



Markets & Companies

Smart reactions in the crisis: Adjusting for a longer downturn

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Chemicals

An interview with Evonik's Dr. Hans-Josef Ritzert offers insights into pharma market

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Changing business for good

Celebrating The Human Footprint

Michael Braungart Makes the Case for Good Chemistry

Newsflow

Clariant has confirmed that it will shed a further 500 jobs; affected plants will be announced in mid February and will include the company's paper and textile units, according to the German newspaper Handelszeitung. The company, which has been hit hard by the downturn in key markets such as automotive and construction, cut more than 3,000 of its workforce last year, and at the end of 2009 employed less than 18,000 people worldwide. A Clariant spokesperson said that employees at Swiss plants could also be affected by the measure. The company plans to announce which plants will be cut by mid February.

Dow Chemical has closed the sale of its acrylic acid and esters business and a specialty latex business to Arkema. Dow first announced the \$50 million sale to Arkema in August. The company has been under Federal Trade Commission mandate to divest some of its assets acquired when it purchased the specialty chemicals company Rohm & Haas last year. The sale involves an acrylic acid and esters plant in Clear Creek, Texas, and the specialty latex business.

The supply bottlenecks at two BASF sites remain; a group spokesperson confirmed that the plants producing the PA 6 and PA 6.6 compounds of the Ultramid and Miramid ranges meanwhile have restarted. However, BASF would only be able to meet its existing orders and that force majeure remained in place, the spokesperson said. The force majeure declared in August 2009 on hexamethylenediamine from its plant in Seal Sands, UK probably would not be lifted before the end of the first quarter this year.

The polyurethanes division of Huntsman has established a new joint venture in China with local partner Jurong Ningwu Chemical to research, develop, manufacture and sell base polyether polyol products. The new company based at Jurong City, in Jiangsu province between Nanjing and Suzhou, will trade as Jurong New Ningwu Chemical

Air Products has announced operating results for the first quarter of fiscal 2010. Earnings were up 72% year over year.

Good Design – Michael Braungart has something of a celebrity status in countries such as the Netherlands and the U.S., where he has inspired politicians and celebrities alike with his Cradle to Cradle concept. In his home country of Germany, however, the chemist is often labeled as an enviro-nut – a monicker usually reserved for the Birkenstock-loving, health-food store frequenting population. But Braungart is more realist than idealist, and his idea is simple: **Make products that are not "less bad," but rather products that are good for the environment. "We want to make triple top line designs: simultaneously good for the economy, good for society, and good for the environment,"** he says. In an interview with Brandi Schuster, Braungart takes the European chemical industry to task and encourages a new line of thinking.

CHEManager Europe: Does green chemistry exist?

M. Braungart: No. There is either good chemistry or bad chemistry.

What kind of chemistry is the European chemical industry producing?

M. Braungart: The situation is somehow very tragic, particularly after the disasters that have happened over the past few decades, like Seveso, Bhopal, Chernobyl, Exxon Valdes. We nearly lost a whole generation of good engineers, especially good chemists. One time I had a student tell me his girlfriend threatened to leave him if he continued to study chemistry. And so, now we have brilliant MBAs, we have great lawyers, but we don't have enough good scientists; a whole generation is missing. And many of those who did study chemistry did it out of opportunistic reasons. And others did it with a feeling of guilt: "Yes, I like to do chemistry, but it is a bad thing, so I try to make the best out of it."

Is the European chemical industry being run with a bad conscience?

M. Braungart: Yes; it is a type of guilt management thing. And this is a pity, because the European chemical industry gets marginalized because of this bad reputation. Companies like Akzo Nobel and DSM make about 50% of their profit with products that are younger than seven years. If they don't reinvent themselves every year, they lose the potential for innovation. And this potential means having creative people, having fun, having spirit and optimism. These are the qualities that disappear when chemical industry makes bad stuff or causes disasters.

For example?

M. Braungart: Take Bisphenol A in polycarbonate, which is used to make bottles for babies. Or when toys are analyzed and more than 600 problematic chemicals are found. Also, 21 years of analyzing breast milk have shown that it contains over 2,500 different chemicals. When a company makes stuff that accumulates in biological systems, it is simply bad chemistry.

What does that mean for the industry?

M. Braungart: The consequence is that the chemical industry is losing the brightest minds and people with MBAs are taking over the management; people who don't really understand the brilliance and the beauty of innovation in chemicals. When someone doesn't understand the chemistry, all chemicals end up seeming like bad things. Because of this culture of guilt management, many companies are trying to be less bad by becoming "eco-efficient", trying to be less bad. Instead of seeing the opportunities and potential

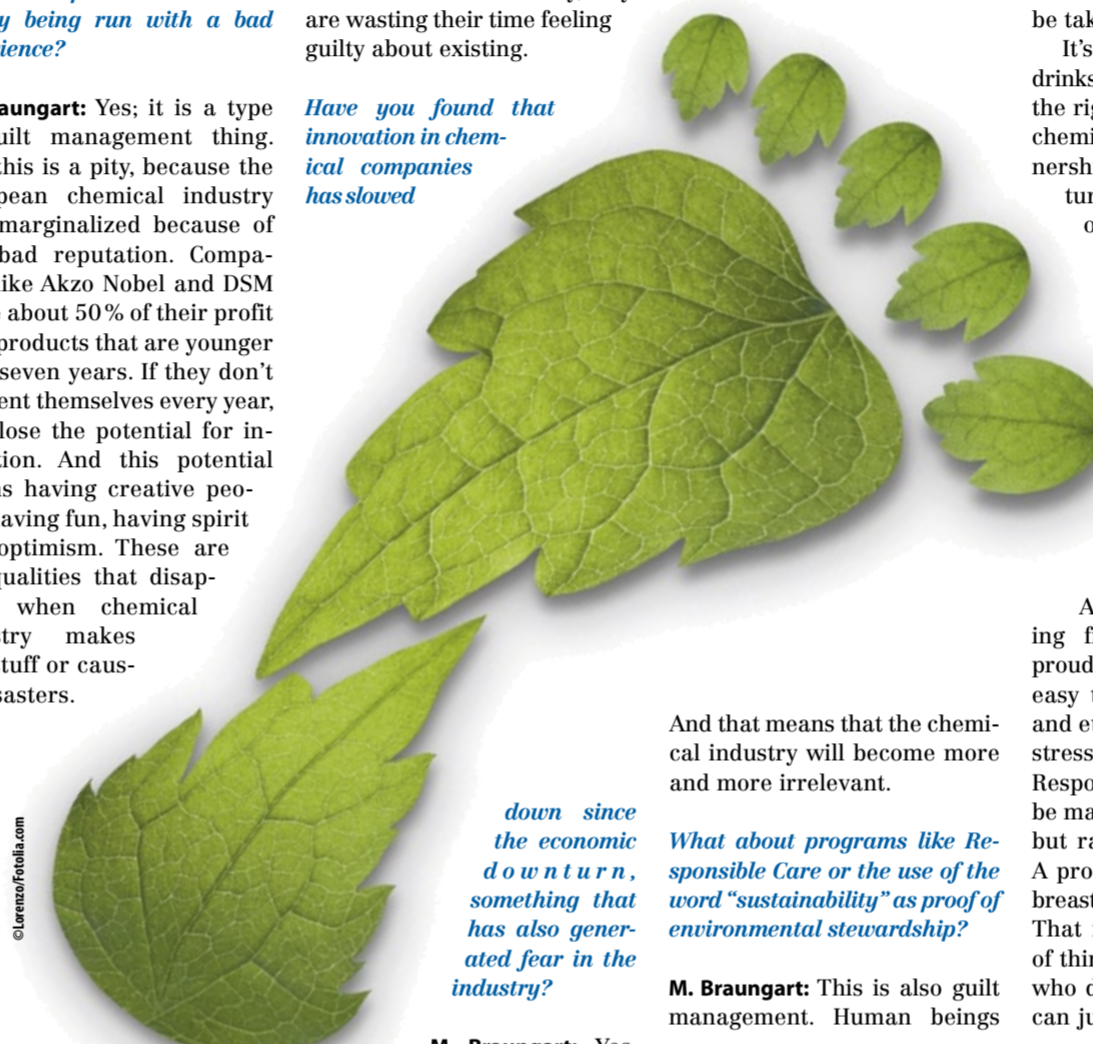
of innovation in chemistry, they are wasting their time feeling guilty about existing.

Have you found that innovation in chemical companies has slowed

down since the economic downturn, something that has also generated fear in the industry?

