade. Many companies that were around 10 years ago—including some with storied histories—are now gone. Nor

does it take great predictive powers to see that 10 years from now, a similar set of dynamics will have played out and some companies that are around today will have been acquired and absorbed by others.

The coming period of consolidation will present many opportunities and risks—especially in an environment of higher multiples. The survivors will be those that demonstrate speed, flexibility, and strategic focus.

In terms of speed, the chemical industry is undergoing huge changes—in terms of demand and supply and regional power shifts. On the demand side, formerly hot growth areas—notably renewable energy in Europe, defense programs in the US, and e-mobility everywhere—have cooled. But there are numerous up-and-coming growth applications that are taking the place of those demand drivers, including 3D printing and wearable electronics. On the supply side, there's the influence of shale gas in North America and of coal-to-olefins in China. Chinese companies are by far the biggest new regional force; their push into high-value chemical sectors is likely to create challenges for many Western companies and jeopardize the profits of those that are currently operating in Asia.

To thrive in this environment of change, chemical companies are going to need to quickly adjust their resource allocations and be creative about seeding new businesses through their venture-capital arms, investing in joint ventures, and rethinking their supply chains and business models. It won't be enough to understand the tactical options; the winners will be those that anticipate where the market is going and get there the fastest.

Regarding flexibility, companies often hesitate and display a kind of "collective myopia" when change looms on the economic and social horizon.

Perhaps it's not all that helpful to say that companies need to be smarter than their peers in anticipating the second-order effect of trends in feedstock, technology and customer demand. The more actionable advice might be that companies need to improve the quality of their corporate planning and foresight functions.

When it comes to strategic focus, too many chemical companies are in the habit of letting operational matters become preoccupations of the corporate board. There is no mystery about why this is the case: chemical companies are complex, and internal departmental issues often require resolution. But a plethora of operational topics in the top-management suite keeps many companies from focusing on more strategic issues. Leaders have to find ways to minimize their operational involvement, preferably by pushing their direct reports and operational entities to act effectively at the interfaces and to resolve cross-unit conflicts with minimal escalation.

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Infobox:

A comprehensive version of this article can be found on www.chemanager.com/en/tags/bcg

US Companies Point to Increased Federal Regulations as Barrier to Growth

Specialty chemical manufacturers have identified federal regulations as a barrier to growth in a recent industrywide Business Outlook Survey conducted by the Society of Chemical Manufacturers and Affiliates (SOCMA) in partnership with UBM.

According to the survey, more than half of those who responded say federal and state regulations were a significant barrier to growth last year and will continue to be a barrier in 2015. Responses also indicate these companies expect to spend more money on regulatory compliance this year than last year, and a quarter of respondents say they would need an improved regulatory environment before deciding to expand their manufacturing business.

"The survey results underscore the need for federal lawmakers to work harder for specialty chemical manufacturers," said Lawrence D. Sloan, SOCMA President and CEO. "Onerous and inefficient regulations deprive our members of significant growth opportunities."

When asked to select the biggest risks to supply chain stability, companies repeatedly chose "regulatory pressures" among the top three responses. This option ranked second only to "global competition." Rounding out the top three risks was "availability of suppliers."

"There is a place for—and often a need for—effective, efficient regulations that help protect the environment, instill public confidence in our industry and protect workplace and consumer safety," said Sloan. "Unfortunately, there are regulations on the books now that ultimately impose significant burdens and costs that impact companies of all sizes. The majority of SOCMA members are small and medium-sized businesses, which often feel a disproportionate impact of these regulations. We need smarter regulations that will achieve their intended goals without compromising industry's ability to innovate and compete in the global marketplace."

Overall, the Business Outlook Survey found that specialty chemical manufacturers are demonstrating increased confidence in their marketplace, indicating plans for new product growth and capital investments in 2015. Concerns surrounding regulations suggest that if these regulatory barriers were addressed, companies would be able to allocate further resources to innovation and growing their businesses.

It is also clear from this survey that specialty chemical manufacturers play a key role in the global economy. This in turn demands a keen understanding of often complex foreign regulations that will help the industry reach the 95% of consumers who reside outside the US. SOCMA understands the increasing importance of access to new markets, and is a staunch supporter of free trade agreements that will enable its member companies and other specialty chemical manufacturers to grow and create new jobs.

While optimism is a bit measured in some areas, the overall results of this Business Outlook Survey are encouraging and reflect a growing optimism about the general economic climate.

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US Environment Agency May Restrict Some Neonic Use

The US is moving more closely into line with Europe in restricting the use of neonicotinoid-based insecticides suspected of posing risks to bee populations.

Faced with mounting criticism as well as a still pending lawsuit—filed in 2013 by a coalition of beekeepers, environmental and consumer groups in a federal district court—the Environmental Protection Agency (EPA) has said it is unlikely to approve new or expanded uses of certain pesticides before the risks are fully evaluated.

The agency is currently conducting an assessment of six types of neonicotinoids and their impact on honey bees, with evaluation of four types expected by 2018 and the remaining two a year later. Up to now, the EPA has not recognized the need for immediate action on neonics. The agency said early this month it would review its de facto moratorium if new crop protection problems appeared that could only be addressed by one of the pesticides in question.

Over protests by agrochemicals giants including market leaders

Syngenta and BayerCropScience, the European Union imposed a two-year moratorium on neonicotinoid pesticides effective Dec. 1, 2013.

In November 2014, Canada's Ontario province announced plans to reduce the acreage sown with crop seeds treated with neonicotinoid-based insecticides by 80% up to 2017.

Pesticide producers blame the bee disease known as Colony Collapse Disorder on a variety of factors, including habitat loss and disease, while disputing that neonics are the primary cause. (dw)

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Chemical Connections

How Liberalized Chemicals Trade Underpins Global Value Chains

Chemicals are vital to our well-being. They help us grow more abundant crops and preserve our food. In the form of plastics, rubber and foam, they help make our homes, factories and vehicles clean and comfortable. They enable us to make safer, lighter, cheaper, more durable goods and structures. And they help us to extract energy and use it efficiently. Trading chemicals around the world stimulates competition, provides an incentive to develop new markets through innovation and boosts production efficiency. But above all, it helps to improve the quality of human life.



Servet Gören, CEFIC

Most chemical products are intermediates, used in the production of other goods. The chemical industry underpins virtually all sectors of the economy and its strategies directly affect downstream chemicals users. The big industrial users of chemicals are rubber and plastics, construction, pulp and paper, and the automotive industry. Nearly two-thirds of EU chemicals are supplied to the EU industrial sector, and more than one-third of chemicals go to other branches of the EU economy such as agriculture, services, and other

chemical industry, bolstering sales and jobs. But barriers need to be stripped away. Despite some multilateral trade deals within the General Agreement on Tariffs and Trade (GATT) framework and some bilateral agreements between the European Union and its partners, much remains to be done in opening markets. And our industry also needs better access to affordable energy and raw materials and greater harmonization of standards and regulations around the world. A more coherent policy framework would help the European chemical industry fulfill its vocation of ensuring that by the year 2050 more than 9 billion global citizens live well, within the resources of the planet.

Surging Population

Between 2014 and 2050 the world's population will surge from 7.2 billion to 9.5 billion, according to the United Nations. But over the same period, Europe's total population will decline to 709 million, just 7.5% of the total. Meantime Asia's population will grow to 5.1 billion, 54% of global citizens; and Africa will be home to 2.3 billion, twice as many as today, and a quarter of those on our planet. World chemicals production is set to almost double from €3.4 trillion in 2013 to €6.3 trillion in 2030. But most of this growth will be outside the EU: If Europe's industry is to grow and share in the rewards, Europe must reinforce its role as a chemical exporting region.

Why Liberalized Trade Needs to Happen

Growth in post-recession Europe remains low, hampered by mature markets and an aging population.

Trade barriers need to be stripped away.

business activities. The rise of global value chains gives all countries an interest in keeping chemical import duties low. Nowadays trade is no longer about "produced here, sold there" but "produced everywhere, sold there."

Future Economic Growth Beyond Europe's Borders

Since 90% of gross domestic product growth will take place outside Europe in the next decade, international trade should be a potential growth driver of the European

Infobox:

The new CEFIC publication, Chemical Connections, analyzes the importance and impact of chemicals trade. More charts displaying facts and figures from this publication can be found on page 20.

Domestic and international economic uncertainty aside, EU chemical industry exports did reach €139 billion in 2013, delivering an EU chemicals trade surplus of nearly €49 billion.

Given an appropriate domestic and international policy framework, the European chemical industry has strong potential to benefit from further forecasted growth in global chemicals demand. The industry firmly supports the European Commission's endeavors to underpin the internationalization of European companies and further liberalize trade—preferably at a multilateral level through the World Trade Organization (WTO) or via bilateral or regional trade agreements such as the Transatlantic Trade and Investment Partnership (TTIP) or proposed EU-Japan Free Trade Agreement.

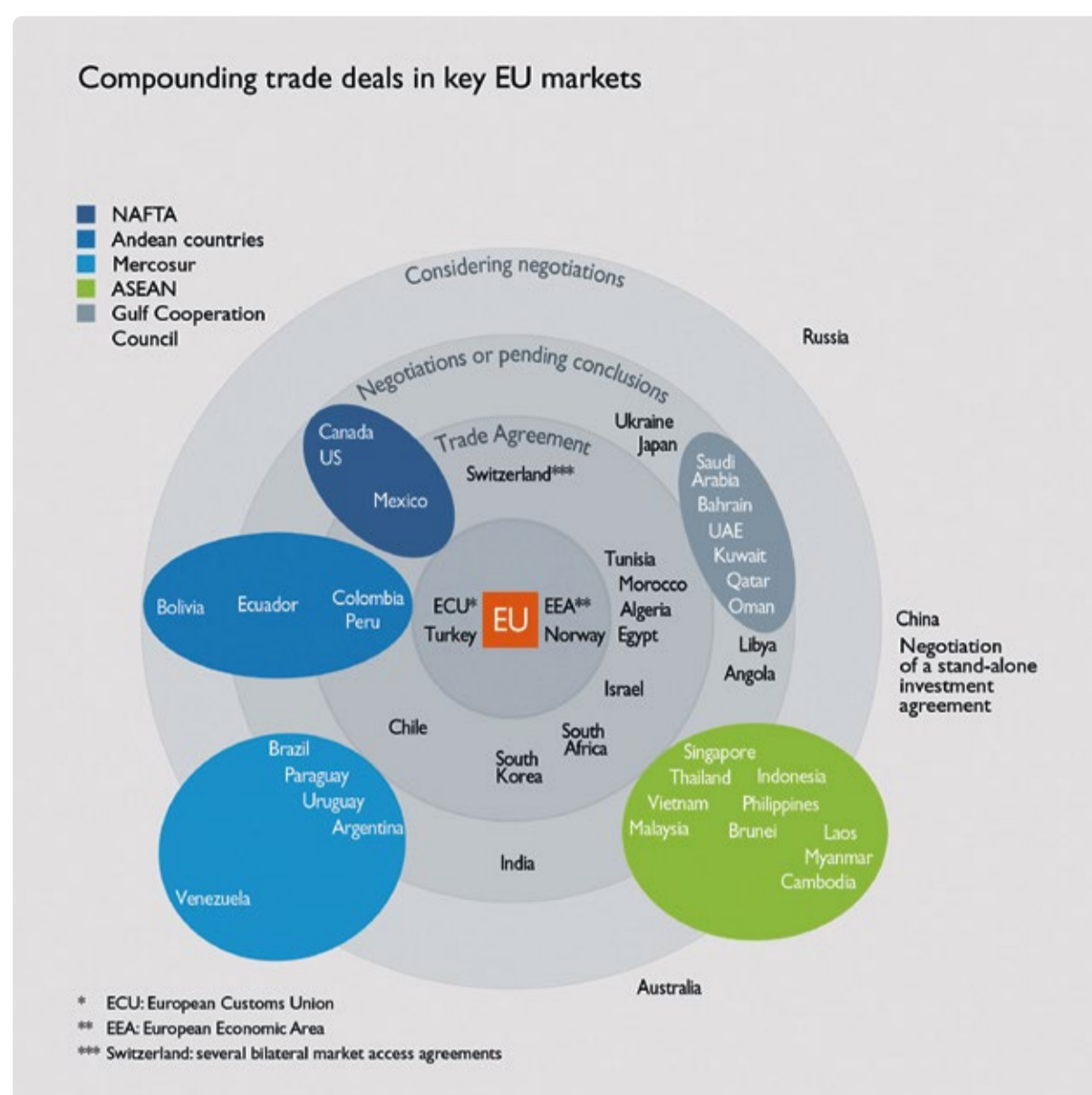


Fig. 1: Compounding trade deals in key EU markets

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Multilateralism Is the Best Option

By its nature, the chemical industry benefits from liberalized trade. Its products are hugely diverse, innovative and widely used, and its plants and employees are located worldwide. Improving trading opportunities for chemicals can make the industry more competitive.

The successful Uruguay round of multilateral trade talks in 1994 achieved the Chemical Tariff Harmonization Agreement (CTHA) and Pharmaceutical Agreement, which harmonized chemical import duties at just 6.5%, 5.5% or 0%. The European Chemical Industry Council (CEFIC) then started advocating for a new, ambitious and proactive agenda. The successive extensions of the CTHA to new members of the WTO and updates to the Pharmaceutical Agreement have delivered

TTIP would help companies compete more effectively in increasingly globalized chemicals markets.

tangible benefits for the industry as well as for consumers worldwide. Consumption and production of chemicals is growing most strongly in emerging and developing economies and in global value chains. If

the WTO lives up to the proclaimed importance of global value chains, the goal of the Doha round should be to substantially reduce or eliminate tariffs for intermediate products including chemicals to help the development of these economies.

The European chemical industry is being increasingly harmed by measures in other regions including double pricing, export restrictions and export taxes. The chemicals sector is especially concerned about discriminatory practices regarding ethylene feedstock, gas, palm oil and important minerals such as yellow phosphorous, fluorspar or rare earths. It therefore welcomed rulings by the WTO Dispute Settlement Body that export duties and export quotas applied by China to rare earths, tungsten and molybdenum breached its WTO obligations. CEFIC supports the strong stand the European Com-

mission takes against breaches of WTO obligations and the commission's pursuit of bilateral free-trade negotiations. But ultimately we need improved rules governing access to raw materials at a multilateral level.

Doing Bilateral Deals

Because the Doha round has made such slow progress, the EU and other regions and countries have sought to liberalize world trade via bilateral free-trade agreements (FTAs, c.f. figure 1). CEFIC considers that FTAs complement the search for a multilateral deal and offer op-

The WTO must include in its agenda more ambitious deals at a regional level.

portunities to achieve agreements in areas that are not yet or not sufficiently addressed by the WTO.

Negotiations on TTIP—a radical, far-reaching trade agreement—began in July 2013 and are ongoing. TTIP can help reduce the cost of trading with the U.S. in various ways. A deal would help companies compete more effectively in increasingly globalized and competitive chemicals markets.

As regards Japan, negotiations for an EU-Japan Free Trade Agreement were launched in March 2013 and are proceeding. An FTA with Japan not only has the potential to enhance market access and regulatory coherence between the EU and Japan, but it will also pave the

way for other bilateral and multilateral negotiations with and between Asian economies. It can also contribute to broader acceptance of world standards by Japan, where many barriers stem from stricter Japanese standards. And thirdly, an agreement with Japan could reduce any handicaps suffered by European companies arising from the proposed Trans-Pacific Partnership (TPP) agreement to which the EU will not be a party.