M. Braungart: Yes, but it's not only that. Companies are also laying off people who are not directly involved in production, because they cannot measure creativity in productive terms so easily. For example, EDTA can be made much cheaper in China and Korea than here in Europe. So when it is produced here, companies end up laying off all the people who aren't involved in the manufacturing. This means that innovations that are there don't reach the market, because the highly optimized wrong systems are dominating the market, and these highly optimized wrong systems can be done much cheaper in China.

With Reach, the erosion will go even faster. If you look at black dyes for T-shirts, for bras, etc., they need to go through Reach. When the same bloody T-shirt comes with the most toxic dye from China, it doesn't need to go through Reach. The legislation basically forces problematic production into other countries and makes extra costs for innovation here. Reach basically means regulating the past instead of organizing the future; it doesn't celebrate innovation. It just means stagnation on the existing level.



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And that means that the chemical industry will become more and more irrelevant.

What about programs like Responsible Care or the use of the word "sustainability" as proof of environmental stewardship?

M. Braungart: This is also guilt management. Human beings

have rights; they don't need to be taken care of.

It's very simple: When a baby drinks breast milk, that baby has the right not to be harassed by chemicals. I am more into partnership; partnership with nature, with colleagues. Without partnership, people are afraid. When saddled with fear, people are not creative. Without creativity, there is little room for innovation. That is why it is important to celebrate the human genius and to celebrate good chemistry – without romanticizing.

A real partnership is learning from nature and being proud of your own creativity. It's easy to forget about romance and ethics when you are under stress. That's why things like Responsible Care should not be made into an issue of ethics, but rather an issue of quality. A product that accumulates in breast milk is just a bad product. That is enough. With this line of thinking, the young scientist who doesn't want to be stupid can just say, "Hey, I am not an

idiot; I don't make stuff that accumulates in breast milk." Self-esteem is far more innovative than ethics in that case.

The concept of Cradle to Cradle celebrates good chemistry, chemistry which really supports people to be partners with nature – not just being victims of it. We have been destroying nature, because nature was not nice to us. There is no reason to romanticize. There is no Mother Nature.

There are many companies who are champions in eco-efficiency, but if you make the wrong things perfect, they are just perfectly wrong. It's typical for many chemical companies to try to be less bad, to minimize, reduce, avoid, doing all this carbon footprint calculation. Many companies are now trying to be to be carbon neutral. But you can only be carbon neutral when you don't exist. Mere existence means that you are not neutral. Take a tree, for example: no reduction, no avoidance. Trees make oxygen, which means that the concept of zero emissions does not exist in nature. It is, however, positive emissions, healthy emissions.

You once said that Germans are a danger for your Cradle to Cradle concept.

M. Braungart: It's not just the German way of thinking; it's more of the Northern approach. In Northern countries, if you walk through the tundra, your footprint means damage, erosion. That's why people try to minimize their footprint. If you throw a banana peel away on the tundra, it will stay there for 500 years. So that's why people put everything into incinerators. And that is such medieval behavior, to take fire to things whenever you feel intimidated. But that is not rational, because you end up losing materials that should go back into either technical or biological cycles. This is simply not related to real material flow management that supports good chemistry.

It is the Northern approach of guilt management to say: "Oh, I am so sorry that I am here, and I will try to be less bad." In reality, eco-efficiency and sustainable development are just different words for stagnation. If someone described their relationship with their partner as sustainable, I would feel really sorry for them. Innovation is



Michael Braungart, Founder, Environmental Protection and Encouragement Agency (EPEA)

(Picture: Enith Stenhuys)

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DECISIVE INFORMATION

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COLLABORATION

BASF and Linde Cooperate: Flue Gas Carbon Dioxide Capture BASF and Linde-KCA-Dresden (LKCA), a Linde Group subsidiary, will jointly market licenses and plants for the capture of carbon dioxide (CO₂) from flue gases in the future. The companies signed the cooperation agreement. Within this cooperation BASF will be responsible for the chemical processes for capturing CO₂, while LKCA will provide engineering and design as well as the construction of the facilities. The cooperation will focus mainly on the Middle East region, where the demand for purified CO₂ is increasing, for example to raise yields in crude oil production (by means of enhanced oil recovery) and in urea production.

"In a situation where energy production around the world relies predominantly on fossil materials and where this share is expected to increase further, we will concentrate precisely on these energy sources in our cooperation," said Dr. Andreas Northemann, head of the gas treatment business in BASF's Intermediates division. ■

Livchem Cooperates with Selectlab Chemicals Livchem announced a cooperation with Selectlab Chemicals to expand its portfolio with innovative molecules. Selectlab Chemicals specializes in custom syntheses and custom research with a particular focus on the production of complex and rare fine chemicals. The Bönen, Germany-based company has particular expertise in the production of fluorine compounds and phosphorus compounds of various classes, e.g. fluorinated heterocyclic compounds, carbonic acids, ketones, alcohols and amines, sources of "naked" fluoride ions, fluorinated phosphorus acids and phosphines. ■

Fluor Expands Intergraph Global Alliance Agreement Fluor Corporation, an engineering, procurement, construction and maintenance (EPCM) companies has renewed its global alliance agreement with Intergraph for the next five years. This agreement covers the Intergraph Smartplant and Smartmarine Enterprise software suites, including Smartplant 3D, PDS, Smartplant P&ID, and Smartplant Instrumentation and numerous other solutions. ■

Intercell, GSK Team up for Patch Vaccines Britain's Glaxosmithkline said it was teaming up with Austrian vaccine maker Intercell to develop patch vaccines that can be delivered without needles. GSK will make an up-front cash contribution of €33.6 million and an equity investment of up to €84 million via staggered share purchases of up to 5% of the company. The deal will include Intercell's candidate vaccine for travellers' diarrhea, which is currently in final stage clinical trials, and a potential single application pandemic flu vaccine which is in Phase II trials. The firms said they would also be exploring the use of the patch technology for other vaccines in GSK's portfolio. ■

Lanxess Builds New Plant in Germany

Lanxess building a new chemical plant at its site in Bitterfeld, Germany. This marks the specialty chemicals group's move into a new segment of the water treatment business. The company is investing a total of around €30 million in this project, in which it plans to develop and produce membrane filtration technology in Bitterfeld. The State of Saxony-Anhalt is sponsoring this project by up to €6 million. In the long term, this project will create 200 new jobs at the Bitterfeld site.

The new plant is scheduled to be taken into operation for a pilot and development phase towards the end of this year. The first products are expected to be launched on the market in 2011. An area totaling some 4,000 m² has been set aside for the creation of high-tech laboratories, logistics areas, offices and a new, state-of-the-art production facility. The membrane technology is used to filter out unwanted substances from water. The membrane's chemical composition and structure make it possible to filter out substances such as nitrates, pesticides, herbicides, viruses, bacteria and the smallest particles. As the water passes through the filter, this filter extracts suspended parti-



Monodisperse ion exchange resins can be detected particularly well under the microscope. Monodisperse means this technology can be used to manufacture the individual polymer beads all in exactly the same size. This makes them particularly powerful and even more suitable for complex material separation, e.g. in the pharmaceutical industry or for producing semiconductors and microchips.

cles and other unwanted substances. In other words, membranes form a selective barrier. By moving into this new field of technology, the group is opening up further areas of application in water treatment. The volume of the global membrane market alone is currently estimated at around €1 billion, and this figure is set to rise further. ■

No Sweeping Changes for Bayer

Bayer CEO-designate Marijn Dekkers stressed he would pursue continuous improvements at the company, in a bid to dampen speculation he would push for sweeping change. In his first media briefing after starting at Germany's largest drug maker in early January, the former CEO of U.S. lab equipment maker Thermo Fisher Scientific made clear that he did not deem Bayer a restructuring case. "My predecessors at Bayer have continuously taken the company further. I'd like to sustain this at the high level that has been achieved," Dekkers said. "There's no restructuring need here." Bayer appointed Dekkers in September to take over from



Bayer's key healthcare division, replacing Arthur Higgins, who will leave in three to four months. Dekkers is scheduled to take over as CEO of the group in

"There's no restructuring need here."

Marijn Dekkers, Bayer CEO-designate

Chief Executive Werner Wenning as part of a management overhaul that immediately prompted speculation that the conglomerate could launch a strategic revamp to focus on healthcare. Dekkers will initially serve as interim head of

October. Dekkers won kudos in the investment community for overseeing a complete make-over of Thermo Electron, which included the merger with much larger Fisher Scientific in 2006, creating a company with annual sales of \$10.5 billion. ■

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Smart Reactions in the Crisis

How to Adjust for a Longer Downturn

Downward Spiral – It is clear that the world is currently experiencing the most severe manufacturing recession since World War II. Overall in OECD countries, manufacturing went down well over 10% compared to 2008 while growth even in emerging countries is sputtering. The chemical industry, which provides raw materials and components for most downstream activities, has been hit faster and harder. At some point in 2009, global volumes even dropped 30–35% in parallel with substantial price reductions.

This downturn is unprecedented in terms of its volatility, variability by region and lack of visibility. There are two key questions facing chemical industry executives: How deep and long will the downturn be, and what is the best strategy to adjust business to these volatile market conditions?

The Impact of The Downturn

With the economy stabilizing, attention has decidedly moved to the timing and nature of the inevitable upturn. Various shapes are being invoked. Many observers meanwhile suggest a v-shaped recession with the upturn at hand. Still, we could revert to a w-shape, a first upturn that would quickly fall back before final recovery. For the chemical industry, we might even see a u-shape – a recession with some time of depressed demand before the upturn, or a “bathtub” or L-shape – a drop in demand with no upturn in sight. Whatever the eventual path, when weighing the options, executives should consider three aspects that make the current downturn different from previous ones.

Recession Combined with a Financial Crisis

Comparing 122 slowdowns, the International Monetary Fund (IMF) has found that “normal” recessions reach their trough typically within three quarters and usually recover in another three quarters (fig. 1). However, today’s recession com-



binates a financial crisis with a global and synchronized drop in demand. These less common double-edged recessions generally take six quarters to reach bottom, and another four to six quarters to revert to previous demand. Putting the start of the recession in the 4th quarter of 2008 would mean an end to the recession by early 2010 and a full recovery by late 2011.

Balance-sheet Recession

Importantly, today’s downturn is different from previous recessions in another way. Most post-war recessions followed a pattern of rising inflation, monetary tightening to counter these and a slowdown in response to higher interest rates. Unusually, today we are experiencing a balance-sheet recession, where demand is more fundamentally impaired as banks and households in many countries try to repair their financial position. This follows a period of unprecedented credit abundance, which ended in the collapse of the credit and housing markets. Building on the boom-and-bust phenomenon of this recession, we calculate that the current drop in demand could last into 2010, with a return to trend taking as long as six or seven quarters, i.e. until late 2011 or early 2012. A full recovery to (inflated) pre-crisis levels would not even be reached before 2014. Indeed, historical evidence show household balance-sheet adjustments take three to four years to settle.

Global Response

While the above assessment would not give much hope for the near future, an encouraging factor is that governments

around the world have taken bold steps to stimulate their economies, and have done so in an unprecedented coordinated fashion. Such actions have undoubtedly round off the sharp edges of the recession. Of course when such measures wear off, it remains to be seen whether the economy can hold its own.

Balance-sheet Recession in the Petrochemical Industry

An intriguing feature of petrochemical industry performance since the 1970s is the predictability of its growth. Looking at eight basic commodities, global volume has increased annually with 5.4% from 1974 until 2000, with surprising consistency. Over the same period, prices have fluctuated but on average have increased some 3.5% per year (fig. 2). This can be seen as a direct effect of the world GDP growth following the globalization of the economy post-1989, and we regard it as the sustainable rate of volume and price increase for the world.

However, evidence of a bubble is clear from the unprecedented increase of petrochemicals pricing between 2000 and 2008, partly supported by the rapid price increase of the crude oil and gas. Interestingly, this price increase has had a negligible effect on supply, which actually grew at a lower rate of 4.1%. This means, in the last eight years end customers have purchased predictably more of the same goods, but at significantly higher cost. The ability to pay such prices has, obviously, been fuelled by cheap credit, implying a deterioration of end customers’ balance sheets.

Between October 2008 and now, both volume and price have dropped, offering customers an opportunity to start repair their balance sheets.

Based on recent prices and volumes, we calculate that full mitigation of the “overpayment” for chemicals in the boom times suggests a return to the “sustainable trend line level” sometime in 2012, with new growth starting in earnest in the course of 2010 (fig. 3). Note that a return to the “inflated” revenue peak of mid-2008 will only be reached again in 2014.

Business Reactions

The current demand slump – despite today’s cautiously positive signs – may well be more protracted than the typical recession we have experienced in the past 25 years. As the demand slump drags on, businesses are increasingly forced to reconsider their company structures. And in doing this, executives are wise not to postpone the inevitable. Only by staying profitable will businesses remain agile, react to changing market circumstances and be well positioned for the inevitable upturn.

Indeed, we have seen many firms taking action, reducing cost and restructuring to adapt to new circumstances. This cannot be a one-size-fits-all exercise. While some businesses see a general drop in demand, others have seen sales plummet in specific segments, with milder effects in other areas. In today’s market circumstances, Arthur D. Little believes businesses should frame its actions based on two measures, as shown in figure 4:

- The level of profit improvement needed; and

Just One More Thing ...

Brandi Schuster asked Edouard Croufer, director, Global Chemicals Practice Leader at Arthur D. Little, for his insight on the affects of the recession on the chemical industry.



Edouard Croufer
Director, Global Chemicals Practice Leader at Arthur D. Little

CHEManager Europe: What lessons should the European chemical industry take from the recession?

E. Croufer: Of course, as a vital part in the supply chain to automotive, construction and electronics, the chemical industry is affected by a recession. That said, the industry was in relatively good shape going into the recession. However, even independent of the recession, there has been a global rebalancing of demand. This is the root-cause of the problem and the key to the solution, and forces the European industry to rethink its strategy. Having previously supplied emerging markets with chemicals on an export basis, the building of emerging market capacity leads to overcapacity in Europe for some time to come. The industry will have to be innovative to use this capacity differently either directing it to emerging markets or creating products more desired locally. Companies should learn to serve emerging markets, particularly China, to benefit from good business circumstances there.

Many companies have reacted to the economic crisis with measures that yield almost immediate results – spending cuts

and headcount reduction. How disciplined do you think the industry will be in implementing changes in business processes – and even in behavior and thinking – that calls for long-term commitment?

E. Croufer: Companies have been surprisingly disciplined with the reaction to the crisis. Generally speaking, companies have a more difficult time implementing business process change than reacting to short-term needs for cost cutting. Arthur D. Little believes that the most successful companies are those that not only keep cost in check, but also invest in a number of long-term, global trends that determine demand in the future: the drive towards a sustainable planet; the increase of global population and wealth, particularly the emergence of a large, global mid market segment in developing economies; the need for transparency; and the importance of innovation in making both affordable luxuries as well as providing solutions.

We also believe that there are large sources for further optimization of optimization “outside the fence”. Chemical companies have spent the last decade optimizing their own processes “within the fence”. Now, looking over the fence, there are many local and regional cluster opportunities

particular in Europe that can help the industry achieve further cost optimizations relative to competitors farther afield. However, this requires a cultural shift towards balanced partnership – the industry isn’t there yet.

What do you think the European chemical industry landscape will look like after the predicted full recovery in 2011?

E. Croufer: We believe full recovery may take more time than perhaps predicted or hoped for. Many consumers in Europe and the U.S. as well as many companies, including banks, have come out over-leveraged from the long economic boom ending in 2007. History has shown us that on average, economies need four years to pay down debts and reach a new equilibrium. Until that, end-consumer demand in the developed economies will remain weak, or weaker. It is vital, though, for European chemical companies to build on one key strength: proximity to high-end, sophisticated markets where sustainability, and the innovations needed for that, is in high demand. Sustainability comes naturally to European players, given the continent’s history in that area and a political context that will drive the issue forward.

Consequently, we see the European chemical industry getting out of the crisis stronger and fitter to play the leadership role that they have always played. Competences are there, and chemicals are more than ever a part of the solution, not part of the problem.

is more temporary. Although general, across-the-board cost-cutting measures are sometimes in order, in most cases executives should want to reduce costs forcefully in structurally distressed businesses, while leaving mildly affected businesses able and ready to benefit from the coming upturn.

Challenging Times Ahead

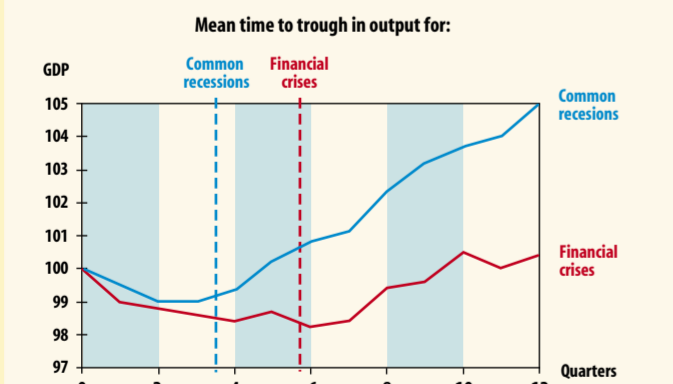
The chemical industry, like other industries, should expect another challenging year ahead. To formulate the right

reaction, each business has to come to terms with the nature of the current downturn, one that, more likely than not, is going to be more protracted than any other recession in the past 25 years.