The EU chemical industry also has a lot to gain by increasing our chemical connections with regions including India, China, the Gulf Cooperation Council (GCC) and Mercosur. Spurring EU chemical industry growth in all these regions requires eliminating all chemical tariffs and removing all trade barriers, including export restrictions and export duties on raw materials. Ensuring effective protection and enforcement of intellectual property rights is essential to give investors confidence and foster innovation. Nontariff barriers such as double-testing of products and burdensome licensing and labeling requirements, and failure to comply with international standards prevent the EU and these regions from achieving the full commercial potential of their chemical trade.

Broad-Based Tariff Liberalization Needed

Despite talks about the importance of global value chains, many countries have yet to draw logical conclusions that growth of all their economic sectors requires liberalization of not only end-products but especially of intermediates like chemicals. A narrowly focused environmental goods agreement being pursued by a group of countries therefore misses the point. The world economy needs broad-based

tariff liberalization, including ambitious tariff reductions for chemicals. The plethora of regional and bilateral trade deals being struck may reinvigorate participants to agree to international trade rules under the aegis of the WTO. If the WTO is to keep relevance for 21st century trade, it must include in its agenda more ambitious deals at a regional level.

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CEFIC: EU Chemical Output Stagnant in 2014, Trade Surplus Contracts from All-time High



European chemical production rose 0.2% in 2014, the chemical industry federation CEFIC said in its just-published Chemicals Trends Report. By contrast, sales fell 1.1% year-on-year against the 2013 figure of €527 billion, and prices sank by 1.8%.

"The lack of European growth in 2014 was partly due to falling exports," said CEFIC Director General Hubert Mandery. "Even if the price of oil has fallen here in Europe,

lowering producer costs, long-term problems persist, especially the challenge of securing affordable energy supplies," he said.

Net exports of chemicals from the EU, at €44.1 billion last year, were "significantly" below the record €48.2 billion surplus achieved in 2013, the organization said.

The net positive trade balance with non-EU countries—including Russia, Turkey and Switzerland—was €11.7 billion in 2014,

some €3.1 billion lower than in 2013. This is attributed in part to a sharp fall in net exports to important trading partner Russia.

The EU's chemicals trade surplus with Asia—excluding Japan and China—widened by €544 million. But its net chemicals trade surplus with China contracted from €1.3 billion to €671 million. The US further narrowed its chemicals trade deficit with the EU by €889 million to €5.4 billion.

Data from January 2015 show that "the worrying performance continued," the CEFIC report says. Output contracted by 0.3% against January 2014, and selling prices plunged by 6%.

EU chemicals output in January declined by 0.3% overall, with worst-hit petrochemicals sliding 7.6% against the same month of 2014. This was partially offset by 4.2% growth in specialty chemicals. Basic inorganics production

contracted by 1%, while output of polymers and consumer chemicals declined 0.6% and 0.2% against January 2014.

CEFIC said chemical producers' confidence also deteriorated in the first quarter of 2015 compared to the last quarter of 2014. Moving into the second quarter, order books were thinner and the outlook for production in the coming months had worsened. Stock levels remained unchanged. (dw)

Surfactants in a Globalizing World

The Requirement for More Sustainable and Effective Materials Ensures a Demand for Innovation and Technological Development

The 10th CESIO World Surfactant Congress and Business Convention in Istanbul, Turkey, 1–3 June, 2015 organized on behalf of the European Committee of Organic Surfactants and their Intermediates (CESIO) will showcase an extensive scientific program on the main theme „Surfactants in a Globalizing World - Creating new Possibilities“. Sessions, posters and exhibition will cover the scientific, economic, technical, as well as safety and regulatory aspects of surfactants and surfactant applications in the industry and consumer products. In the run-up to the event, Michael Reubold asked John Hibbs, President Elect of CESIO, to provide a status report on the industry and a sneak preview on what will be discussed in Istanbul.

CHEManager International: Mr Hibbs, this year's congress theme is "Surfactants in a Globalizing World — Creating New Possibilities". Which new possibilities can you imagine and what will it need to take advantage of them?

J. Hibbs: Surfactants have and have always had a very large range of applications, because of their versatility. Industry has, and continues to be able to innovate to meet the requirements of growing demands, and increasing constraints, in terms of regulatory and user requirements. We see surfactants being used to replace traditional solvents, giving lower risk and reduced environmental impacts. Surfactants can play a key role in the development of technologies such as nanomaterials, and the use of surfactants and soluble polymers is a major enabler in the efficient extraction of our oil resources.

How have the global and the European market for surfactants as a whole developed in recent years and what are your growth expectations for the years to come?

J. Hibbs: It is widely believed that the demand for surfactants grows in line with GDP, and this is generally what we see. In developing regions we also see a link to population growth. In the future, we expect this trend to continue, since surfactants are an important contributor to the quality of life. The European demand for surfactants is fairly static in terms of volume - in line with the region's economic trends - however there is

a requirement for more sustainable and effective materials, ensuring a demand for innovation and technological development.

What are the main growth drivers in terms of geographies? Do you expect the BRICS and MIST countries (including Turkey, the host country of the congress) to set the pace or are there other markets that are thriving?

J. Hibbs: A simple view of statistics would suggest that, as mentioned, population growth and GDP growth are the key factors. This is certainly seen, as China, India, South America and SE Asia head the volume growth statistics. What is less apparent is the growing sophistication of markets, often linked to increasing consumer affluence and awareness. This drives a growing consumption in more specialty surfactants, linked to more use of highly formulated



John Hibbs, CESIO

factant use rising in oil producing regions.

For the "mature" markets, such as Europe, we should not overlook the dynamic created by the demand for more sustainable and effective products. This drives innovation, which is not necessarily visible in volume/value statistics. Mature does not mean static!

What are the main growth drivers in terms of application areas?

J. Hibbs: The key volume markets for surfactants are household and personal cleansing, so the state of these key areas will always have a substantial impact. The rise of extended oil recovery, including fracking, has



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J. Hibbs: We have seen a high level of activity in the development of surfactants & polymers in oil extraction and production, which is why this topic is featured more strongly in our 2015 conference. The source of the carbon backbone, which normally forms the bulk of the molecule, is also a topic of interest and there is work on biomass conversion to provide new sources of surfactant feedstock, with more efficient use of natural resources. There is also a trend to more "skin friendly" surfactants in personal care, replacing the standard primary surfactants with amino acid based products. That creates demands for more efficient synthesis, and formulation aids to give good product rheology etc.

Sustainability has become a buzz word in many industries. What are the most important aspects of sustainability in the surfactants industry?

J. Hibbs: Many people make a subconscious link between "sustainability" and "natural". It's true that the use of renewable resources often plays a key part in sustainability, but it's not the whole story. Our industry is exemplary in the use of renewable resources, with roughly 50% of the mass of all surfactants consumed coming from renewable resources, which is substantially better than other mass-consumption chemicals, like plastics and coatings. Despite leading the way, I'm proud to say that CESIO is playing a leading role in an EU project to increase further the use of renewables in surfactants. Green Carbon is only a waypoint on the road to true sustainability, as we have to consider the wider impact of production, distribution and consumption of our raw materials and finished goods. From a "local" perspective, a key step in sustainability for the surfactant industry is to continue to provide the European downstream industries with products which are produced in Europe, thereby reduc-

ing environmental burden associated with transport, controlling the manufacturing conditions (social chapter) and contributing to wealth production in Europe. Hence, companies like Solvay are continuing to invest in Europe.

What role do natural or bio-based raw materials for "greener" surfactants play for consumers/customers and how can they create value for the surfactants industry?

J. Hibbs: Surfactants industry has always sourced its feedstock from both bio-based and petrochemical

J. Hibbs: As a global industry, we face the challenge of meeting the growing demands of our customers, both in terms of scale, and complexity, within the constraints of finite material resources, economic pressures, and growing regulatory burden. While every person in Europe (for example) uses surfactants on a daily basis with extremely few instances of adverse effects, the regulatory burden on the products continues to increase. The cost of doing business in Europe, compared to other regions is currently being assessed in a cumulative cost study. This has to be seen as an opportunity for EU

The use of renewable resources often plays a key part in sustainability, but it's not the whole story.

laundry products, automatic dishwashers and specialized cleansing products, together with increased use of personal care products. This growing "middle class" can be seen in regions like Turkey, Russia and China. Oil production is also a major consumer of surfactants, both for exploration, production and extended recovery, so we can see sur-

driven a large increase in use of surfactants and soluble polymers.

Surfactants are used in a wide spectrum of applications - from detergents to crop protection, from the cosmetics to the oil & gas industry. What are currently the hot topics in surfactants R&D? What could be the next innovation leap?

Oil production is a major consumer of surfactants, both for exploration, production and extended recovery.

Clean Growth: Market for Surfactants to Exceed \$40 Billion by 2022

Surfactants facilitate the removal of dirt and enable to finely mix water and oil. These surface active chemical substances are used in every household but also serve for numerous industrial applications.

"In 2014, a worldwide turnover of \$33.2 billion was achieved with surfactants" says Oliver Kutsch, manager of the market research institute Ceresana. "We expect a further growth in sales of approx. 2.5% per year so that more than \$40 billion are reached in 2022."

Growth in the Segment Paints and Plastics

Ceresana already analyzed the world market for surfactants for the second time. Surfactants are mainly used to improve the properties of aqueous formulations. The best-known applications are clean-

ers and detergents. In 2014, around 56% of total demand accounted for this segment. Also, surfactants are used for example in cosmetics and textiles. They are also included in pesticides, antistatic agents, lubricants, printing ink and many other products. For the application area paints and plastics, Ceresana forecasts the highest growth in demand: 2.6% per year until 2022.

Anionic vs. Non-ionic

Depending on charge and polarity, a difference is made between anionic, cationic, non-ionic and other surfactants. The current most significant type are anionic surfactants: the so called linear alkyl benzene sulfonates (LAS) are mainly used for detergents and have a global market share of 53%. However, the strong-

est growth is recorded by non-ionic surfactants. With this type, fatty alcohol ethoxylates (FAEO) dominate. They can be obtained from palm kernel oil or coconut oil and are considered to be more environmentally friendly alternatives to LAS.

Other Countries, Other Surfactants

With a world market share of more than 36%, the Asia-Pacific region has the highest demand for surfactants. The product types reveal significant regional differences: Currently, Asia reaches a market share of more than 43% with alkyl benzene sulfonate. On the other hand, consumers in Western Europe and North America dominate the market for alkylsulfates (FAS), alkyl ether sulfates (FAES) and alcohol ethoxy sulfates (AES) with a share of around 62%. ■

feedstock to address the demands of downstream industry and develop surfactants with properties for specific applications. There are no fully "natural" products which have the properties required of the surfactants we all use in our daily lives, so synthetic chemistry is essential to give us safe and effective products. While surfactants consume significantly less than 1% of oil production - 90% is burned as fuel - a wholesale change to totally renewable materials would stress global land use, and create competition with food crops. It is essential for coming generations that we DO increase the use of renewable materials, but this needs to be achieved in a sustainable way. Value creation can be achieved through more efficient use of a wider range of biomass especially that which is produced outside the tropical regions.

What are major challenges the surfactants industry is facing and how could these challenges be overcome or even turned into opportunities?

based businesses to highlight the barriers of doing business in Europe. We have already seen a number of consuming industries move outside of the EU (such as textiles), and the low cost of the surfactants they use, often means that the materials must then also be produced outside Europe.

We have seen how our industry has adapted and developed in the past to challenges of providing safe, efficient and cost effective materials into a growing and demanding market. These changes will continue, and there are still opportunities to continue to develop products which give higher performance (allowing lower consumption) based on sustainable materials and processes. It's a simple fact that the surfactants we use in our homes and our work improve our quality of life, from basic hygiene to the production of low energy electronic devices. The challenge (and opportunity) of the future is to continue to meet the developing needs of our consumers, in a way that benefits every stakeholder. ■

No Compromise on Performance

The Challenges on the Road to Non-Phosphate Dishwashing Tabs

The global world is connected via social media, search engines and blogs. Mega trends are shared in seconds. Online communities give 24-hour guidance on ingredients, performance, use and price of detergents and cleaning products. Cleaning performance, in addition to convenience in use, is still the main prerequisite for purchasing a product (again).



Heike Kohm, BASF

Multibenefit tabs in automatic dishwashing are an example of this. They enable easy dosing and save time for the consumer without compromising on cleaning performance. However, with the phosphate ban for automatic dishwashing detergents in Europe taking effect in 2017, the performance levels in this category could change. The consumer in the connected world will take note of this immediately. It's thus time to make the right choice now.

Consumers Are Well-Informed Around the Clock

Globally, 80% of the population has a mobile phone. Smartphone penetration runs at an annual growth rate of 30%–50%. We are heading toward an almost universal mobile connectivity. Near-field communication will let our machines communicate with each other and directly with the supplier of refills when the auto dispenser is running low. Who would have expected to ever live in such a smart world?

In 2014, already one-third of shoppers in the UK compared products via their smartphone while shopping. What does that mean for retailers, for the formulators of consumer products and for suppliers of ingredients?



Besides price, consumers compare cleaning performance more often in this connected world. Nowadays, consumers are informed about the benefits of their cleaning products by watching TV or YouTube commercials and are evaluating the claims on the packaging to make their purchase and repurchase decisions.

Let's take the example of automatic dishwashing tabs. With their multipurpose cleaning and caring solution, as well as their easy handling, they have advanced to the lead-

ing category in automatic dishwashing detergents in Europe. However, their well-known cleaning level and the perceived benefits such as fat removal, drying of plastic, and perfect sparkling dishes and glasses could be subject to change in 2017, with the upcoming ban of phosphate for this application.

By now, most multi-benefit tabs consist to about one half of phosphates. They act as chelating agents to prevent unsightly scale on dishes by trapping the calcium and magnesium ions of water.

Phosphate performs this task superbly, but has a poor reputation in ecological terms. In 2017, a regulation change will take effect in the EU: The use of phosphates in dishwasher products, such as dishwasher tabs, will be limited.

With the regulation changes on the horizon, formulators of cleaning products in Europe are searching unceasingly for alternative chelating agents to secure the established and consumer-expected high cleaning performance level — not only for the branded but also for the private-label products sold in large numbers by regional retailers. Nobody can afford to put products on the shelves that do not satisfy consumer expectations.

Naturally, consumers do not speak the language of formulators — the producers of these tabs — in

the way they express their knowledge in cleaning, filming and rinsing benefits, as well as in drying properties on different surfaces or build-up on cutlery and tableware. Nevertheless, consumers are experienced in judging the results of these most important criteria of automatic dishwashing detergents as published in consumer test magazines. By studying these magazines or social media, they might even link their results to specific ingredients.

Phosphate Alternative — Let's Not Repeat Consumer Frustration

Brand owners had to learn this lesson the hard way, when the phosphate ban was introduced in parts of the U.S. market in 2010. Alternatives did not reproduce the strong chelat-

ing function of phosphate, leading to lower performance and dirty dishes. This experience should not be repeated in Europe. High consumer trust must be upheld, which includes the necessity to reformulate existing products in order to maximize performance. How can this be achieved?