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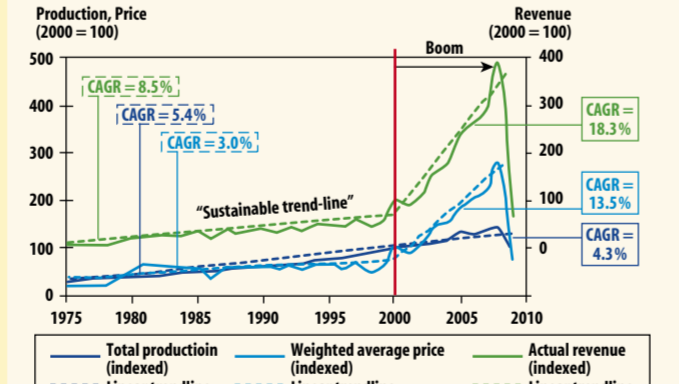
Comparing duration of common recessions and those coinciding with financial crises **Figure 1**



Source: World Economic Outlook, April 2009, Crisis and Recovery, IMF

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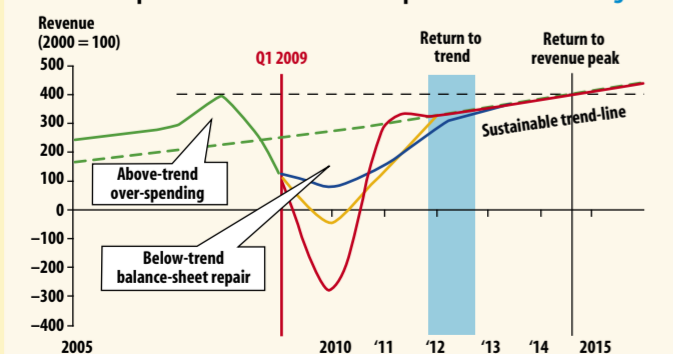
Petrochemicals volume, price and revenue development 1975–2008 **Figure 2**



Source: Arthur D. Little analysis; Volume weighted basket of ethylene, propylene, butadiene, methanol, benzene, toluene and xylenes

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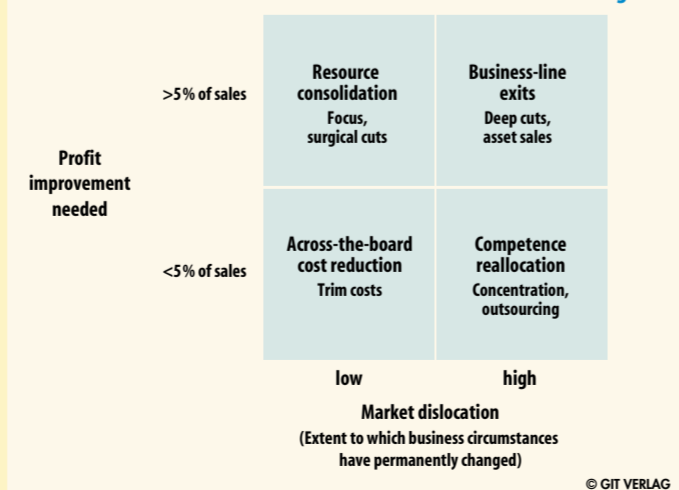
Scenarios for petrochemicals revenue development 2009–2015 **Figure 3**



Source: Arthur D. Little analysis; Volume weighted basket of ethylene, propylene, butadiene, methanol, benzene, toluene and xylenes

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Profit dislocation matrix **Figure 4**



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Lonza Streamlines Chemical Manufacturing Operations

Following its announcement in October to adjust the organization to the more volatile market environment, Lonza has reported three site closures. The company cites the economic pressures of the past 18 months for having accelerated the cost reduction efforts of the pharmaceutical industry. In response to that, Lonza said it is strengthening its platform in Asia and will close the sites of Conshohocken, Penn. (U.S.); Shawinigan (Canada) and Wokingham (UK) in 2010. This step complements Lonza’s existing platform in Nansha (China) and is the response to customer needs for mature regulated products at competitive conditions in a new market segment for Lonza.

The closure of the sites will affect 175 employees. Lonza has put a comprehensive severance package in place, in consultation with local employee representatives and authorities. The total restructuring cost amounts to approximately CHF 140 million, 75% of which is attributed restructuring activities in small molecules. The amount



Stefan Borgas
CEO, Lonza

also includes impairments of assets and other restructuring activities and will be booked into 2009, 70% of the charges are non-cash.

The Riverside plant will cease its activities in the fourth quarter of 2010. Lonza is in contact with all Riverside customers to offer tailored solutions that will strengthen the supply security of their individual drug substances by transferring the projects into other operations within Lonza’s global network. The pilot scale plant for the vitamin K3 activities in Shawinigan will cease its activities by the end of March 2010 after having completed the full technical development of this new, proprietary, environmentally friendly technology. Lonza will evaluate further opportunities to provide its customers with

chromium-free vitamin K3 from another site in the future.

As part of a modernisation and streamlining initiative within the Lonza Bioscience supply chain, the offices and warehouse in Wokingham (UK) will be closed and the activities will be transferred to Verviers, Belgium. The Verviers facility already supplies all other countries in Europe and can readily handle orders from UK and Irish customers, while maintaining an equivalent level of service to that enjoyed by customers today.

“The closure of the three sites will help to optimize our global operational network and further increase the competitiveness for our customers. The re-engineering project is a key element in our endeavour to bring Lonza back to a sustainable growth,” Lonza CEO Stefan Borgas said. “We will continue to drive this project throughout the year and we will see many initiatives rising from it. We are confident that we are on the right track and that the identified measures support the Lonza strategy.”

Aromatics Catalysts

Süd-Chemie Acquires Share in GTC Technology

Strategic Agreement – Süd-Chemie, a leading manufacturer of industrial catalysts based in Munich, Germany, and GTC Technology, Houston, Texas, U.S., a global technology licensing and engineering company for chemical and petrochemical applications, have reached agreement on a strategic alliance. As part of this alliance agreement, Süd-Chemie has acquired a 25% share in GTC.

The partnership significantly strengthens Süd-Chemie's position in the market for catalysts used in aromatic complexes. Aromatics are key intermedi-



Dr. Hans-Joachim Müller
Member of the
managing board at
Süd-Chemie

ates for many fast-growing applications. A prime example is para-Xylene – a compound that is the key intermediate for polyester and whose demand is projected to grow significantly especially in China, the Middle East and Southeast Asia.

Within the scope of this cooperation, Süd-Chemie will develop and supply catalysts and absorbents for GTC's processes. The two companies have also agreed to cooperate closely in promoting research and development, expanding the product

portfolio and providing mutual technical support. GTC Technology, a technology and process equipment supplier focused company has been growing rapidly over the last couple of years. They currently employ more than 100 people worldwide and run production and sales sites in the U.S., South Korea, China, Mexico, Singapore and the Czech Republic. Dr. Hans-Joachim Müller, member of the managing board at Süd-Chemie, said, "By combining Süd-Chemie's catalyst know-how with GTC's process expertise and technical support capabilities, we will make a difference to the industry we are serving." CHEManager Europe asked him to explain the strategy behind this alliance in more detail.

CHEManager Europe: Dr. Mueller, what role do aromatics catalysts play in your portfolio?

Dr. H.-J. Müller: Süd-Chemie is already well positioned in certain aromatic areas, such as styrene catalysts, where we are the world market leader, but still a smaller player in xylene production catalysts for polyester applications.

How do you judge the growth rates?

Dr. H.-J. Müller: While styrene is projected to grow with a rate of 2%, a much stronger growth rate of some 6% is projected for xylenes in the years to come. Key drivers of xylene growth rate are textile and packaging applications.

How will the strategic alliance with GTC increase Süd-Chemie's market position?

Dr. H.-J. Müller: By forming this alliance, both GTC and Süd-Chemie will enjoy tremendous benefits from aligning development capabilities and from exploiting synergies related to our current service offerings. This partnership will not only focus on growing the existing portfolio but is also determined to expand its role as a technology and service provider.

What R&D synergies do you pursue with GTC and what is the cooperation strategy?

Dr. H.-J. Müller: If you want to make a difference to your customers in petrochemical pro-

duction, you need to have both a strong and reliable technological process and bespoke high performance catalysts running in this process. Therefore, Süd-Chemie and GTC will jointly develop catalysts and processes. Our catalysts will be tuned for optimum performance in GTC's processes and vice versa.

What is the geographic presence of Süd-Chemie?

Dr. H.-J. Müller: Süd-Chemie already has a strong global market presence. In recent years, we have expanded our catalyst activities focusing on high growth regions with strong access to natural energy resources such as the Middle East, Russia and China.

Will the stake in GTC will expand Süd-Chemie's presence in key market areas?

Dr. H.-J. Müller: The partnership with GTC enables us to particularly strengthen our global position in aromatic applications for polyesters, which is one of the key market areas in petrochemicals. These applications show particular high growth rates in China, the Middle East and Southeast Asia.

www.sud-chemie.com



PORTFOLIO

Sumitomo to Buy Stake in Nufarm Sumitomo Chemical has agreed to buy a \$590 million stake in Australian farm chemicals maker Nufarm in a surprise deal that knocked out a rival bid from China's Sinochem. While the deal evoked a tepid response from Nufarm and Sumitomo shareholders, it is seen by some as helping stabilize the Australian company and setting a floor for its shares after a series of profit downgrades. The move would offer joint development and distribution opportunities for Sumitomo in agrochemicals, which the Japanese company sees as a global growth business. The deal, however, is a blow to Sinochem's growth ambitions. Nufarm rejected a bid from state-owned Sinochem that had been cut to \$2.3 billion after the Chinese firm completed due diligence following six months of talks.

Ineos Looking at Disposals After Considering IPO British chemicals group Ineos is looking at full or partial disposals to cut its debt after putting on ice exploratory work for an initial public offering, the Financial Times has reported. The newspaper, quoting people close to the situation, said a listing was one of a range of options that had been considered by Ineos to strengthen its balance sheet. Ineos in July agreed to new terms on its debt. It has debts of about €7.5 billion built up through acquisitions of petrochemical assets sold off by major oil companies.

Eastman Acquires Specialty Polymers Manufacturing Facility in China Eastman has announced that it has completed the acquisition of Tongxiang Xinglong Fine Chemical, a cellulose-based specialty polymers manufacturing facility located near Shanghai, China. Terms of the transaction were not disclosed. The acquisition will support Eastman's Coatings, Adhesives, Specialty Polymers and Inks segment, specifically its Ensure product line, by providing additional capacity to meet the growing demand in China. Similar to Eastman's other cellulose esters, Ensure has approximately 60% bio-renewable content and is used in a variety of end-market applications such as coatings for packaging and consumables.

DSM invests in Bioprocess Control DSM Venturing, the corporate venturing unit of Royal DSM, has announced that it has made an equity investment in Bioprocess Control, a market leader in providing advanced control technologies and services that enable the efficient design and optimal operation of biogas processes. In addition to the investment, a strategic cooperation agreement has been signed which will enable DSM and Bioprocess Control to leverage their complementary activities in the area of biogas. Financial details will not be disclosed.

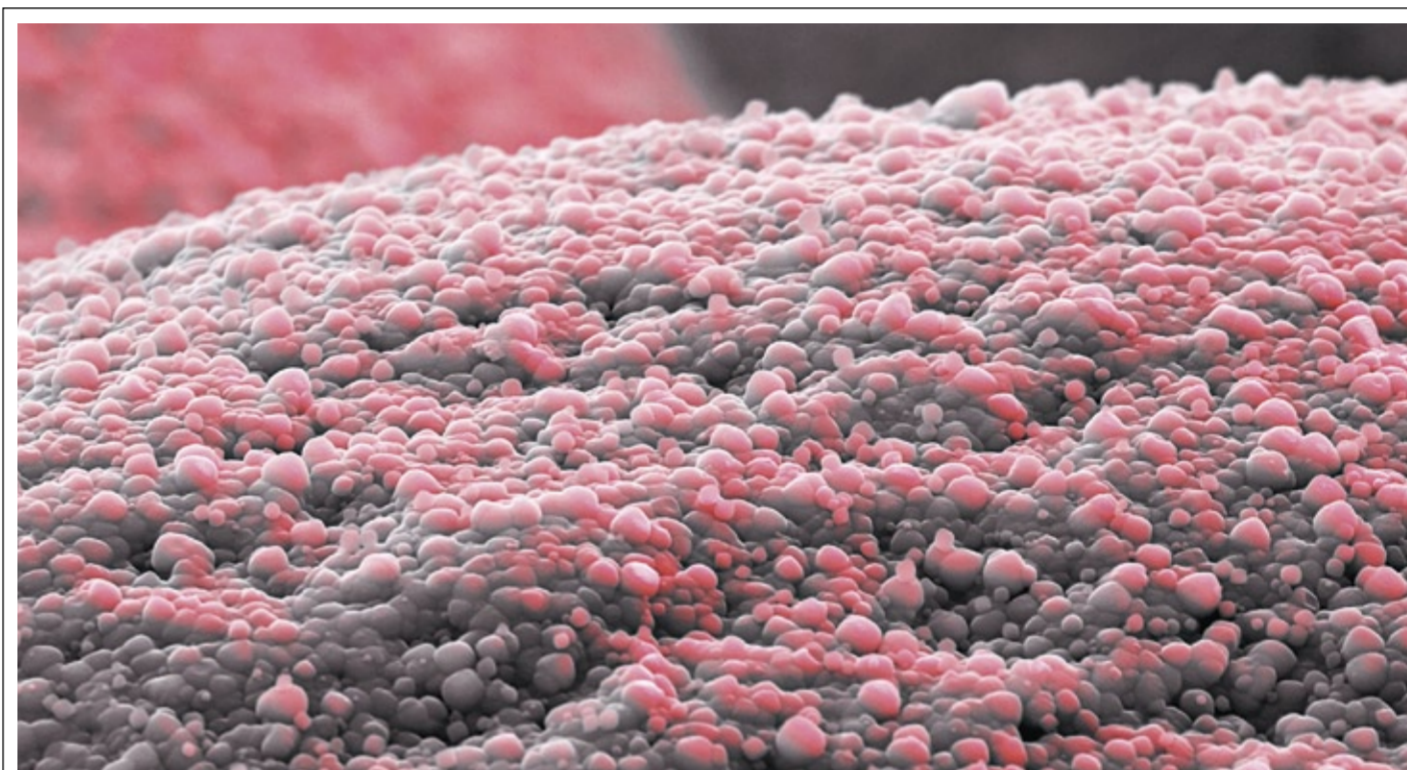
DSM Acquires Full Ownership of NPC PA6 Polymer Facility DSM and Shaw Industries Group have announced that DSM has acquired full control of the PA6 polymerization facility of Nylon Polymer Company (NPC) in Augusta, Ga. (U.S.). Shaw Industries and DSM Chemicals North America were previously joint venture partners in NPC. As a result of the transaction, NPC is now fully integrated into DSM Engineering Plastics' activities. Financial details and terms of the transaction will not be disclosed. For DSM Engineering Plastics the acquisition of the full ownership of the PA6 polymerization facility is an important step in its strategy to increase its geographical footprint, including expansion into South America. It also allows the company full integration in the PA6 chain, including caprolactam, polymer and compounded products, in North America, supporting its strong commitment to key customers in the Americas. Last year, DSM opened its first PA6 polymerization plant in China.

Eurochem (Quaron) Terminates Penta Group Shareholding Eurochem Holding and Penta Chemikalien have announced that Eurochem have terminated their shareholding in the Penta Group, by mutual agreement, as of the beginning of the year. Eurochem is the holding company for chemical distribution companies trading under the "Quaron" brand in the Netherlands, Belgium and France. This change was a result of Quaron having an increasingly different focus on the purchase of key-products in relation to other members of the Penta Group. In the future, the Penta Group intends to have a more focused product strategy working more closely with its shareholders and key suppliers/manufacturers. The separation of the companies was by mutual agreement though Eurochem will remain a close co-operation partner of Penta in areas such as purchases of non-key products, environmental protection, new products, legal matters and single sourcing projects.

Merck & Co. Acquires Avecia Biologics Merck & Co. and Avecia Investments have announced that they have entered into a definitive agreement by which Merck will acquire the biologics business of the Avecia group through a Merck affiliate (Merck Sharp & Dohme). Avecia Biologics is a contract manufacturing organization with specific expertise in microbial-derived biologics. Financial details of the transaction were not disclosed.

Under the terms of the agreement, Merck will acquire Avecia Biologics and all its assets, including all the company's process development and scale-up, manufacturing, quality and business support operations located in Billingham, UK. In addition to honoring all Avecia Biologics contractual commitments, Merck plans to engage in discussions with individual customers relating to their specific ongoing and future biological process development and manufacturing needs after the transaction is closed.