Companies can develop products without phosphate by using highly sophisticated ingredients, such as powerful yet sustainable, readily biodegradable chelating agents. One alternative is MGDA (methylglycindiacyetic acid), offered by BASF under the brand name Trilon M. Of course, the best ingredient is not enough. It additionally requires the top formulation expertise in the labs of the brand leaders and private-label producers.

Dear Retail: It Comes Down to Winning or Losing a Category — Performance is the Key

Naturally, retailers also need to be convinced to defend their strong category of automatic dishwashing detergents. Phosphate is not only a low-cost material but also extremely effective. The more sustainable alternative needs to be as powerful and high-performing but at the same time readily biodegradable. Why is this important?

Cleaning performance is and will remain the dominating buying factor long before price. Consumers are only willing to repeat their purchases in this category if the product meets their established, high performance expectations. Consumers are not willing to accept any trade-offs on clean and shiny dishes and are certainly not prepared to unload dirty teacups or dishes with bits of lasagna from last night's dinner. Nor are they willing to drink from turbid wine glasses. How annoying is it to rewash your dishes by hand at the last minute while waiting for your guests?

In the connected world, innovative choices for high-performing and more sustainable ingredients for detergents and cleaning products are available. It's time to choose.

Heike Kohm, director marketing home care and industrial & institutional cleaning, BASF, Ludwigs-hafen, Germany

► www.homecare-and-i-and-i.basf.com

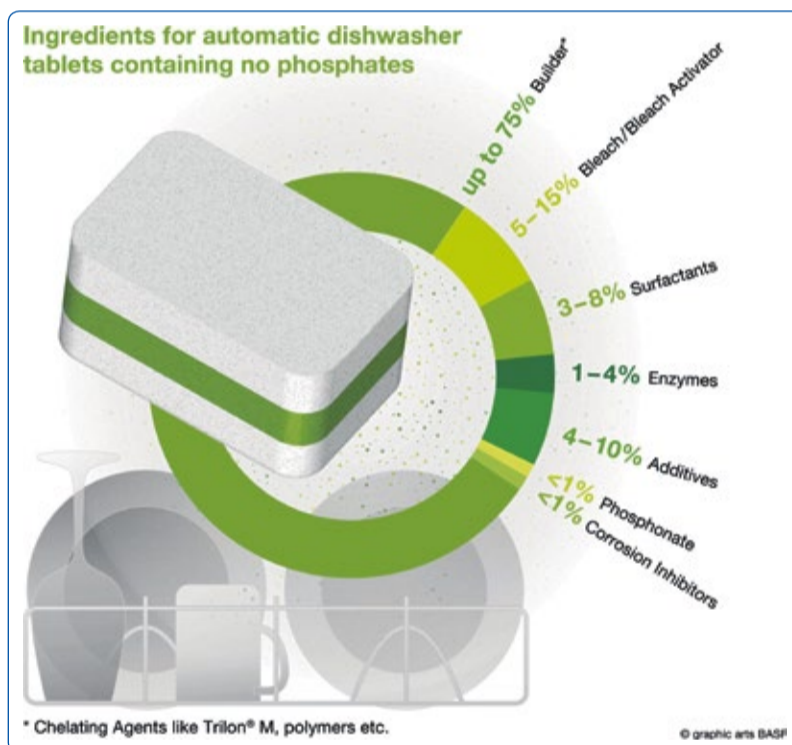


Figure 1: Ingredients of a multipurpose dishwashing tab



Figure 2: Evaluation of the cleaning performance in the BASF lab

Arvinas Collaborates with Merck & Co. on Novel Therapeutics

Private US biotechnology company Arvinas has announced a multi-year collaboration with Merck & Co. to create novel therapeutics using its PROTAC (proteolysis-targeting chimeras) technology.

PROTACs are bifunctional small molecules that target proteins for degradation and removal from a cell. This is in contrast to more traditional drug development that is based on inhibiting proteins.

Financial details of the collaboration were not revealed, however Arvinas will receive an up-front payment and funding to support

Merck-related research. In addition, Arvinas could earn up to \$434 million if all targets, initially selected by Merck & Co., are met, as well as tiered royalties.

The partnership will encompass multiple disease targets across several therapeutic areas. Merck & Co. may also, at its discretion, decide to expand the collaboration to include additional diseases.

Arvinas said only 25% of the body's 20,000 proteins can be drugged by traditional methods, leaving the remainder as potential targets for PROTACs. (eb) ■

Oxea Extends European Distribution Pact With IMCD

German-based chemical group Oxea has expanded its European distribution agreement for amines with Dutch distributor IMCD. At the beginning of April, IMCD began distributing Oxea's TCD diamine, a high performance epoxy hardener for specialty adhesives and surface coatings.

The decision to continue the partnership with IMCD reflects Oxea's

success in expanding its customer base over the past two years, said the company's European Marketing Manager Michael Harbich. ICMD market manager Stephen Rosenthal said the extended distribution pact with Oxea will strengthen his company's portfolio and enable it to cover the special formulation needs of customers in the European coatings and adhesives sectors. (dw) ■

Residues of Glyphosate Found in Food and Body Fluids

Private labs in the US are said to have found significant residues of the glyphosate weed-killer, marketed by Monsanto as Roundup, in samples of honey, soy sauce, infant formula and even breast milk and urine.

Tests by the Abraxis lab found glyphosate residues in 41 of 69 honey samples and in 10 of 28 soy sauces, while tests by the Microbe

laboratory detected the chemical in three of 18 breast milk samples and in six of 40 infant formula samples.

Although testing has increased over the past two years, US lab operators are quoted as saying requests have skyrocketed since the end of March, when the French-based WHO research unit IARC announced plans to classify glyphosate as "probably carcinogenic to humans." (dw) ■

Chemical Industry Security Lag Said to Put US at Risk

The slow implementation of the Chemical Facility Anti-Terrorism Standards (CFATS) in the US as part of homeland security and anti-terrorism measures is leaving chemical plants vulnerable and putting the population at risk, a study published in the International Journal of Critical Infrastructures suggests.

Although the Department of Homeland Security (DHS), established after the terrorist incidents of Sept. 11, 2001, was charged with regulating the safety and security of chemical facilities and in 2007 added an interim final rule, called

the Chemical Facility Anti-Terrorism Standards (CFATS), the study's authors say very few chemical facilities have actually implemented the security measures.

The researchers urge the industry and DHS to work more closely together "before it is too late to ensure the safety and security of the US population." With almost 1 million direct employees, the US chemical sector sustains an additional 5.5 million jobs in other sectors. It is also represents 2% of GDP — based on 2009 figures — and is the nation's biggest exporter. (dw) ■

BASF Trials MDI Precursor Production at Chongqing

BASF has begun trial operations at its 400,000 t/y mononitrobenzene plant at Chongqing, in western China. The new facility will feed the group's integrated MDI complex at the same location. Investment costs

for the entire project are pegged at €860 million. The site will also produce 300,000 t/y of aniline, 400,000 t/y of crude MDI and will also have an MDI splitter with a capacity of 400,000 t/y. (dw) ■

Shintech Going Ahead With \$1.4 billion US Gas Cracker

Shintech, US subsidiary of Japanese PVC producer Shin-Etsu, said it plans to start up a 500,000 t/y ethylene gas-fed cracker at Plaquemine, Louisiana in the second quarter of 2018. Construction on the \$1.4

billion facility, is expected to begin shortly. Construction is being handled by Toyo Engineering Corporation, and Lummus Technology US will provide the ethylene process technologies. (dw) ■

Reinventing Sustainable Value Creation

Why the Chemical Industry Must Decouple Economic Growth from Ecological Footprint

In the last several years, we have witnessed global trends that are changing the way global chemical companies operate. These trends include a consolidation of suppliers, manufacturers and buyers; the shift of growth to emerging markets and higher market volatility with faster transfer of information. But these trends are not the only developments having an impact on our business.



Prof. Thomas Müller-Kirschbaum, Henkel

The acceleration in global economic activity and continued population growth are putting immense pressure on our planet's resources. In this context, we, as an industry, must address the relationship between economic growth and resource consumption. Can we grow despite the sustainability challenges that we face? The answer is 'yes' but we need to become more efficient, i.e. create more value with a smaller footprint. We cannot afford to pursue economic growth alone. The chemical industry, in particular, has already done a lot to decouple growth from footprint but there still is some way to go. We can and must do better.

Vision 2050

Creating value in this new reality requires a clear vision and transparent goals. At Henkel, we are working with Vision 2050 developed by the World Business Council for Sustainable Development (WBCSD). The vision states: "In 2050, 9 billion people live well and within the resource limits of the planet."

This vision is the basis for our strategy of "achieving more with less." We need to create more value — for our customers and consumers, for the communities we operate in, and for our company — while reducing our environmental footprint.

By 2030, we want to triple the value we create through our business operations in relation to the environmental footprint of our products and services. We summarize this ambition to become three times more efficient as "Factor 3."

Our sustainability strategy summarizes the objective of every business to achieve more value with fewer resources and therefore demonstrates that sustainability is a critical factor to be competitive.

Driving Sustainability along the Value Chain

Creating more value can be achieved through our partners, our products and our people. Only by joining forces can leading chemical companies drive sustainability along the value chain. That's why we have been developing innovative solutions and setting new standards together with our partners to manage complexity and risk in our global value chains.

For example, in 2011, we and five other companies in the chemical industry established the "Together for Sustainability" initiative (TfS) to harmonize the increasingly complex supply chain management processes and to optimize the dialogue among business partners worldwide. At the heart of the initiative is the idea that "an audit for one is an audit for all." With TfS, suppliers only need to pass one assessment or audit performed by independent experts. 1,100 audits and assessments were carried out under the TfS initiative at our suppliers last year and 90% of the suppliers who underwent a repeat audit had improved their sustainability performance. In 2014, the initiative turned its focus toward emerging markets, particularly those in Asia. The intention is to actively involve suppliers in sustainability assessment processes and audits.

Incentivizing Suppliers to Develop Sustainable Solutions

We need to incentivize our suppliers to develop new innovative and sustainable solutions. At Henkel, we work with strategic suppliers on process optimization, resource efficiency, environmental and social standards, as well as innovation. In addition, we have been recognizing strategic supply chain partners that make the biggest contribution to sustainability for each of our three business units since 2011. BASF, Croda, Evonik, Monosol, Novozymes and Solvay are among the strategic partners that have received an award for their outstanding contribution.

Partnership should not be limited to cooperation between a company and its own suppliers. We, as an industry, should make all efforts to safeguard existing, and create new sustainable renewable feedstocks



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for the value chain. We are committed to zero net deforestation by 2020. Therefore, the palm and palm kernel oil that we use should not contribute to deforestation of primary or secondary forests with significant ecological value. We are working with our partners to establish full traceability of palm and palm kernel oils used in ingredients for our products, such as surfactants, by 2020.

We are providing targeted support to plantations and smallholders in palm-growing countries to promote sustainable farming practices, improve livelihoods and ensure that sufficient volumes of sustainable oil are available on the market. After developing our first smallholder project with NGO partners in Latin America, we have recently signed a second project in South East Asia.

Industry – Academia Collaboration

Creating superior value also means that the businesses and the academic community must come together to



Sustainability is a critical factor to be competitive.



work on innovative sustainable solutions. This partnership is extremely important for Henkel and that's why we started a cooperation with the Technical University (RWTH) in Aachen, Germany. There, we are researching and developing the

laundry and home-care solutions of the future in the "Henkel Innovation Campus for Advanced Sustainable Technologies" (HICAST).

The cooperation has three objectives: to find new sustainable feedstocks that can be used as raw materials in our products, create high-performing ingredients and exploit unknown synergies between new and existing washing agents. The unique advantage lies in the seamless cross-disciplinary cooperation of four professors and their research teams specialized in process technology, biotechnology, as well as physical and polymer chemistry.

We expect game-changing innovations, which will significantly contribute to better performance, resource use efficiency and preservation of the climate, from the cooperation.

Revolutionizing Product Development

Based on internal innovation and our partners' support, our products must deliver more value at a

ity strategy, i.e. performance, social progress, safety and health, energy and climate, water and wastewater as well as materials and waste.

These focal areas summarize the main challenges of sustainable development as they relate to our operations. The idea is to start with a qualitative assessment of the sustainability contribution at the very beginning of every research project and turn it into a quantitative evaluation, which ends with a life cycle analysis (LCA) for the final product. This year, we reinvented the approach by integrating the planned sustainability contribution into the briefing phase of the new product development.

Henkel Sustainability#Master

Innovation will reinvent the industry's contribution to a more sustainable world. It starts with the identification of sustainability "hot spots" for each product or category. These are areas where a particular product can have a very significant positive impact — when designed in the right way. Unfortunately, there are not many tools available to monitor a company's product portfolio, especially for small and medium-sized enterprises.

That's what motivated us to create the "Sustainability#Master" to systematically measure and continuously improve a product's sustainability performance. It consolidates information from life cycle analyses, stakeholder feedback and external product requirements. At the heart of the system is a matrix with 36 fields mapping the entire

value chain from raw materials to disposal on the one axis and all six focal areas of sustainability from performance to waste on the other axis. That makes it very convenient to check which field makes the biggest difference when improved.

The Henkel Sustainability#Master serves as a communication tool. The Marketing and Sales teams fill it with specific product information and adapt it to suit each specific regional market. It is also widely used as a presentation tool in dialogue with retail partners, non-governmental organizations, research institutions and other stakeholders.

Engaging Employees

Finally, every company in the industry must engage its employees around the same sustainable goals to create value globally. Our shared vision and our corporate values are what unites us worldwide to create more value and build our success. If we want to achieve our goal for 2030, we need everyone to contribute. That's why we strive to give our employees a clear understanding of sustainability and enable them to convey the importance of sustainability to others. Our Sustainability Ambassador program was launched in 2012 to engage employees more deeply on the topic of sustainability. Since then, Henkel has trained more than 3,800 Sustainability Ambassadors — including all Management Board members — in 70 countries. Since the start of the program, the Sustainability Ambassadors have educated about 36,000 children in 37 countries.

In summary, the industry has a very important role to play in decoupling growth from footprint if we want the world population to live well by 2050. We have to face our responsibilities and reinvent sustainable value creation wherever possible. And for us, sustainability is not only a responsibility but also a great opportunity to continuously improve and to strengthen our competitiveness. Sustainability has already become a key differentiator for business success.

Prof. Thomas Müller-Kirschbaum, corporate senior vice president of Research & Development, Laundry & Home Care, co-chair of the Sustainability Council, Henkel, Düsseldorf, Germany

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Emerald Kalama Enters Distribution Agreement with BCD and Caldic

Emerald Kalama Chemical, a business of Emerald Performance Materials, has made key new distribution appointments for the K-Flex platform of fast fusing plasticizers and low-VOC coalescents. BCD Chemie will service the DACH region (Germany, Austria and Switzerland), while Caldic Spécialités will manage K-FLEX distribution in France.

K-Flex products are utilized as effective plasticizers in adhesives, PVC plastisols and compounds, caulks, sealants and other latex polymer applications, as well as coalescents in paints, coatings, inks and graphic arts. The products are known as environmentally friendly specialty plasticizers and coalescents: low-VOC, readily biodegrad-

able and REACH-registered. In addition, they enhance key performance features, such as film formation, adhesion, processing characteristics and resistance of the end-product to oil, grease and water.

"Emerald continues to build its infrastructure in the EMEA region in response to demand for more environmentally friendly materials that deliver the performance that manufacturers need," said Hans Dick Terhonne, K-Flex business director for EMEA.