Abbott to Buy Starlims Technologies for \$123 Million Abbott Laboratories said it has agreed to acquire Israel-based Starlims Technologies for \$123 million to boost its position in the global diagnostics market. The acquisition will give Abbott Starlims' advanced web-based applications to help laboratories store, retrieve and analyze clinical, managerial and administrative data, the company said. The Starlims line "will provide Abbott with leading products to build upon existing technologies and expertise in the emerging field of healthcare informatics," Edward Michael, Abbott's executive vice president for diagnostics products, said in a statement. Illinois-based Abbott said it expects the transaction to close in the first quarter of 2010 and that it will not impact its 2009 earnings forecast.



Spherical Catalysts These tiny spheres are zeolite crystals that act as catalysts to speed up the chemical reaction in the production of amines. Photo: BASF

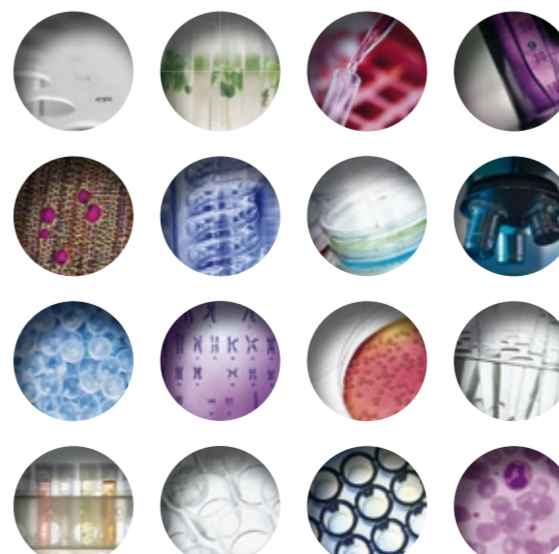
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Global Footprint with a Local Touch

Shasun Has Found Its Place in the Global Pharma Market

Expansion – With the acquisition of Rhodia Pharma Solutions three years ago, Indian-based Shasun Chemicals has successfully positioned itself on the global market. The company provides business services to various pharma companies, with matured APIs being a major contributor to Shasun's overall revenues. CHEManager Europe asked Shasun's chief technology officer and executive vice president Dr. Michel Spagnol about the development of the Rhodia acquisition and the future strategy of Shasun's pharma business.

CHEManager Europe: What has happened since Shasun took over Rhodia Pharma Solutions in April 2006?

M. Spagnol: Many things! Our initial objectives were geared

towards two main goals: Creating the Shasun brand worldwide while quickly integrating our processes and our workforce on a worldwide basis. Ours is a service business – attention to people is key to our success. No matter where in the world you are doing business with Shasun, you have the same key fundamentals of quality, service and innovation all across the board, from people to assets.

No takeover comes without change. What has happened in terms of integrating Rhodia Pharma Solutions into Shasun?

M. Spagnol: The integration has been smooth; our main priority was the integration of processes and people. We needed to demonstrate to the new owners that the combination of Shasun and Rhodia Pharma Solutions created a new ground for enhanced performances at all levels.

At the end of the day, the one point that counts the most – as in any other business – is the



Dr. Michel Spagnol, executive vice president and chief technology officer, Shasun

bottom line. Our success here was demonstrated by the performance of our first year in operation.

How far along are you as far as reaching those objectives are concerned?

M. Spagnol: We have now successfully positioned Shasun as a global player in the pharmaceutical industry, servicing the entire life cycle of a drug: from drug product and substance development to manufacturing. Our global manufacturing footprint and marketing office allow us to provide these services with a local touch.

How has the company positioned itself in the marketplace?

M. Spagnol: Shasun positioned itself as a service organization to the pharmaceutical industry capable of managing all aspects of drug life cycle from the early development activities – from lead optimization, scaffold synthesis to route scouting and process development work – to manufacturing of the commercial APIs as well as finished dosage. The start of our formulation facility located in Pondicherry allowed us a successful quick entry into drug product manufacturing having put on the ground one

of the largest tableting facility in India.

In addition, we consider our unique set of cutting edge proprietary technologies vital in differentiating ourselves. We have seen a steady growth in the number of projects using our Hydrolytic Kinetic Resolution – also known as HKR – as well as a sharp increase in activity regarding our cross coupling technologies...

...Buchwald technologies that were exclusively licensed from MIT in 2002.

M. Spagnol: Yes. We also successfully ventured in the biotherapeutics by launching streptokinase for the Indian market in July and will continue growing that activity in the future.

What is Shasun's future strategy in the pharma business?

M. Spagnol: Shasun is aiming at becoming a true integrated supplier to the pharmaceutical industry, with a base built around a manufacturing com-

pany offering East and West capabilities.

We are continuing to move up the value chain by focusing increasingly on the development of our existing technologies and fostering new ones for both the manufacturing and formulation of APIs.

As a first step, to promote our integrated services we have invested significantly in the Japanese market and opened an office in Tokyo last year. The result after only 12 months in operation is quite spectacular. We will now build on that success to spread that offering worldwide. Ultimately, our goal is to become one of the top three service providers in the industry.

What role has the harsh economic climate played in the pharma industry?

M. Spagnol: The current business environment is without a doubt a challenging one. The global financial crisis has an impact on the pharmaceutical business and one of its first manifestations

can be seen in the lack of money to fund early phase projects, resulting overall in a decrease in the number of projects that are being outsourced. This has also – to some extent – forced the pharmaceutical company to better prioritize their pipeline candidates, which I believe is not such a bad thing.

As a consequence of the pressure on cost for pharmaceutical companies, India remains a great option and will be an increasingly favored destination for outsourcing.

Do you see a positive side to the worldwide recession?

M. Spagnol: This is an opportunity for Shasun to increase its impact. The interesting observation that is also emerging from that situation is the regained preference for a "one-stop shop" concept, which had virtually disappeared from our vocabulary in the industry. We have a key role to play to service this new emerging need.

www.shasun.com

Reliance: \$763 Million in Block Deal

Indian energy major Reliance Industries raised \$763 million, its third big equity fund raising in less than four months, as it readies to buy bankrupt Lyondellbasell. Reliance sold 33 million existing treasury shares at about 5% discount to a clutch of foreign institutional investors. The deal follows a \$577 million share sale to state-run Life Insurance Corp of India and a \$660 million share sale by India's largest listed company in September. The deals are seen as part of Reliance's bid to take control of Luxembourg-based Lyondellbasell. A source recently told Reuters Reliance had upped its offer to buy a controlling stake that valued Lyondellbasell at \$13.5 billion compared to its earlier bid of \$12 billion. But Lyondell's board had rejected Reliance's sweetened offer.

Reliance has interests in petrochemicals, refining, oil and gas exploration and retail, and a deal with Lyondell would catapult it into the ranks of top petrochemical makers such as Saudi Arabia's Sabic, Germany's BASF and Dow. Acquiring Lyondellbasell would also give Reliance a leg up in its efforts to gain greater access to the U.S. and European markets. Its



bid comes as petrochemical and refining asset prices have fallen globally in the wake of the financial crisis.

Lyondell filed for bankruptcy protection last January after being unable to meet its debt obligations when demand dropped for petrochemical products during the global economic downturn. In December, Lyondellbasell filed an amended reorganization plan with a U.S. court, proposing a \$2.8 billion rights issue, to simplify its corporate structure and exit bankruptcy protection with significantly less debt. A U.S. bankruptcy judge gave the company more time to exclusively file a plan of reorganization, and denied a creditors' motion to expand a probe into some of the company's restructuring methods. The company has until April 15 to plan its reorganization without competing plans from other parties.

Biogen's Mullen to Step Down

Investors welcomed the announcement that Biogen Chief Executive James Mullen will be leaving the company, with some saying he had lost credibility as a leader. The move came less than a month after the biotechnology company said its chairman would step down and just seven months after activist investor Carl Icahn succeeded in placing two members onto Biogen's board.

"We're happy," said Scott Harrison, an analyst at Argent Capital, which has \$850 million under management and owns 365,000 Biogen shares. "There hasn't been a lot of confidence in Mullen's leadership, and this reminds folks that the moves made last year by Icahn are having some impact." Icahn was not alone in pushing for change at Biogen. In November, Healthcor Management LP, which owns about 3.65 million Biogen shares, slammed Mullen for selling more than \$85 million of Biogen stock and collecting \$63 million in com-

pensation while doing little to enhance shareholder value. "We anticipate that Mr Mullen's successor will be more focused on improving Biogen's research and development productivity and efficiency," Healthcor said in a statement. Mullen is set to retire on June 8.

Speculation is expected to pick up on whether the company, which makes the multiple sclerosis drugs Avonex and Tysabri, is preparing to sell itself. Biogen previously put itself on the market but found no buyers. Icahn accused the company of deliberately sabotaging the sale process. Now that process could open up again.