Emerald Performance Materials had been an affiliated portfolio company of Sun Capital Partners since 2006 and, in August of 2014 changed hands to become an affiliate of private equity firm American Securities. (mr)

Omni-Chem136 Adds Harke Group as New European Member

Omni-Chem136, the world's largest alliance of regional independent chemical distributors with 18 member companies in North America, South America and Europe, more than 145 facilities and \$3.0 B of combined sales has announced that Harke Group of Germany has joined the alliance effective February 1, 2015. Harke Group, headquartered at Mülheim an der Ruhr, Germany, is a wholly owned private company.

"The addition of Harke Group to our alliance is another significant step forward in our strategy to build a global chemical distribution alliance," says Fred A. Buehler, Managing Director Omni-Chem136.

As an international distributor with subsidiaries and sales offices

throughout Europe, Harke Group opens industrial sourcing and sales markets for its customers and suppliers in Europe and around the world. The product portfolio of the group includes industrial, specialty and high purity chemicals, plastic additives, plastic raw materials and plastic products, high quality pharmaceutical excipients, food additives and ingredients, dietary supplements and ingredients for the personal care and clean care industries. In addition, Harke Group offers related services such as contract packing, mixing and blending, legal consulting and representative services concerning EU chemical (REACH), pharmaceutical and food legislation. (mr)

ExxonMobil President Says Bureaucracy Strangling LNG Exports

The US is at risk of losing economic opportunity and the ability to solidify its role as a global leader in energy production if policymakers do not quickly move to approve liquefied natural gas (LNG) exports, Rob Franklin, president of ExxonMobil Gas & Power Marketing Company, said in a speech at the Johns Hopkins School of Advanced International Studies in Washington DC.

With bureaucracy stalling legislation and issuance of export permits, the US role as world's leading energy producer is at stake, Franklin added. In his view, exports of LNG "should be treated no differently from other exports such as agricultural goods, automobiles and computer products.

"LNG exports can provide the spur to further increase America's natural gas production, providing all the attendant benefits that would generate," the executive said.

ExxonMobil is currently engaged in a \$10 billion project to convert the LNG regasification terminal at Golden Pass, Texas, into an LNG export terminal. An application to export to non-Free Trade Agreement countries was submitted to federal officials more than two years ago, but no decision has been made.

As global LNG demand is expected to triple between 2010 and 2040, the amount of incremental gas needed to meet global demand by 2025 will be almost double the size of the entire US gas market today. (dw)

Roles Under REACH

REACH Demands that Competitors Work Closely Together — Certain Tasks Still Challenge Industry

Almost eight years have passed since REACH went into effect, but some problems remain in regard to joint submissions. The cooperation of members within consortia is arranged by contracts that in most cases were signed after the preregistration period in the end of 2008 and previous to the first registration deadline in 2010.



Dr. Susanne Kamptmann, Steinen

As time was running toward the first deadline, the contracts signed before this deadline did not cover all important aspects in regard to data sharing and late(r) entrants, therefore consortia also have to find solutions to cover the needs of future registrants. Cost-sharing is an important topic, as it needs to be done in a fair, transparent and non-discriminatory way, but the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) regulation itself does not define how this may be achieved in practice.

Covering the Needs of Late Entrants

Creating contractual documents for a letter of access to enable late

entrants to participate in a joint submission causes extra costs, if this was not considered before the signature procedure in consortia agreements. Now there may be a need to involve lawyers again to create or check the letter of access contracts and also do necessary adaptations in already existing consortia agreements to cover the needs of late entrants appropriately. Cost-sharing needs to be discussed again and agreed on in consortia by respecting the rule that cost-sharing has to be done in a fair, transparent and nondiscriminatory way. Calculations in regard to splitting of the costs and eventual refunding to all former members is extremely time-consuming and causes an increase of consortium-management costs.

To save costs, consortia often agree on doing the refunding procedure only twice instead of a yearly recalculation. It seemed sensible to do that for the first time after the 2013 deadline, and it was common sense to do the second refund after the 2018 deadline. In general each member of the joint submission will be pleased to have a refund, but it is useful to reconsider whether a refund shall be done only when there is a considerable sum to be refunded. If only a few hundred euros need to be refunded, the time needed for transferring the money from a consortium account to the members of the consortium and also the double-checking of calculations and the bookkeeping within the member companies will exceed the profit. Therefore many consortia have agreed on a minimum amount



under which no refunds will be made.

The Unpopular Role of the SIEF Formation Facilitator

The European Chemicals Agency (ECHA) demands Substance Information Exchange Forum (SIEF) surveys done by a SIEF formation facilitator, but usually the efforts of the company having this workload will not be compensated, because there

is no contractual basis for that at this stage of the registration process. Therefore the willingness of preregistrants to become SIEF formation facilitators has decreased over the last eight years.

In particular, for substances that are manufactured in smaller volumes by the group of the preregistrants and that did not have a registration deadline in 2010, the originally foreseen procedure was amended by industry. If a company could fulfill all data requirements on its own, it started by registering on its own and then offered a letter of access to the other pre-SIEF members. Neither the REACH regulation nor ECHA intended this, but it often kept costs low for all involved parties.

How to Cope with Registrants-to-Be that Have Higher Data Requirements than the Former Lead Company

Difficulties may arise when a lead company registers with fewer data requirements (e.g., registration for a transported isolated intermediate only), but later a further registrant-to-be needs to register with higher data requirements (e.g., standard registration in a lower tonnage band). In such a case there are three ways to solve the problem, but each of them will require at least some discussions and a sort of agreement within the group of the registrants and registrants-to-be.

The first possibility to solve the issue is that the lead company updates the registration dossier to cover the needs of the registrant-to-be. One of the most important tasks will be to define who will bear the

costs for further studies and tests, and also for the tasks that need to be done by the lead company for the benefit of the registrant-to-be.

The second option is to transfer the role of the lead company to the registrant-to-be with the highest data requirements. In this case, the former lead company may be interested in having a compensation for the work it had already done. The situation will become really difficult if there are already further registrants whose rights also have to be respected.

To avoid all the discussions in regard to financial issues and further contracts in these two options, a third option can be considered. The registrant-to-be with higher data requirements may prepare an own registration dossier and either opt out, or — if agreed on in the pre-SIEF — the pre-SIEF could be split into two groups: a registration group for a transported isolated intermediate only and another group for those that require a standard registration. The registrant-to-be then can become the lead company for the standard registration group.

Opt Out because Participation in a Joint Submission is too Expensive

Management of consortia is time-consuming and often has high costs — sometimes it is even more expensive than the studies and tests needed to prepare the registration dossier for a certain substance. That already has led to an increasing number of opt-outs in particular by companies that registered in a smaller tonnage band or for a

transported isolated intermediate. This was less expensive for the single company but not for the benefit of ECHA as it originally demanded “one substance, one registration” and now has to examine several dossiers for the same substance.

Special Arrangements for Small and Medium Enterprises (SMEs)

Small and medium enterprises can pay lower fees to ECHA if they have proof of not being a large company. ECHA also had the idea that small and medium enterprises shall benefit from lower costs within consortia. If a consortium is willing to consider the company size of its members, that will lead to additional work to calculate costs for each member of the consortium. Furthermore, there remains the question whose obligation it is to double-check whether a company may benefit from SME status and what needs to be done when there is a change in a company's status. As the competition law always needs to be respected, it seems necessary to have an independently acting trustee (e.g., a consultant or a lawyer) who does the calculation and invoicing for each single member of a consortium.

A small company with few substances to register even when a higher volume band is required may have less total cost than a larger company that has to cover the registration of hundreds of small-volume substances on its own. Therefore some may question whether it is fair to make a distinction between small and large companies in regard to consortium costs.

An easier approach to share costs is to do it based on the type of registration and connected data requirements. As for the registration of a transported isolated intermediate above 1,000 tons per year, a registrant has to fulfill the same data requirements as a registrant for a standard registration in the smallest tonnage band of up to 10 tons per year. (Remark: In both cases, data requirements in accordance with Annex VII of the REACH regulation have to be fulfilled.) It seems to be fair, transparent and nondiscriminatory that costs for these two types of registration shall be the same.

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INFO:

This is the final of a series of four articles from Dr. Kamptmann on the REACH legislation. Parts 1, 2 and 3 were published in issue 11-12/2014, 1-2/2015 and 3-4/2015 of CHEManager International.

EU Authorizes 17 GMOs for Food and Feed

Hot on the heels of its proposal to permit member states to reject the import of genetically modified crops for food and feed, the European Commission has authorized 10 new GMOs for this purpose, renewed seven existing authorizations and allowed the importation of two GMO cut flowers.

In a statement, the Commission pointed out that the products all had gone through a full authorization procedure, including a favorable scientific assessment by the European Food Safety Authority (EFSA). The permits do not extend to crop cultivation.

The GMOs approved today had received “no opinion” votes from member states in both the Standing and Appeal Committees, as no qualified majority had been reached either in favor or against the import. Authorizations had not been granted during the past months while a review of the decision-making procedure on GMO — announced on Apr. 2 — was in progress, the EU regulatory agency said.

Until the new proposal is adopted by Parliament and Council, the authorization process will continue to be based on the current applicable legislative framework, the Commission pointed out.

The GM food and feed authorizations will be added to the existing list of 58 GMOs authorized in the EU for food and feed uses (covering maize, cotton, soybean, oilseed rape, sugar beet) and are valid for 10 years.

Any products made from these GMOs will be subject to the EU's labelling and traceability rules. All but one of the food and feed products is manufactured by GMO giant Monsanto. One, a cotton product, is made by Bayer.

The cut flowers, carnations, are manufactured by an Australian company, Florigene. (dw)

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Industrial Water Management

By Reducing Its Thirst for Water the Process Industry can Conserve Resources and Cut Cost

How well does industry manage water resources? The general tendency today is to take a holistic systems approach. More process water is being recirculated and industrial producers are recovering reusable substances and water treatment chemicals. Companies are also taking a new approach to effluent management. Partial flows are being diverted at an early stage, making treatment easier and less expensive. Technology is even available which can virtually eliminate effluent.



Plants, animals and humans depend on water for survival, but water is also an essential technical resource for industry—whether as cooling agent, transport medium, solvent or process water in a range of qualities from industrial water to softened or demineralized water to highly purified water for the pharmaceutical industry.

Industrial water consumption is not free. Inlet water normally needs to be conditioned, and treatment costs money. Circulation pumps consume energy. Post-treatment is also normally required so that the water can be re-circulated or discharged into receiving watercourses. For cost and environmental reasons, it is advantageous to reduce water movement, water heating and water contamination, and this is where industrial water management has a role to play.

Technological complexity is lower in regions where there is an abundance of water compared to parts of the world where water is scarce. The costs of closed-loop recirculation or even water-free production are more acceptable there than in countries like Germany. Whatever the water supply situation, production and water technology are always closely interrelated, creating the need for integrative technologies and water management systems.

Water Recycling and Elimination of Production Effluent

„Off-the-shelf“ industrial water management does not exist. That is the conclusion reached in a Process-Net position paper on the trends and outlook in industrial water technology, which was published in March 2014. Tailored strategies are needed for the specific industry, application and site. Water recycling based on recirculation of process water is normally only a viable option if contamination levels are low and water

treatment is relatively inexpensive. Experts say that water recycling is less efficient for waste streams that are highly contaminated and/or contain substances that have a very diverse range of chemical and physical properties. The basic prerequisite for water recycling is the establishment of an efficient water management system to separate water that readily lends itself to recycling from water that is less suitable. Most of these internal recycling processes are located at or near the source where the complexity of the constituents is limited and additive techniques can be deployed with minimum effort and expense.

The integrated energy supplier Suncor Energy recycles more than 90% of the water contained in steam which the company uses to extract oil from oil sand. Instead of storing injection steam in underground disposal wells, recycled saline water is treated, the salts and solids are filtered out and the water is reused to produce steam again.

What Wabag is currently doing is another example. At the beginning of 2014, the company was awarded a contract to build a wastewater treatment plant at the new industrial park in the city of Al Kharj in Saudi Arabia. Effluent from various production facilities at the site will be treated to the maximum extent possible for re-use as process water. The plant will have a capacity of 10,000m³/d.

Zero Liquid Discharge — the Model for the Future?

Instead of purifying water to the extent possible prior to discharge, would it make more sense to eliminate water discharge altogether? Elimination of effluent from production (zero liquid discharge) is currently the subject of a highly controversial debate. 400 plants are already operating around the world.

However treatment of the residual concentrates is problematic. Choosing a site with an abundant supply of water and implementation of an industrial water management program are generally preferable to the burdens associated with zero liquid discharge production which is very energy intensive. As a result, experts are pinning their hopes on tighter integration of water and energy management.

Bayer Technology Services has developed a process for handling effluent which contains organic matter as well as inorganic salts at an Indian pharmaceutical plant. The new stand-alone treatment process has three stages: the organic matter is removed by biological purification and the salt concentration is increased through reverse osmosis to minimize energy consumption in the subsequent evaporation stage.

Veolia Italy has developed a zero liquid discharge system for a global manufacturer of dispersions and adhesives that can treat 15 t/d of wastewater. In the first stage, a heat pump vacuum evaporator with forced circulation pre-concentrates the rinsing water. A vacuum evaporator with heat pump and scraper system in the boiling chamber then produces a final concentrate which is mixed with fresh dispersion to obtain a constant density. The distillate is treated for use in washing, reducing the wastewater volume to zero. What used to be a waste product that was sent for disposal is now re-used in the production process.

As part of the EU E4Water Project, currently the world's largest

water management research project in the chemical industry, a number of plants in Belgium, France, Holland and Spain are working in unison to significantly reduce fresh water consumption. At Solvic and Dow Benelux, water flows from different plants are joined together. Treated effluent from one plant is used as feed water for another plant. The goal is to reduce fresh water consumption by up to 50%.

Membrane Process: Learning from Mother Nature

The use of membranes in water treatment technology has been on the increase for many years. There are good reasons why that is the case:

- Membranes run continuously and are fully automatic.
- Membrane materials are now cheaper and more effective.
- The membranes operate at lower pressure and that reduces energy consumption.

More than 2/3 of new desalination capacity being installed worldwide is now based on reverse osmosis. In contrast to traditional evaporation-based technologies, no heat energy is needed for this technology and thus the cost of desalinated water is reduced. Even in regions where energy costs are relatively low such as the Middle East, reverse osmosis is increasingly the solution of choice. Given the right plant design and the right equipment (60% of total energy consumption is used to power the pumps), nothing can

match reverse osmosis technology, reports Sulzer.

Sea water is not the only option. Desalinated ground water is another potential source, for example in the dry American South, claims GTAI (Germany Trade & Invest). Texas, Florida and California are leading users of the technology. Seawater desalination is becoming an increasingly significant factor, particularly in California where megaprojects are in the planning pipeline. Demand for high-efficiency pumps and rugged membranes continues to increase. Financing for many projects is now provided by public-private partnerships.

Jim Taft, Executive Director of the Association of State Drinking Water Administrators (ASDWA), says that mobile desalination systems have very significant potential. Demand is likely to increase because these systems in the South could help the water industry to manage more frequent periods of drought or temporary supply shortages.

Some membrane system suppliers have now started to standardize their systems. Higher production volumes drive down the manufacturing costs for these plug-and-play solutions which are used to purify service water and drinking water and also for treatment of industrial wastewater. It takes minimal effort to connect the pre-assembled systems.

Recovery of Energy and Re-usable Materials

When there is direct contact, it is impossible to prevent production materials from contaminating the process water. As a result, the process water contains varying concentrations of contaminants (ranging from a few ppb to several %). If a substance can be re-used, recovery can make economic sense in addition to helping protect the environment.

The French startup Magpie Polymers has developed a highly efficient filtration method for capturing re-usable precious metals even if they are only present in minute amounts. Various filters made of polymer beads are installed, and the metals form selective bonds with the beads. The technique is already being deployed at several European companies.

The chemical group Lanxess also provides technology for recovering re-usable materials. Ion exchangers function as selective adsorbers for fine purification of wastewater flows and process electrolytes. Heavy metals and other substances such as boric acid, chromate, arsenate, fluoride and ammonia in salt solutions can be selectively captured.

Little use has been made so far of wastewater as a heat source. In the past, utilization of this energy was seldom possible, one of the constraining factors being the 65 °C flow temperature limit for heat pumps. Ochsner now markets high-temperature heat pumps with flow temperatures up to 100 °C, opening the door to totally new industrial and commercial heat pump applications.

Smart Use of Water

Resource conservation and economic considerations make it imperative to make intelligent use of industrial process water and to consume as little as possible. Water should not be transported, heated or contaminated more than is absolutely necessary to meet process needs. Water re-circulation and re-use are two crucial aspects of “smart water”.

Dechema Gesellschaft für Chemische Technik und Biotechnologie e.V., Frankfurt am Main, Germany

► www.achema.de

Infobox:

The article is based on a trend report commissioned by Dechema and written by international trade journalists. Industrial water management will be one of three focal topics at Achema 2015 on 15 – 19 June 2015 in Frankfurt, Germany. The world forum and leading trade show for the process industry brings together experts from a wide range of disciplines, institutions and generations to stimulate scientific exchange in chemical engineering, process engineering and biotechnology. Dechema is globally known as the organizer of Achema.

A. Schulman to Build Masterbatch Plant in Turkey

US plastic compounds and resins company A. Schulman is planning to build a new masterbatch plant in Turkey, leasing existing industrial facilities in the greater Istanbul area.

The cost of the plant, expected to go on stream by the end of the company's 2016 fiscal year, is estimated at €5-7 million.

The facility will produce about 40 million lbs/y (18,000 t/y) of A. Schulman's premium additive, white and

breathable masterbatches for food and industrial packaging customers in Turkey as well as countries in the Middle East and North Africa.

Heinrich Lingnau, vice president and general manager Europe, Middle East, Africa (EMEA), said the company will be “ideally positioned to participate more fully in the accelerating growth occurring throughout Turkey and other countries in the Middle East and North Africa.” (eb)

Solvay has broken ground at Gunsan, South Korea, for a Highly Dispersible Silica (HDS) plant that it says will develop innovative HDS grades and address growing demand in Asia for energy saving tires.

The plant with an annual capacity of more than 80,000 t/y is expected to be operational within the next two years.

The advanced grades produced at the Korean site by Solvay's global business unit Silica is reported to

allow for higher productivity and greater flexibility in producing energy saving passenger car and truck tire compounds.

With the new production platform dedicated to silica innovations for Asia and the silica research facility that belongs to Solvay's new R&I Center at the Ehwa University Campus in Seoul, the company intends to speed up innovations in close cooperation with its regional customers.” (dw)

Solvay Building Korean Plant for Tire-grade Silica

IDT Opens Molecular Biology R&D Facility in Redwood City

Integrated DNA Technologies (IDT) is capitalizing on its expertise to deliver a broader range of validated molecular biology products. Research and development for these products will now be performed in a newly built facility in Redwood City, California/USA. The building houses state-of-the-art labs that will allow the scientists of the manufacturer of custom nucleic acid synthesis to maximize the company's oligonucleotide

manufacturing capability. The new R&D center of excellence keeps IDT on the cutting edge of innovation in molecular biology applications, particularly qPCR, next generation sequencing (NGS), and synthetic biology (SynBio).

To lead Redwood City's Product Development Team, IDT announced that Dr Caifu Chen has joined the company as Senior Vice President for Research and Development. (mr)

New Challenges in Chemical Purification

Ion Exchange Resins Lead the Way to Comply with High EU Standards

Purification of chemical compounds has become a vital part of most industrial processes. Germany, with some of the tightest chemical sector regulations in Europe, has seen ion exchange (IX) resins become the leading methodology to remove trace contaminants because of how the resins selectively, efficiently and flexibly conduct their mission. Dow Water & Process Solutions has developed a special portfolio of ion exchange resin products that purify compounds in a broad range of industrial applications including the production of biodiesel, caustic soda or lactose.

Since ancient times, people have purified chemical compounds to improve quality of life. The first attempts to filter water as a means to purify it were made by Hippocrates to treat his patients in the fourth century B.C. During the industrial revolution, purification started assuming a major role and, as a result, over the years, related regulation has intensified.

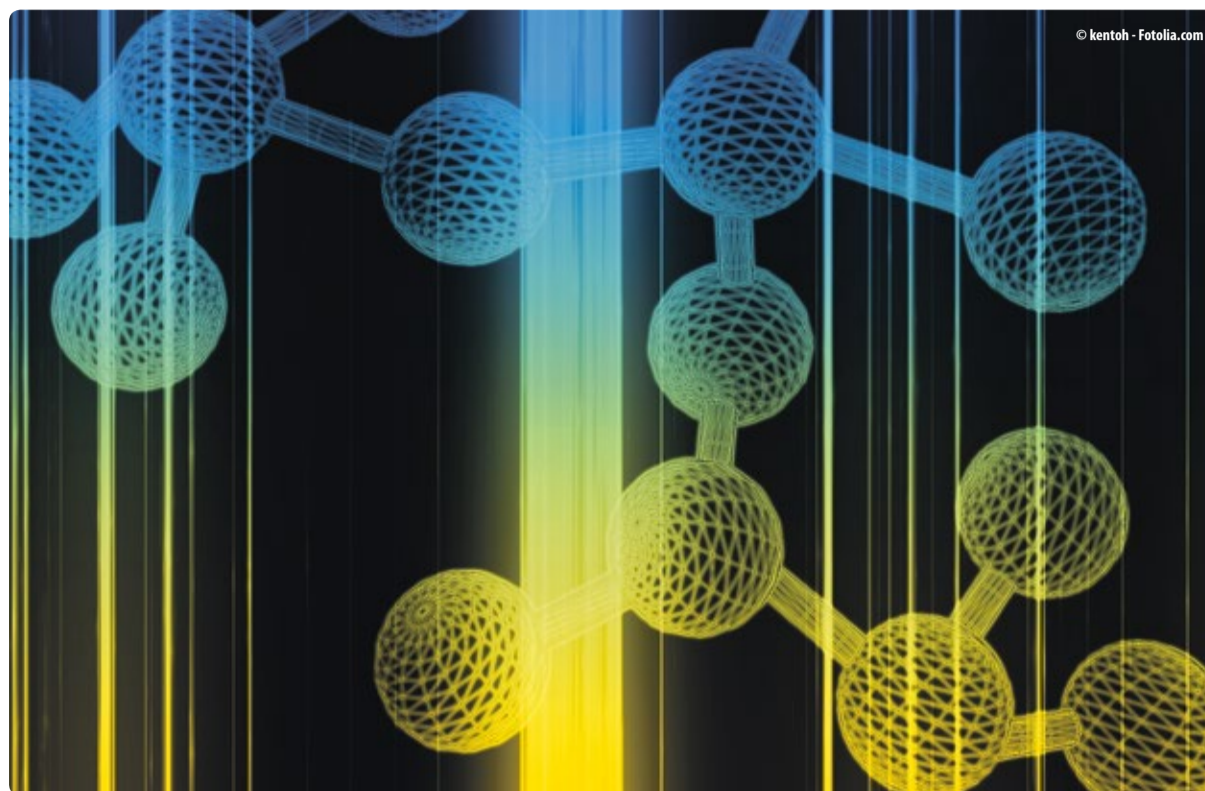
In this sense, in Germany, wastewater is treated following the highest EU purification standards. In 2006, the Registration, Evaluation and Authorization of Chemicals (REACH) regulation established a database in which any company manufacturing, marketing, importing or using chemical substances must be registered. Also in the international sphere, companies producing organic chemicals must provide a complete accounting of their production activities as a result of the Chemical Weapons Convention

Treaty signed in 1993. In addition, Germany approved its own Law of Chemicals in 1980, which obligates companies to register their chemical compounds in a database that explains the substances and their properties.

It is clear, therefore, that tailored solutions are needed to adapt to a complex regulatory environment. Dow Water & Process Solutions, a leading filtration, purification and separation technology supplier, understands the challenge of achieving the appropriate chemical purity for each application and offers a wide range of advanced resin solutions to businesses, consumers, industries and municipalities around the world.

Ion Exchange Resins

Ion exchange resins are particularly well-suited to purification requirements. They act as "chemi-



cal sponges," removing more than 99% of trace contaminants with an ultratight hold. They also have a very high exchange capacity, which allows them to treat effectively many thousands of volumes of water before they need to be replaced. An exceptional selectivity for trace contaminants makes ion exchange the most cost-effective technology to eliminate these naturally occurring and synthetic pollutants.

On the one hand, IX resins are able to remove trace contaminants selectively by matching contaminant with resin for a lock-and-key fit. On the other, they are incorporated in modular tanks, enabling an installation to be easily expanded. In this sense, Dow Water & Process Solutions works side by side with companies to design the purification system that best meets their specific needs.

As a result, ion exchange resins are widely spread in the basic chemicals and petrochemicals industries as an economic and effective method to separate and purify a large number of different compounds or process streams. Moreover, in some cases, IX is the only technology available that can produce the desired levels of purity.

Products for Which Purification is Vital

Purification treatment based on ion exchange resins is essential to obtain some of the basic products needed both in industrial applications and everyday life. Biodiesel, for instance, is well-known for being used in most injection pump diesel engines but also, depending on the source of the fatty acids, to significantly dissolve crude oil in industrial processes.

Base catalyzed trans-esterification is the preferred method to pro-

duce the crude biodiesel needed for the manufacture of biodiesel fuels. However, crude biodiesel must be purified to remove the salts, soaps and residual glycerol. Amberlite BD-10Dry is the easiest and most cost-effective product for a successful solution.

However, it is important to note that this technology is designed to be used in a water-free process and that the polymer beads will swell to up to three times their original volume as they absorb water. It is strongly recommended, therefore, to leave sufficient void space in the columns.

Another substance that has to pass a purification process is sodium hydroxide, also known as caustic soda. Although it is widely used in many industries — more than half of all global production has an industrial use — it is common to find chloride contaminating sodium hydroxide when low-chloride caustic soda is required. To solve this problem, the Dowex Retardion 11A8 has been developed as a unique amphoteric ion exchange resin. It features cation and anion exchange moieties in the same bead, being capable of reducing the chloride content of concentrated caustic soda. After the process, regeneration is achieved by applying only hot and deionized water.

Lactose, one of the best-known products for its use in the food and beverage and pharmaceutical industries, is treated through a combination of methods. First, lactose can be isolated from whey proteins using ultrafiltration. Then it can be purified through combinations of nanofiltration, ion exchange and chromatographic enrichment.

Some of the most successful products for lactose demineralization are the resins Amberlite FPC16 Na and Amberlite FPA42 Cl. While the latter is a strong base anion resin offering a high yield solution, the former is a gel cation resin with high osmotic stability. Completing the pair is Amberlite FPA55, an acrylic weak base anion resin with an excellent physical stability. Finally, Dowex Monosphere 99K/310 is a chromatographic separation resin designed especially for sweetener applications and purification of polyols in food and beverage applications.

One of the big advantages that the aforementioned products offer is their efficiency. IX processes often concentrate the contaminant so effectively that the loaded resin represents the smallest possible volume of waste, which means that, in some applications, they can be regenerated and used for years.

At the same time, to achieve the highest possible performance, Dowex ion exchange resins — backed by more than 60 years of IX manufacturing expertise — have been engineered to be the toughest beads on the market.

All these developments have a meeting point in Germany, where Dow Water & Process Solutions has several of its facilities. The biggest plant is in Stade, Lower Saxony, at the Elbe River between Hamburg and the North Sea. In recent years it has become renowned for developing the best wastewater solutions for industrial and residential purposes, among other application areas.

Alexander Lane, commercial director for EMEA, Dow Europe, Horge, Switzerland

► www.dow.com



The Stade, Lower Saxony, plant of Dow Water & Process Solutions at the Elbe River between Hamburg and the North Sea.

South African Analytical Lab Optimizes Pipetting

Regen Waters, an accredited analytical laboratory based in Witbank, in the South African province of Mpumalanga, has been performing chemical and bacteriological analyses since 1986. Areas of application include among others organic analyses of contaminated soil and water as well as comprehensive inorganic analysis. The laboratory also maintains and operates wastewater treatment plants for the industrial sector or mining companies. A main focus is therefore on the study of water samples, which require specific control services concerning their chemical and bacteriological quality.

As part of the microbiological tests, the experts identify any impurities. The procedure is important for sewage plant effluent discharges. This can effectively help prevent environmental damages that occur because of unsuitable water usage or discharge. Thus the water quality is checked on a regular and defined basis, with the view to record, for example, the effectiveness of plant performance.

Pipetting Stations Reduce Error Rate

Modern laboratory equipment is a must have to ensure reliable studies.

In order to reach the best chemical dosage of the water samples, laboratory managers began to search for instruments that always allow the same fluid volume intake and discharge in the shortest possible cycles, without leading to a high error risk for the user.

The semi-automatic pipetting station Microlab 300 from Hamilton Bonaduz was able to fully meet the requirements of the laboratory. A fast and especially secure handling of the liquids is necessary to obtain and record accurate results. Microlab 300 offers features that significantly reduce the occurrence of

human error, such as reading errors for example or inaccurate pre-configurations of the pipette.

Thanks to the intuitive operation via touch screen, the technical staff at Regen Waters can program time-efficient, even complicated pipetting steps and link them together. The pipetting station combines the performance of a fully automated liquid handling platform with the flexibility and affordability of a manual solution. Especially in situations where fluids must be frequently pipetted in succession, there is quickly a risk of fatigue and loss of concentration. These issues have been targeted and resolved optimally. Even intermediate steps, such as changing pipettes, are superfluous since the pipetting station covers a volume range of 1 µl to 1000 µl.

Simple Handling Leads to Effective Workflows

Thanks to the so-called "wizards", users at Regen Waters are also offered higher levels of flexibility. Pre-

ferred settings are saved and subsequently accessed at the touch of a button. Frequently used parameters,

such as mixing ratios, serial dosing, dilutions or even reverse pipetting modes, can thus be quickly applied.

Essential liquid properties are taken into account in the pre-stored and editable categories of liquids for aqueous, volatile and viscous fluids, which helps dispensing also fluids that are challenging and pipetted with difficulty.

Additionally, the memory function of the device offers the possibility of seamless recording of operations that have already been performed. Users at Regen Waters have thus access to the date, time and past pipetting operations. An optimal traceability is thus ensured and frequent repetitions and accurate processes are performed.

According to Ludolf Uys, the owner of Regen Waters, Microlab 300 is an excellent instrument to ensure accuracy and repeatability in laboratory practice.