"You have the perfect story in terms of activist shareholders, a stock whose valuation is very attractive, and stock underperformance that has just made investors more eager for change," Harrison said. "So whether it's an acquisition by another company or bringing in a new CEO from the outside, change will be good."

Evonik to Split Off Real Estate, Energy Units

As part of a new strategic course, Germany's Evonik will be developed from a conglomerate into a globally leading specialty chemicals company in the coming years, a spokeswoman for the company told Reuters recently. Evonik, owned by the government-controlled RAG foundation and private equity firm CVC, already makes about three quarters of its total revenue from chemicals. It also builds and operates power plants and manages a real estate portfolio. Both the real estate and the energy unit will be operated as largely independent holdings, Evonik said.

Evonik is seeking one or several partners for its energy business, who could either invest in individual projects or in the company as a whole. The spokeswoman did not say what Evonik planned for its real estate business beyond merging it with housing company THS, a 50-50 joint venture with trade



Evonik is currently Germany's fifth-largest power producer.

union IG BCE. Germany daily Handelsblatt earlier cited sources close to Evonik's supervisory board as saying that Evonik aimed to launch an initial public offering of the real estate business by the end of 2011.

The merger will create a new entity managing 130,000 apartments and generating €800 million of annual revenues. Germany daily Financial Times Deutschland said those apartments are valued at about €5-6 billion, based on previous divestments. Reports had surfaced in September saying that

Evonik planned to break up its businesses to concentrate on chemicals, but Evonik had denied the reports at the time. The RAG foundation, which owns about three quarters of Evonik, had planned an IPO of Evonik as a whole but had scrapped that plan during the global economic crisis. It has said it still aims for an IPO by 2013 to finance the winding down of the company's coal-mining operations as Evonik transfers responsibility for its coal mining to the German government.

Lanxess Divests Sites; Heitmann 'Optimistic' for 2010

Lanxess has sold its 55% stake in the hydrazine hydrate joint venture Lanxess Yaxing (Weifang) Chemicals Company to its Chinese partner Weifang Yaxing Group. The joint venture was founded in September 2004 and is based in the Weifang Industry Park in Shandong province, China. Both parties have agreed not to disclose financial details. Lanxess will continue to produce hydrazine hydrate at its Leverkusen plant in Germany and said it is committed to providing a regular and long-term supply to its customers worldwide. Weifang Yaxing Group will continue to operate the assets after Lanxess' exit. In addition, Lanxess Corporation has sold the infrastructure and supporting services at its site in Bushy Park, South Carolina, U.S., to the investment company Cooper River Partners for €10 million.

The company's Rubber Chemicals business unit will continue to manufacture at the



site and has reached a long-term lease and service agreement with Cooper River. The company also recently announced its Functional Chemicals business unit will transfer its colorants production from Lerma, Mexico, to its existing facility in Leverkusen, Germany, in the coming months. Lanxess also sold its remaining shareholding in the acrylonitrile butadiene styrene (ABS) joint venture to its partner Ineos in September, thus completely exiting the ABS business in 2009 as planned.

These measures run parallel to the company's "Challenge09-12" program that was implemented to help mitigate the effects of the crisis. Lanxess

said it expects to cut costs worldwide by about €360 million by 2012.

Lanxess CEO Axel Heitmann said in an interview with the weekly newspaper Wirtschaftswoche that the company expects a good performance in 2010 and plans to expand capacities in Germany.

"I am optimistic for 2010. Demand for chemical industry products and capacity utilization will be improved compared with the previous year," Heitmann said in the interview. Investments and spending on research and development would be increased and new jobs created in Germany, he said. Heitmann said that Asia was a special focus area where new capacities would be created to meet rising demand for synthetic rubber.

He also did not rule out possible acquisitions, saying Lanxess was keen to exploit opportunities arising from consolidation in the chemical industry.

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Merck Considers Acquisitions

Merck KGaA has mulled acquisitions in both the pharmaceutical and chemical industries and has sufficient funds for big targets, its chief executive told a German newspaper.

"In principle, I can very well imagine acquisitions in both areas – in the pharma and chemical sectors," Karl-Ludwig Kley told the Sueddeutsche Zeitung in a recent interview. Kley said that the company had enough funds to finance small as well as big acquisitions, but did not specify. "But it also needs to fit," he said.

The head of Merck's pharmaceuticals unit, Elmar Schnee, had told Reuters in September the company aims to boost its drugs pipeline by acquiring rights to drug candidates or buying smaller research-based companies, with such projects accounting for 30% of total expenses for research and development.



He then said that the company does not need "another Serono", referring to the 2007 takeover of Swiss biotech company Serono for €10.3 billion.

Merck is also the world's largest maker of liquid crystals (LC) for flat-panel displays and expects a full-year EBIT margin at its LC unit of 30% percent, far below margins of about 50% seen in 2008. "Operating margins that are constantly above 50% are not possible ... I rule out that we return to those regions," Kley said, but he added he was convinced that the margin would rise again in 2010 from the current 30%.

Major M&As Likely in 2010



Almost one in five European companies is likely to make a major acquisition this year, a survey showed, adding weight to claims that European mergers and acquisitions (M&A) are set to rebound from their 2009 trough. But highlighting the continuing obstacles to deal making, the survey by UBS and The Boston Consulting Group (BCG) found executives were wary of taking on new debt and many thought there was a dearth of good targets at reasonable prices. Compared to last year's survey, conducted at the height of the financial crisis, respondents were also less convinced that "transformational" M&A would reshape their industries.

"CEO confidence is improving and signals the return of more normal M&A market conditions; balance sheet and other 'crisis'-related drivers are less of an issue than last year," the UBS team said. The poll of 166 companies found 19% were

likely, very likely, or definitely going to buy another company that had at least €500 million in annual sales in 2010. Strategic reasons such as expanding product ranges, or accessing new locations and new customers, were most frequently cited. However, only 20% expected a "transformational" deal in their sector, down from 43% in 2008. The poll also illustrated a mismatch between buyers' and sellers' price expectations, with about 40% of respondents saying there was a lack of attractive targets and a similar proportion citing high valuations as a hurdle to deals. And just 9% planned to take on new debt or loans to finance deals, while 42% said deals would be financed by existing cash reserves. UBS forecasts a 15-20% percent increase in M&A this year. Its top picks as potential acquisition targets next year include pharma company Basilea and specialty chemicals manufacturer Croda.

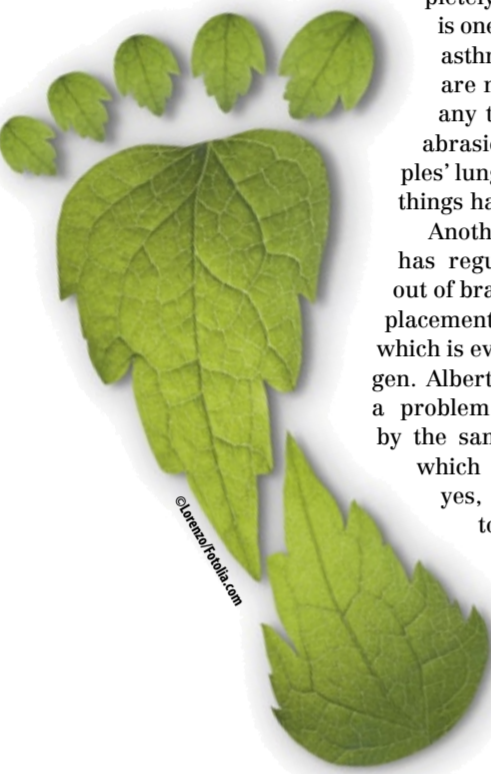
Celebrating The Human Footprint

Michael Braungart Makes the Case for Good Chemistry

◀ Continued Page 1

never sustainable – otherwise it wouldn't be innovative. That is why feeling guilty for being on the planet means you are not creative.

Is the impulse for change in the chemical industry more likely to come from outside – for example from companies such as Nike, who are using a particular kind of rubber that can be put back into the ecosystem – or do you think the impulse for change really will come from within the chemical industry itself?



M. Braungart: Within the Nike project, we made a profound analysis of rubber, and it is really amazing: There are about 500 chemicals being used to make rubber, but about 400 of them are basically dangerous for the environment or for human health.

Consider this: Tires last twice as long as they did 20 years ago, and everybody thinks that this minimizes impact. But now the problem is that tire dust has become much smaller, and in the combination with all the other chemicals you have a permanent inhalation of highly irritating latex dust. I am completely convinced that this is one of the key causes of asthma today. When tires are made without giving any thought to what the abrasion means for people's lungs means the wrong things have been optimized.