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Quality and Efficiency in Pharma Manufacturing

Part 2: PAT Can Turn Batch Processes into Continuous Processes

An investment in process analytical technology (PAT) is not just a capital investment, but also an investment in human resources and a commitment to change fundamental processes. PAT is more than just inline analyzing. As an enabler of Quality by Design (QbD), PAT affects all pharmaceutical workflows, from product development to process design to process control.

The most important aspect of a PAT implementation is to retrain a company's culture to approach quality with a proactive rather than reactive mindset. To achieve this, cross-functional, multidisciplinary teams are necessary to effect change management to devise and implement the new processes that take full advantage of PAT. A successful PAT implementation requires a rethinking and a reorganization of resources. Users should anticipate an increased need for statistical analysis and more control engineering skills as analyzers are integrated into production systems. A key success factor, however, is to bring together development and production teams at the earliest stage to ensure the buy-in of top managers of these departments.

On the technical side, it's important to understand that PAT tools and devices won't simply automate existing processes. Instead, processes like manual quality checks are replaced by automated measurements. This information in real time allows the process to be adjusted, but this new flexibility must be built into the process control strategy — a challenge that will require program changes on existing lines, or consume development resources when engineering new lines. In addition, production equipment should have redundant systems in place in the event PAT equipment should fail.

Costs and Risks of Not Investing in PAT

Making a business case for PAT is not straightforward because it is difficult to estimate future returns from improved quality or the lower costs of generating less waste. A PAT investment is not just in equipment, but also in people and processes, so those costs must be amortized over a longer payback period. ARC recommends taking a holistic view to the PAT value proposition that not only considers the initial capital outlay, but also weighs the costs of organizational change against the long-term benefits.

The pharmaceutical industry is known for high-tech research and development but relatively low-tech manufacturing. PAT technology is changing that. In the past, the heavy R&D focus and strict, validated processes made it nearly impossible to improve manufacturing processes with optimization tools commonly used in other industries. Started by the U.S. Food and Drug Administration to proactively improve the productivity of American drugmakers, the PAT initiative has become a chance for all manufacturers to add sophisticated technology to their process control with the cooperation of government authorities, rather than being held back by regulations. As the industry adopts PAT, pharmaceutical manufacturers may not be able to afford not to invest in PAT due to the risk of losing competitiveness.

Making a Batch Process Continuous with PAT

Faced with the pressures of globalization, some pharmaceutical manufacturers are answering their challenges with innovation. One of the top five global pharmaceutical manufacturers recently employed Sipat in a pilot project. Instead of just designing PAT tools into the tablet-making process, the company took the bold step of converting a classic batch process into a continuous process using Sipat. The goal was to take an innovative approach to improve some of the chronic inefficiencies inherent in this type of process, including high inventory requirements, long changeover times, disconnected processes, high process losses and low asset utilization.

The production line applies high-shear wet granulation process technology to produce oral solid dosages (tablets). The line consists of unit operations for granulation, drying, milling, blending and compression, and is controlled by two PLCs (SIMATIC S7-300) with WinCC for line visualization. Near-infrared (NIR) analyzers measure properties such as moisture, content uniformity and assay, and laser diffraction is employed for particle-size detection.

In this application, Sipat software collects and evaluates multivariate product quality information (CQAs), such as loss on drying or particle-size distribution, as well as univariate process data such as speed, torque, temperature and compression forces for closed-loop model predictive control. Quality parameters are shared with a manufacturing execution system (SIMATIC IT) that tracks this information for real-time release reporting. Sipat allows parameters such as moisture

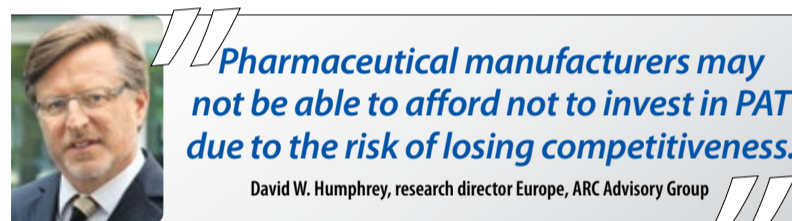


content, content uniformity, hardness and thickness to be adjusted should a batch start to veer out of spec, thus maintaining quality in real time and greatly reducing the risk of having to scrap a whole batch

ous flow of materials that don't need to be stored at a single location. The result is smaller requirements for clean room space, lower clean room HVAC energy usage, fewer operators, and less work-in-process.

Extrusion is essentially a mixing process during which process parameters for temperature, mixing and feed rate can be adjusted. Extrusion occurs when the mixture is forced under pressure through an orifice in the die. As the extrudate leaves the die, the molten substance drops between two chilled rolls, causing its temperature to fall below its glass-transition temperature and form a brittle glass sheet. The sheet is then broken into smaller flakes of glass to make it easier to mill. In the final steps, the material is milled, blended with excipient, and then lubricated and compressed into a conventional solid oral dosage form.

According to MSD, the HME platform can be easily scaled up to production levels or scale-up can be eliminated, depending upon product volume forecasts, because the extruder used for most of process development is essentially the same size as the one used later in production. If scale-up is required, CQAs remain the same while process parameters are scaled up to manufacture large batches of extrudate — up to several thousand kilograms. After the successful development and scale-up of a pilot project, MSD has now deployed the HME platform to additional sites.



David W. Humphrey, research director Europe, ARC Advisory Group

at the end of the process. By using PAT tools, company engineers were able to deepen their process understanding much faster. The scale of the process equipment used for continuous manufacturing in the development phase is the same as for commercial production, so the company was able to eliminate the scaling-up process.

According to the manufacturer, the new continuous process concept was developed within two weeks and the line was producing tablets reliably and with excellent quality after just six months. The in-line quality checks now make possible real-time release with significant increase in efficiency versus traditional batch methods with end-of-line QC. Interestingly, the equipment has a substantially smaller footprint — requiring only about a tenth of the space needed by an equivalent batch line. The reason is that a batch process requires all raw materials to be stored locally during the batch process. A continuous process, on the other hand, employs a continu-

Hot Melt Extrusion as a Continuous Process at MSD

Extrusion is a process commonly used to manufacture plastic parts by forcing molten material through a die under pressure. Merck Sharp & Dohme Corp. (MSD), a subsidiary of Merck & Co., employs a hot-melt extruder (HME) in a process for manufacturing solid oral dosages. This process allows a drug substance to be stabilized in its amorphous form within a polymer matrix, increasing solubility and in vivo exposure, which is useful when the active pharmaceutical ingredient has low solubility. The HME process combines multiple steps such as mixing, melting, degassing and densification, which increases efficiency by reducing the number of unit operations. MSD employs PAT tools and Sipat software from Siemens, using Fourier-transform near-infrared (FT-NIR) spectroscopy to monitor form change, assay and uniformity of the mixed substance.

NOTE:

This is the second of two articles from David Humphrey on process analytical technology (PAT). Part 1 was published in issue 3-4/2015 of CHEManager International.

Last Word

Quality by Design takes a different approach to ensure consistent levels of quality by allowing for flexibility during the manufacturing process. PAT tools play a crucial role in the implementation of QbD by providing the real-time feedback that allows operators to keep CQAs in spec by adjusting processes during operation. At the same time, quality data collected during the process can take the place of end-of-line QC, drastically cutting batch release times. The many business benefits of employing PAT tools are highly attractive.

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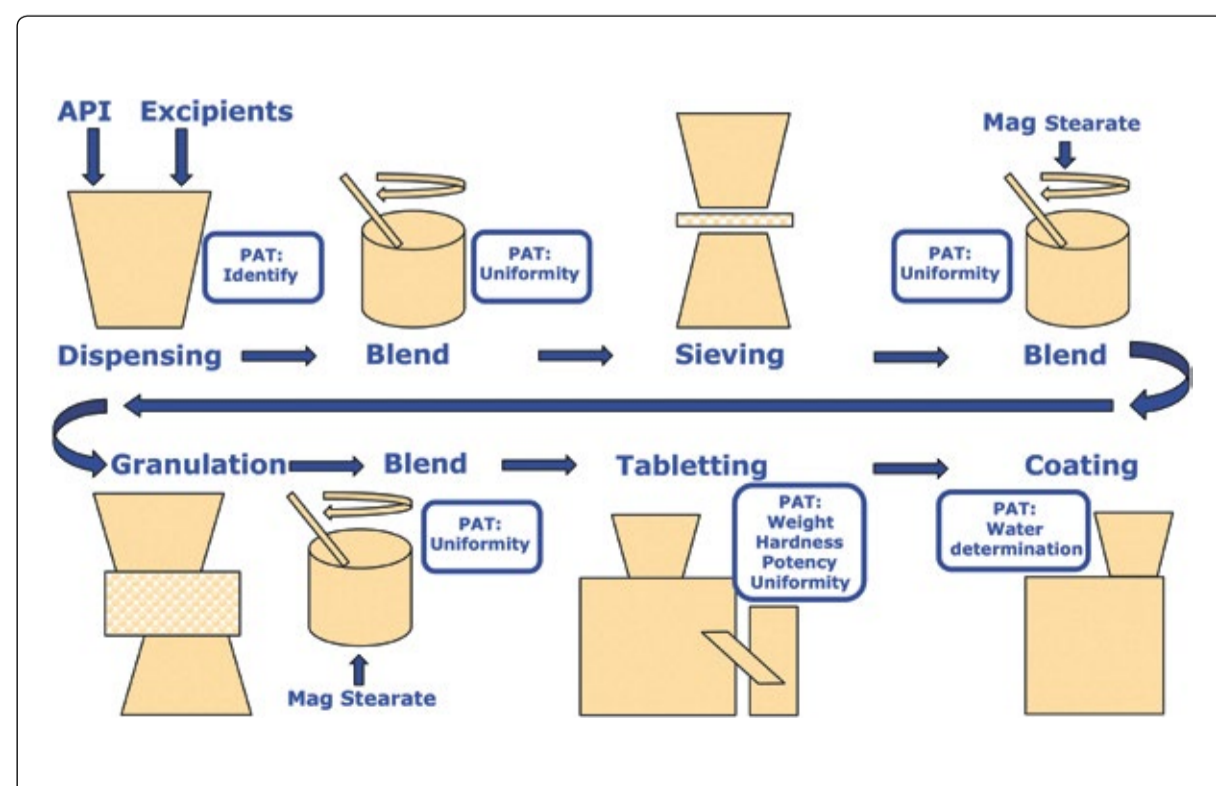


Fig. 1: PAT measures CQAs after each unit operation to ensure in-process quality.

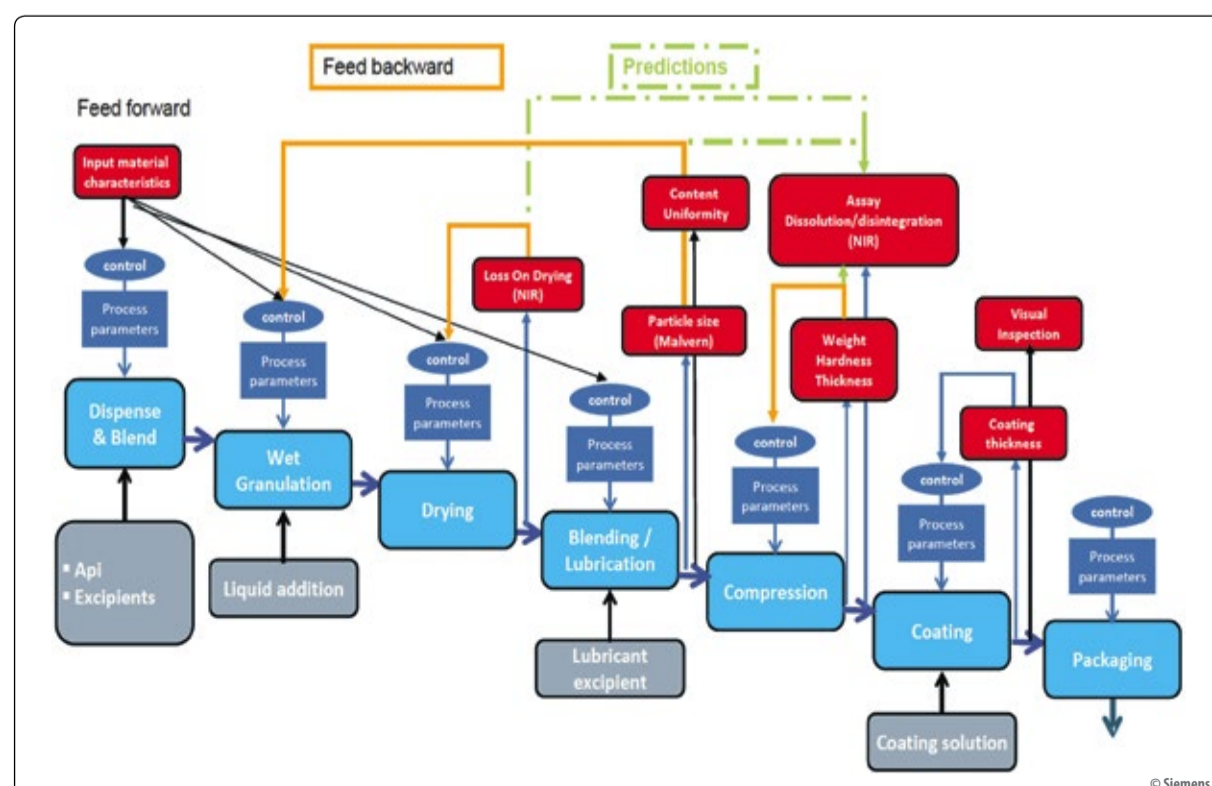


Fig. 2: Using Sipat to turn batch tablet making into a continuous process with savings in space, energy use and waste. (Source: Siemens)

Intellectual Property in China's Chemical Industry

Companies Will Have to Prevent, Detect and Respond to IP Loss to Access Growing Market

Chemicals are an increasingly mature industry with a high degree of competition. In this situation, industry participants need to consider how to differentiate themselves and stay ahead of their rivals. Superior intellectual property is such a differentiating factor. It allows companies to participate in market segments with a smaller number of competitors and higher margins. However, intellectual property is only a differentiating factor as long as it is restricted to a limited number of players.



Nick Blank, Blackpeak Group



Dr. Kai Pflug, CEO, Management Consulting — Chemicals



For Western chemical companies, the threat of exposing critical intellectual property has therefore frequently been a key concern and an obstacle in expanding activities in China, particularly in the areas of production and research. However, China is already the biggest market for chemicals in the world, and current growth rates compared with other countries suggest that its importance will increase even further. Thus excluding China as a location for chemical production and chemical research is not a realistic long-term option for companies aiming to be leading global players. Without local production, chemicals producers have serious disadvantages with regard to cost and delivery times. Without local research, it is almost impossible to create products sufficiently adapted to local needs.

As a consequence, Western players will have to bring more of their intellectual property into China. At the same time, they will have to improve the way of protecting this IP. Similarly, Chinese chemical companies, particularly those that have already been in business for some time and thus have gathered their own intellectual property, must also protect their IP in order to avoid competition from other domestic companies.

The protection of IP can broadly be split in different phases — prevention of IP loss, detection of IP

loss, and response to the loss. We will discuss these issues separately.

Prevention of IP Loss

Any strategy to prevent IP loss must start with a definition and prioritization of the IP owned by the company. It is important to note that IP is not at all limited to protecting patents. IP covers a far broader area. For example, it also includes items such as customer lists, information on pricing, experience in how to best train staff, know-how in production, HSEQ (health, safety, environment, quality) knowledge, information on chemical formulations, names of key staff, supplier lists, specifications of raw materials, etc. While identifying these IP items, the location of the respective IP within the company should also be cataloged. Subsequently, the intellectual property items should be prioritized based on the likely damage a loss of each item would cause to the company. This allows management to focus on the most critical IP items and apply corresponding levels of protection. However, prioritizing IP is not as straightforward as it may seem. Opinions may differ about what constitutes key IP. For example, the legal team's priorities may differ from those of the research team and so on. As all employees have a role in

protecting IP, it is imperative to consider a broad range of perspectives.

After key IP assets are identified, measures should be defined to reduce the exposure risk for individual IP items. Obviously, these measures will affect many different areas, and we will only give a few selected examples.

Facility design: Chemical companies setting up new facilities may consider designing them from the ground up with security in mind. For example, conference rooms for meetings with external guests may be located at the main entrance, thus preventing visitors from walking through a facility unattended. While closed-circuit TV cameras may be helpful, this investment is a waste if the security staff is not sufficiently trained to use the system. Controlling IP at a single centralized facility with robust security is easier than operating many smaller locations.

Black box approach: Bringing IP in as a "black box" from outside (this may be from outside of China for multinational companies, or from outside of, e.g., a production site for a domestic company). This can apply to a variety of items including mixtures of raw materials, equipment parts or software. Building equipment in China could mean entrusting contractors with schematics and designs. The same contractors may see business opportunities supplying

the same equipment to competitors later.

Access to IP: IP should be available only on a need-to-know basis, i.e., access to specific IP should be limited to the staff requiring it for their specific work.

IT setup: Basic precautions such as utilizing computers without USB slots, or limiting access to personal email websites, should be taken to prevent theft of IP. In one case, an employee downloaded a series of control settings and other key technical and environmental data onto a USB device just days before he resigned. Even though the company learned about the incident and took action against the employee, it was too late to undo damage caused by the employee passing the information to others.

Employee retention: Companies must be strategic about protecting their core assets — knowledgeable employees. This includes creating long-term career plans and incentives for employees with access to sensitive IP. This is particularly important for segments booming in China. In these segments, the danger of competitors poaching knowledgeable employees is particularly high. At the same time, companies should conduct adequate due diligence on new hires to understand if they left any former employers under a cloud of suspicion.

Detection of IP Loss

Keeping an eye on the markets; listening to customers, suppliers and employees; and taking whistleblower reports seriously are all good measures to detect IP loss. The human resources department also can play an important role, particularly by conducting exit interviews. These interviews may help detect a problem with an employee who is leaving. Even more importantly, as employees leave, they may feel more comfortable reporting a colleague's inappropriate behavior.

Suppliers and customers are also good sources of intelligence. They are the ones who are usually approached by new companies purporting to "offer the same technology at a better price," which is a red flag for IP theft. Suppliers also have opportunities to visit a range of plants, and may spot equipment and design infrastructure that copies the original. Informal reports from these sources are often the first step in detecting IP loss.

Response to IP Loss

If a chemical company suspects patent infringement or theft of a trade secret, it should investigate to gather more information. As a first step, it is important to understand the background and shareholding of

the potential infringer. This will help companies formulate legal strategies and choose jurisdiction.

Next, any publicly available information that can demonstrate a link between the original technology and the infringer should be identified. Technicians may have carelessly disclosed too much about a company's trade secrets in an academic paper. Or a Chinese media article may have photos of equipment under construction and specifications about production capabilities. A suspected infringer's website may disclose product specifications (sometimes in Chinese language only) that are helpful in building a case. Lastly, local environmental regulators may require technical information, disclosed within the environmental impact assessment report, to be publicly available for a period of time.

After a thorough review of all publicly available materials, investigators can focus on gathering evidence including interviews, photographs of equipment, product samples, product brochures and certificates of analysis. Clients should discuss in advance with risk consultants and legal counsels how any such evidence might be used in court. This can help guide collection of the evidence so that it is admissible in court.

Changes to the Chinese legal system may also make it easier for companies to litigate and recover damages. China announced the establishment of specialized IP courts in Beijing, Shanghai and Guangzhou. The cases heard by these courts will be technically complex matters such as patents and technical trade secrets. The Supreme Court has also proposed removing limitations to damages that can be claimed by patent owners.

No Total Security

Admittedly, all the measures outlined above will only limit the risk and the consequences of IP loss — there are no guarantees to stop it. Some chemical companies have experienced significant IP loss, not in China, but in their Western home countries. This has obviously not stopped them from doing business there. And with the right strategy, companies will be able to achieve a similar level of IP security in China as in their Western markets.

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Lanxess Starts New EPDM Rubber Plant in China

German chemical producer Lanxess has started production at its new ethylene propylene diene rubber (EPDM) plant at Changzhou in China's Jiangsu Province.

Over the next several months, the company said it will be running sampling and approbation processes with customers. The new 160,000 t/y plant in Changzhou Yangtze Riverside Industrial Park, said to have access to "excellent storage and ship uploading facilities," will produce ten premium grades of EPDM tai-

lored to Chinese and Asian customers' needs.

With the gradual ramp-up of the new facility to its nameplate capacity, Lanxess said it will "complete" its global EPDM asset base. In fact, with the planned shutdown of the 70,000 t/y EPDM plant at Marl, Germany, by the end of this year, output will actually be reduced.

In announcing the planned closure simultaneously with publication of its annual results for 2014, in mid-March the Cologne-based com-

pany said the Marl plant is "the least competitive in its EPDM production network, due to its poor economies of scale and relatively high energy and raw material costs. Some 120 jobs will be slashed in the move.

Excessive investment in an over-supplied rubber market—in which Lanxess is the leading player—has been blamed for the dramatic profit slide that led to the forced resignation of former CEO Axel Heitmann in early 2014 and the subsequent departure of managing board member

Werner Breuers — who had responsibility for the group's Performance Polymers business — in August 2014.

"We still have significant overcapacity" for synthetic rubber, current CEO Matthias Zachert said at the annual results press conference. For 2015, he said the business will remain "challenging." Earnings of the Performance Polymers segment, which also includes engineering plastics, are expected to be in line with the 2014 figure of 808 million. (dw)

BASF Signs Coatings Deal in China

BASF's Coatings Division has signed a manufacturing agreement with Guangdong Yinfan Chemistry Co, a Chinese firm that recently opened a new production facility at Jiangmen City, Guangdong Province.

Under the agreement, Yinfan will manufacture automotive refinish coatings, targeting the non-premium segment, for BASF at the new plant, using the German chemical giant's formulas and technologies.

"Establishing a reliable, regional manufacturing footprint for automo-

tive refinish coatings is important for fulfilling the growing market demands," said Peter Fischer, senior vice president, Coatings Solutions Asia Pacific at BASF. Partnering with Yinfan "supports BASF's ambitious plan in this fast-growing market," he added.

Qingtao Zhang, Chairman of Yinfan, said his company is "fully committed to meeting the stringent quality requirements of BASF in automotive refinish coatings." (dw)

PEOPLE



Stefan Oschmann

Stefan Oschmann (57), currently deputy chief executive of Merck KgaA, will be promoted to replace current CEO **Karl-Ludwig Kley** (63). Oschmann would take on the new role next year after the group's annual shareholder meeting in April 2016 or in September next year at the latest, when Kley's current contract expires. The German drugs and chemicals maker last September appointed Oschmann, the head of its pharma business at the time, as deputy chief executive from January 2015 on, sharing strategic management functions and representation of the company with Kley.



Udit Batra

Udit Batra (44), currently CEO and President of Merck Millipore, has been appointed to lead the combined life science business of Merck Millipore and Sigma-Aldrich once the acquisition of Sigma-Aldrich has been successfully completed. Batra has served as CEO and President of Merck's life science business Merck Millipore since March 2014. He joined Merck in 2011 to head the Group's Consumer Health business. Prior to that, he worked at Novartis Vaccines and Diagnostics, where he was head of Global Public Health and Market Access. He served in a range of executive management positions at Novartis, including global Head of Corporate Strategy and Country President for the Pharma Business in Australia.

Marie Ffolkes has been appointed to the position of President, Industrial Gases–Americas at Air Products, effective May 18, 2015. Across North and South America, Ffolkes will have accountability for safety, plant operations, distribution, supply chain, procurement, sales, marketing, as well as regional operations. She joins Air Products from Tenneco where she was global vice president and general manager of its Global Elastomer & Ride Performance Group. Prior to Tenneco, she served at Johnson Controls as vice president and general manager for its South American Region's Automotive Group based in Sao Paulo, Brazil. Ffolkes also formerly worked for General Electric in a variety of roles, including senior manager, Global Mergers & Acquisitions–GE Healthcare. She holds an MBA from Columbia Business School and a B.S. from Brooklyn College.

Svein Tore Holsether will become president and CEO of Yara International with effect from October 2015. He will succeed acting CEO **Torgeir Kvidal**. Holsether is currently serving as president and CEO of Sapa Group, a position he has held since 2011. Kvidal, who has been acting CEO since October 2014, will return to his position as CFO. Holsether was born in Norway in 1972 and holds a BSc in finance from the University of Utah.

Mario Mehren, currently a member of the board of executive directors of Wintershall and responsible for Exploration & Production Russia, North Africa and South America, has been named president of BASF's oil and gas division, effective July 1, 2015. In this function he will be head of Wintershall. He succeeds **Dr. Rainer Seele**, who has been named CEO of OMV, Vienna, Austria, effective July 1, 2015. Seele has been head of Wintershall since 2009.

Michael Pontzen has become a member of Lanxess' management board on April 1, 2015. He assumed the role of CFO at the specialty chemicals company. He will succeed **Dr. Bernhard Düttmann**, who left the company at the end of March, 2015. Düttmann has been CFO at Lanxess since 2011. Michael Pontzen was born in Mönchengladbach, Germany, in 1969. After studying business administration, he held various positions at Ferrostal, MAN and EADS. He joined Lanxess in November 2004 as head of the investor relations group. In October 2008, he became head of corporate finance within the treasury group. He additionally assumed responsibility for risk and cash management from spring 2009. Pontzen has been head of the corporate controlling group since January 2012.

Peter Vanacker (49) succeeded **Dr. Martin Wienkenhöver** as CEO of CABB on April 1, 2015. Wienkenhöver will retire later this year after a transition period and then serve on the company's advisory board. Vanacker has served for about 10 years as member of the executive committee of Bayer Material-Science and ran its global polyurethanes business from 2004 to 2011. He was also Chief Marketing and Innovation Officer of Bayer Material-Science. Most recently he has been CEO of Treofan Group.

Oliver Albrecht took on the role as new managing director of Vetter on April 1, 2015. He replaces **Max Horn** who left the company in June 2014. In his new role as Managing Director, Albrecht will be responsible for two of the eight company divisions, the first of which is comprised of Finance, Controlling and IT. The second division includes Corporate Development, Legal and Corporate Compliance. In recent years, he was CFO of SHW headquartered in Aalen, Germany and acted also as an independent consultant for mid-sized companies. Albrecht previously held positions at Centrotherm Photovoltaics and in the financial and banking sector. He holds a diploma in Business from the University of Mannheim, Germany.

Dr. Giorgio Bruno has been appointed General Manager of Recipharm Italia. In this role, he will serve as CEO for all of Recipharm's Italian operating companies. Dr. Bruno has long established senior management experience from within the pharmaceutical industry, especially in the area of manufacturing. He has worked in both Italian and multinational pharmaceutical companies covering a wide range of disciplines. In particular he has had responsibility for quality and manufacturing at such companies including Parke Davis, AstraZeneca and Corden Pharma. Dr. Bruno also has held a number of positions within Italian based industry associations. He holds a Ph.D. in Pharmaceutical Chemistry and Technology from the University of Milan.

Biorefineries and Chemical Processes

As the range of feedstocks, process technologies and products expand, biorefineries will become increasingly complex manufacturing systems. This book presents process modelling and integration, and whole system life cycle analysis tools for the synthesis, design, operation and sustainable development of biorefinery and chemical processes. Topics covered include an introduction to the concept and development of biorefineries, tools, a look into biorefinery systems as well as four

case studies, additional exercises and examples. This textbook is designed to bridge a gap between engineering design and sustainability assessment, for advanced students and practicing process designers and engineers.

► **Biorefineries and Chemical Processes**
Jhuma Sadhukhan, Kok Siew Ng, Elias Martinez Hernandez
John Wiley & Sons
Price: € 97.90
ISBN: 978-1-119-99086-4

NanoInnovation: What Every Manager Needs to Know

The innovative, easy-to-read guide to the „nanoscale revolution“, this book provides essential knowledge of nanotechnology and clearly explains the fundamentals of nanomaterials and properties. Written by a technology pioneer, the book shows feasible strategies for managers in nanotech companies, including how to communicate with nanotech engineers and developers, coupled with examples of emerging technologies and innovations. A level-headed discussion of critical issues for decision makers and stakeholders rounds off

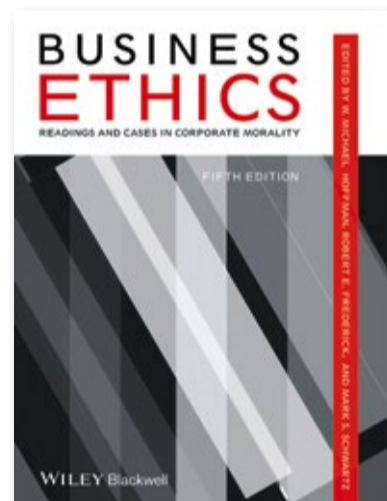
the contents. The result is a vivid, yet realistic look at nanotechnology, providing orientation in the nano world: major lines of research, key players in R&D, as well as social, economic and political issues.

► **NanoInnovation: What Every Manager Needs to Know**
Michael S. Tomczyk
Wiley-VCH Verlag
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ISBN: 978-3-527-32672-3

Business Ethics: Readings and Cases in Corporate Morality

The fifth edition of Business Ethics addresses current, intriguing, often complex issues in corporate morality

through 53 readings and 30 pertinent case studies. Significantly updated, it includes new leading articles, related current cases, and mini-cases based on MBA student dilemmas and provides impartial, point-counterpoint presentations of different perspectives on the most important and highly contested issues of business ethics. All authors have substantial experience in teaching, writing, and conducting research in the field.



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W. Michael Hoffman, Robert E. Frederick, Mark S. Schwartz
Wiley Blackwell
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EVENTS

CESIO Congress, 1 – 3 June 2015, Istanbul, Turkey

The 10th CESIO congress will showcase an extensive scientific program on the main theme „Surfactants in a Globalising World—Creating new Possibilities“. In addition, business convention facilities will be offered to all participants and their companies to do business efficiently. Sessions, posters and exhibition will cover the scientific, economic, technical, as well as safety and regulatory aspects of surfactants and surfactant applications in the industry and consumer products. The CESIO Congress provides a good opportunity to meet with key contacts along the surfactant value chain.

► www.cesio-congress.eu

Achema, 15 – 19 June 2015, Frankfurt, Germany

With 3,800+ exhibitors and almost 170,000 participants, Achema is the leading international exhibition congress on Chemical Engineering, Environmental Protection and Biotechnology. Environmental Protection and Biotechnology are integral general topics at Achema, both exploit the technological solutions enabled by process engineering. As a result, the synergistic concept of production-integrated environmental protection has become one of the hallmarks of Achema. In answer to the great demand, the event offers additional exhibition space for Pharmaceutical, Packaging and Storage Techniques.

► www.achema.com

Chemspec Europe, 24 – 25 June 2015, Cologne, Germany

Chemspec Europe is the only dedicated event for custom, fine and specialty chemicals professionals and end users from segments like pharma, biotechnology, crop protection, cosmetics, contract manufacture, and many more. The trade show with a focused range of exhibits and easily identified feature areas will be accompanied by a range of conferences, seminars, workshops and networking opportunities, as well as new features to celebrate the 30th edition of the event. Chemspec Europe provides a perfect opportunity to connect with buying teams from every type of industry sector ; customers, distributors, end-users and new prospects.

► www.chemspec-europe.com

Specialty & Agro Chemicals America, 9 – 11 September 2015, Charleston, USA

Specialty & Agro Chemicals America focuses on the chemical products and technologies that have specific applications for the agrochemical and specialty chemical manufacturing markets. Participants cover a diverse range of chemical end-uses including adhesives & sealants, agriculture & crop protection, coatings & paints, cosmetics & personal care, flavors & fragrances, oilfield & lubricants, pharmaceuticals, plastics & composites, and water treatment. The conference program includes a mix of presentations focused on both the agrochemical market and broader specialty chemical industry.

► www.chemicalsamerica.com

ChemOutsourcing, 14 – 17 September 2015, Long Branch, USA

ChemOutsourcing is the largest USA-based API show attracting annually around 700 chemists from the pharmaceutical, biotech, and chemical industries. The show focuses on API development spanning early drug discovery through chemical development and commercial supply. Attendees are executive scientists from pharmaceutical companies responsible for sourcing starting materials, intermediates, and APIs, and experienced in working with Contract Research and Contract Manufacturing Organizations (CROs & CMOs). Likewise, the show is attended by high-level executive suppliers of these services and products, including 100+ exhibitors.

► www.chemoutsourcing.com

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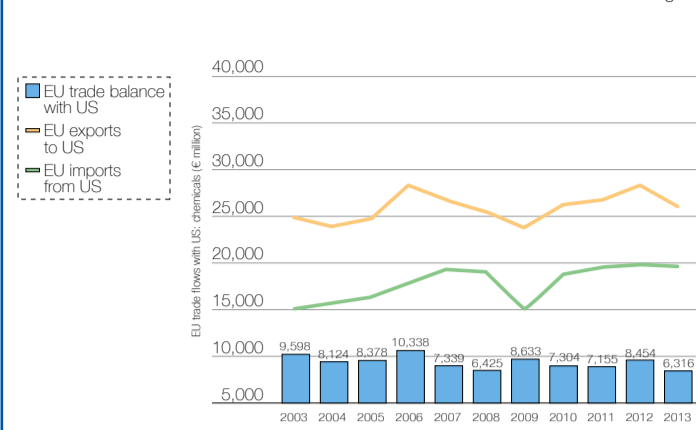
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Creating a Market Leader in Research Chemicals & Equipment
– Interview with Udit Batra, Merck
- **CHEMICALS**
Future Growth: Chemtura OMS is Committed to Delivering Customer Value
– Interview with Alan Swiech, Chemtura
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EU Chemicals Trade with Major Partners

EU chemicals trade flows with the United States Fig. 1

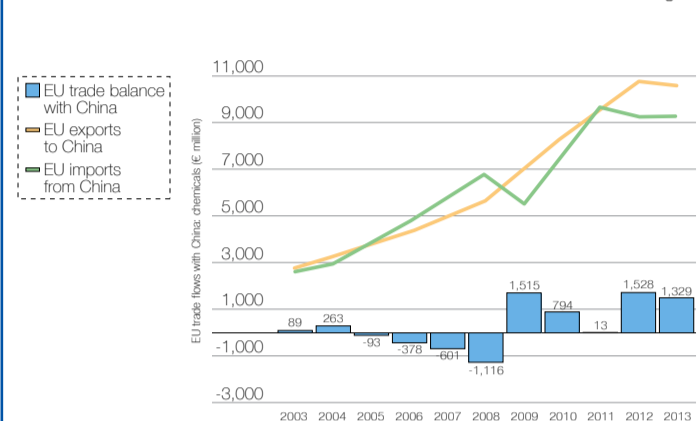


Source: Eurostat (Comext), CEFIC 'Chemical Connections' Report, 2014 © CHEManager International

EU - US Chemicals Trade

Extra-EU chemicals trade in 2013 totaled €229.3 billion with exports reaching €139 billion, thus delivering an EU chemicals trade surplus of nearly €49 billion. The top 10 EU chemical trade partners accounted for 70% of exports and imports (c.f. the article on page 10). The US is by far the EU's biggest trading partner in chemicals. It buys €26 billion of EU exports, nearly 20% of the EU chemicals total every year, whilst providing €20 billion of EU imports. The drop in exports since 2012 is mostly due to petrochemicals that account for 46% of EU chemicals exports and have been negatively affected by the US shale gas boom, hence lowering the total export volume.

EU chemicals trade flows with China Fig. 2

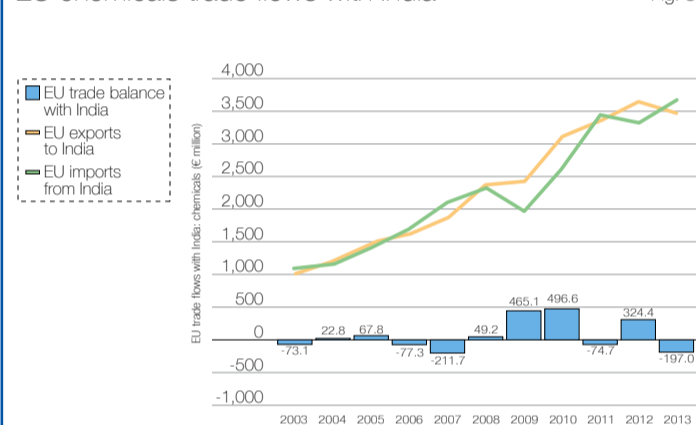


Source: Eurostat (Comext), CEFIC 'Chemical Connections' Report, 2014 © CHEManager International

EU - China Chemicals Trade

Within a decade, China has become world leader in chemical output by a wide margin, with annual sales of €1,047 billion, a 33.2% share of the global total and far ahead of the EU's €527 billion sales and 16.7% global market share. Today China is the EU's second-biggest chemicals trading partner, accounting for 8.7% of EU exports. While Chinese chemical companies are gradually increasing their focus on specialty chemicals, the country will remain a major importer of commodity chemicals for some time to come. Chinese expansion does not necessarily imply Europe loses out. Rather, there are wins for both, and China offers many opportunities.

EU chemicals trade flows with India Fig. 3

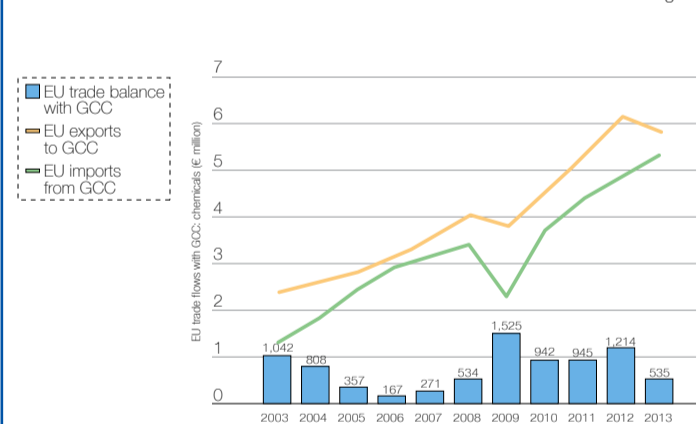


Source: Eurostat (Comext), CEFIC 'Chemical Connections' Report, 2014 © CHEManager International

EU - India Chemicals Trade

India is the world's second-largest emerging market, and the EU is India's biggest source of foreign direct investment. EU-India trade in goods and services accounted for nearly €73 billion in 2013, of which €7.2 billion was in the chemicals sector. EU chemicals trade with India tripled in value during the last decade. Exports in 2013 reached €3.5 billion, of which petrochemicals, specialties and polymers accounted for almost one third each. Basic inorganics and consumer chemicals share the remaining 11% almost equally. But, still, India buys only 3.1% of EU chemical exports, which is modest compared to potential trade between the two economies.

EU chemicals trade flows with the GCC Fig. 4



Source: Eurostat (Comext), CEFIC 'Chemical Connections' Report, 2014 © CHEManager International

EU - GCC Chemicals Trade

In 2013, the Gulf Cooperation Council (GCC) was the fifth largest trade partner of the European chemical industry, with a trade flow of €11 billion. Thanks to sustained economic growth, since January 2014 the GCC countries no longer qualify under the Generalised Scheme of Preferences (GSP) that allows preferential tariffs for the least developed countries. They are subject to full import duties when exporting chemicals to the EU. This matters because thanks to their huge output of low-cost fossil fuels, GCC members are massive exporters of energy-intensive petrochemicals and polymers. Thus, the EU exports primarily specialties and consumer chemicals into the GCC. (rk)

EU Commission Finalizes New GMO Import Rules

The European Commission has finalized new rules allowing member states the freedom to restrict or prohibit the import of genetically modified crops for food or feed, even if they have been approved by the EU legislative authority.

This proposal, which mirrors a directive issued by the EU in March covering the cultivation of GM crops, will now be sent to the European Parliament and the Council for a vote.

Under the latest rules, to opt out of approving an imported crop for domestic use, member states will have to provide reasons not already assessed by Brussels authorities, which currently include effects on human health and animal health and potential damage to the environment.

Suggested reasons could include local planning restrictions or lack of public consensus about the desirability of the product.

"The objective is to give national governments' view the same weight as scientific advice in the authorization of GMOs in their territory," Competition Commissioner Margrethe Vestager, standing in for Health Commissioner Vytenis Andriukaitis, said at a press briefing to announce the proposals.

A deadlock in GM crop approvals has been a major hindrance to their distribution in the EU up to now. Only one is currently approved for commercial cultivation, Monsanto's insect-resistant maize, MON 810, which is grown in Spain and Portugal.

Of the 129,000 hectares of GM maize grown in the EU in 2012, figures show that Spain accounts for more than 90%.

Currently, 58 GM crops are approved for use in feed and food. While very few are on sale for human consumption, an estimated 60% of the EU's requirements of vegetable proteins for cattle nevertheless are met by imported soy and soy meal from countries such as the US, where GM cultivation is widespread.

The US government and the European biotech industry have repeatedly complained about the EU's inaction in approving GM products. The association representing the interests of the biotech industry, EuropaBio, contends that the Commission has not cleared any crops since November 2013.

Additionally, GM crops are a point of controversy in negotiations between the EU and the US over the Transatlantic Trade and Investment Partnership free trade deal, TTIP.

While the US wants Europe to open its doors to these products, many environmental and health advocates are vehemently opposed.

In a statement, US Trade Representative Michael Froman expressed disappointment over the Commission's plans to let EU national governments decide for themselves whether to allow GM imports. "Proposing this kind of trade-restrictive action is not constructive," he said, adding that it appears to divide the European trade bloc into 28 separate markets.

For their part, European environmental organizations are fearful that the proposed legislation does not provide a firm legal basis for member states to opt out, exposing them to legal challenges from biotech interests.

The right for companies to sue national governments seen as restricting trade is an especially controversial talking point, which has consistently held up TTIP negotiations.

A lack of a consensus about whether this right should be excluded from any deal is one of the reasons leading European politicians such as Germany's vice chancellor, Social Democrat Sigmar Gabriel, predict that the agreement may never be concluded. (dw)



Mediterranean Biochemistry — Pesto (Italian for "crushed") is a paste made out of pine nuts, garlic, hard cheese, olive oil, and — above all — basil. The dish originated in Genoa, Italy, where basil (*Ocimum basilicum*) played an important role as early as the Middle Ages as a medicinal agent. When we take pesto prepared from fresh basil, spread it onto steaming pasta, and allow the inimitable fragrance to rise up, we ask ourselves: with what aromatic molecules is this plant blessing us? Prof. Klaus Roth answered this question in an article in Wiley's journal "Chemie in unserer Zeit". The principal component of the Mediterranean-type basil — usually used for pesto — is linalool. Other components are α -pinene, β -pinene, 1,8-cineol (eucalyptol), camphor, methyl chavicol (estragole), eugenol, α -bergamotene, and τ -cadinol. And now: buon appetito!

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Index

A. Schulman	5, 15	DuPont	2, 5	Perrigo	3
Abbot	3	Eastman Chemical	8, 9	Plantic	6
AbbVie	5	Emerald Kalama	6, 13	PolyOne	8, 9
Abraxis	12	Evonik	5, 7, 13	PPG	2
Actavis	3	ExxonMobil	13	Ranbaxy	5
Air Liquide	7	Ferrostaal	19	Recipharm	5, 19
Air Products	19	Florigene	14	Regen Waters	16
Allergan	3	Gazprom	3	Revecoat	2
American Chemistry Council (ACC)	3	General Electric	19	Rockwood	8, 9
ARC Advisory Group	17	Guangdong Yinfan Chemistry	18	Roquette	7
Arkema	7, 8, 9	Hamilton Bonaduz	1	SABIC	3
Arvinas	12	Harvard University	1	Saltigo	3
Ashland	2, 7, 8, 9	Henkel	2, 13	Sandoz	3
AstraZeneca	19	Hexpol	8, 9	Sanofi	5
Axon	2	Highlander Partners	2	Sartorius	5
Bachem	5	Huntsman	7, 8, 9	Shell	1
Balmex	5	IMCD	2	Shin-Etsu	12
BASF	5, 7, 12, 13, 14, 18, 19	Ineos	7	Siemens	7, 17
Bayer	5, 7, 9, 14, 15, 19	Integrated DNA Technologies	15	Sigma-Aldrich	19
BCD	6, 13	Invista	6	Sivance	5
Bellona	3	Kushalchand	2	SOCMA	3
Beumer	7	Lanxess	15, 18, 19	Solvay	3, 11, 13, 15
BG Group	1	Management Consulting - Chemicals	18	Solvic	15
BioOutsource	5	Merck	12, 19	Sun Pharmaceutical	5
Blackpeak Group	18	Mercosur	10	Syngenta	9
Boston Consulting Group	8	Milliken & Company	5	Synthomer	7
Braskem	3	Moberg Pharma	5	Synthos	5
Caldic	6, 13	Monosol	13	Synthos	8, 9
Camelot Management Consultants	4	Monsanto	5, 12, 14	Taxon Biosciences	5
CEFIC	10, 20	Mylan	3	Teva	3
Ceresana	11	Niteo	2	Total	3
CESIO	11	Novamelt	2	Triplan	Titelseite
Chattem	5	Novartis	19	UCB	5
Chengdu Rongsheng Pharmaceutical	7	Novozymes	13	Union Instruments	2
Croda	13	Olfin	1	Valeant	3
Daiichi Sankyo	5	Omni-Chem	13	Veolia	15
Dechema	15	Oxea	12	W.R. Grace	8, 9
Dow	1, 15, 16	Paulson	3	Westlake Chemical	8, 9
Dr. Reddy's	5			Wiley	9, 19
DSM	6				