Another example: The EU has regulated the asbestos out of brake pads, but the replacement is antimony sulfate, which is even a worse carcinogen. Albert Einstein said that a problem cannot be solved by the same type of thinking which generated it. So, yes, the impulse needs to come from the outside, but I am very optimistic when companies like Lego say that they want to have the best polymers in their toys, the



Prof. Dr. Michael Braungart

Prof. Dr. Michael Braungart is the scientific director of EPEA International Umweltforschung GmbH (Hamburg, Germany), which he founded in 1987, and is co-founder of McDonough Braungart Design Chemistry (MBDC) in Charlottesville, Virginia. He also co-founded the Hamburger Umwelt Insitute (HUI) in 1989. These organizations share a common set of values that embrace intelligent, aesthetic and eco-effective design and seek to optimize products within the Cradle to Cradle framework.

Braungart has been a professor of Process Engineering at Universität Lüneburg (Germany) from 1994. Additionally, since autumn 2008 he has been named to hold a newly funded professorship at the Dutch Research Institute for Transitions (DRIFT) at Erasmus University of Rotterdam in collaboration with the TU Delft. A Cradle to Cradle Masterclass is now available.

Through these activities, Professor Braungart has developed the tools to design eco-effective products and business systems and has worked with a number of organizations and companies in a range of industries. In 2002 he has accepted a visiting professorship at the Darden School of Business, lecturing on topics such as eco-efficiency and eco-effectiveness, Cradle to Cradle design and Intelligent Materials Pooling, and he continues to lecture at universities all over the world. *Cradle to Cradle: Remaking the Way We Make Things*, was written by Braungart and architect William McDonough and published in 2002. Since then, the book has been translated into eight other languages: Traditional and Simplified Chinese, Dutch, German, Hungarian, Italian, Korean and Spanish.

best ones that can be used in cycles. The same can be said about Phillips and Nike. If we look across the different industries, it's amazing how fast this is happening. The Netherlands announced to do all their public purchasing by 2012 according to the C2C method. That means innovation – €45 billion of innovation potential.

What other problems still exist?

M. Braungart: Our systems are still very primitive. A normal glossy magazine contains three to four grams of chlorinated halogenated hydrocarbons that were never designed to go back

in paper recycling. So when toilet paper gets made out of the stuff, three to five million liters of drinking water ends up contaminated by just one kilogram of toilet paper.

One time, a printing company showed me a printer that could print twice as fast and uses 20% less energy. But could I eat the paper that comes out of the machine? Could I compost it and use the compost in my garden? Could I burn it and use the ash in my garden? No. This is another situation where the wrong thing got optimized. The good news is that the Dutch government announced that in five years, they will only pur-

chase paper can be burned in a normal fireplace and the ashes can be put in a garden. Now there are 16 players in the Netherlands who all are looking to make paper for biological cycles.

C2C has a significant following in the Netherlands and in the U.S. Does culture play a significant role in the acceptance of the concept?

M. Braungart: It's not just that. C2C is so successful in the U.S. because of George W. Bush. With him in power, it was clear: He basically signaled to the industry that he was not very intel-

ligent and they shouldn't wait for him to do anything. That stimulated so much innovation within all these giant companies like Nike, BASF, Ford, Herman Miller, Steelcase, Hewlett-Packard, S.E. Johnson, etc. In Europe, the government is always pretending to do something, and everybody sits back and waits. However, we see the same happening in some European countries: There are fast developments in Italy because of Berlusconi, because every-

body says, "Oh, my God, what an idiot we have for a president! It is up to us; we cannot wait for them anymore."

In the next two to three years, C2C will become the standard of the chemical industry, because it is a positive agenda. It celebrates human footprint – it celebrates chemistry.

See also our in-depth article on the C2C Concept on page 10.

▶ www.epea.com

Merck Builds New Production Plant

Merck KGaA has announced that it has started construction work at its Darmstadt, Germany, site on a production plant for the manufacture of inorganic salts. This will increase capacity by around 50% compared to the production lines currently being used. The company is investing around €30 million in planning, de-

veloping and constructing the plant, which will produce active ingredients and excipients, products for use in biopharmaceutical production processes, additives for the food industry and laboratory reagents. The plant is scheduled to begin operation in mid-2011, when nearly 70 employees in inorganic chemical production will

move to the new facilities. The modernization measures in inorganic chemical production are part of the growth strategy for Merck's units Life Science Solutions and Laboratory Business, both within the division Performance & Life Science Chemicals. This is one of Merck's largest chemical investments worldwide. ■

DSM Announces Closure Of DSM Specialty Intermediates

DSM Specialty Intermediates (DSI) in Sittard, Netherlands) has announced the intention to discontinue its operational activities by Dec. 31 at the latest. As a consequence, DSI's production activities at the Chemelot

industrial site in Sittard-Geleen will be stopped with effect from July 1. The closure will result in the loss of 37 jobs at DSI. DSI produces and sells intermediates for the automotive, food and pharmaceutical industries.

Due in particular to increasing competition from China and India, among other countries, prices and margins for these products have been under heavy pressure for a number of years. ■

Dupont: \$295 Million Expansion for Photovoltaics

Dupont has announced an investment of \$175 million to complete the multi-phase expansion of its high-performance Dupont Tedlar PV2001 series oriented film production line. This investment is in addition to \$120 million in capacity expansions, announced in August 2009, for raw materials used to make the film, bringing the total commitment of these two phases to \$295 million. Tedlar films serve as the critical component of photovoltaic backsheets, providing long-term durability and performance for photovoltaic modules in all-weather conditions. The film line expansion will be located at the DuPont Circleville, Ohio, facility using existing and retrofitted assets. Film production is scheduled to start up in September 2011.

The manufacturing steps for Tedlar oriented film include producing vinyl fluoride (VF) monomer, which is converted into polyvinyl fluoride (PVF)

polymer resins, and extruded into the Tedlar film. DuPont plans to increase monomer and polymer resin capacity by more than 50 percent. Construction is under way for these new monomer and resin facilities at the Dupont Louisville, Ky., and Fayetteville, N.C., sites, respectively, and the facilities

are scheduled to start up in mid-2010.

Dupont said anticipates that the photovoltaic market will grow rapidly over the next several years, and this growth will drive the demand for Tedlar and other new materials that increase the lifetime and efficiency of solar cells and modules. ■



Dupont is a leading supplier of materials and technology to the photovoltaic industry, and expects that overall sales of its family of products into the industry will exceed \$1 billion by 2012.



Sustainable Construction In The Desert Burj Khalifa, the world's tallest building, stretches majestically towards the sky. For the construction of the tower, BASF developed a special concrete mix that can be pumped to a height of 600 meters without segregating. The admixture Glenium Sky 504 the concrete can be worked for more than three hours and then hardens quickly. This allows for a shorter construction time and gives the building a longer useful life, in this way making it more sustainable. (Photo by BASF)

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EVENTS

CeBIT, March 2–6 in Hannover, Germany CeBIT has undergone the most radical make-over in its history, and opens for business on March 2 with a line-up of new special displays and content. This year's theme "Connected Worlds" documents the convergence of technologies and the growing integration of global markets and applications. Featured topics at the show include new e-commerce offerings; AutoID/RFID Solutions; and green IT.
▶ www.cebit.de

Analytica, March 23–26 in Munich The 22nd international trade fair for laboratory technology, analysis and biotech will be focused on innovative and applied product and system solutions for the entire laboratory in science, research and industry. Exhibits will cover the entire value-added chain for laboratory technology, analysis and quality control, biotechnology, the life sciences and diagnostics in its full breadth and depth.
▶ www.analytica.de

LogiChem 2010, April 20–22, Dusseldorf, Germany At LogiChem, the annual European supply chain conference, attendees can benchmark their supply chain and logistics operations against the leading chemical companies in the world. The event provides the opportunity to learn from and network with the industry leaders from, e.g., BASF, Dow, Henkel, Ineos, Exxonmobil, DuPont, and DSM. See how leading supply chain VPs analyze trends and capitalize on them to grow their businesses in uncertain times, hear experts discuss whether the "green movement" and current sustainability initiatives are here to stay, and learn how robust supply chain strategies combined with sound risk management can reinforce business strategies at LogiChem 2010.
▶ www.logichemurope.com

LOPE-C 2010, May 31–June 2 in Frankfurt Organic photovoltaics (OPV) are an innovative solar cell technology based on conductive plastic materials such as polymers. Such devices are fabricated by ultra low-cost, roll-to-roll printing techniques. OPV is one of the most dynamic, rapidly developing technology segments pertaining to renewable, or green, energy.
OPV is well on its way to broad commercialization, as first products are available on consumer markets. Current trends and the latest developments in this field will be on display at LOPE-C 2010. LOPE-C (Large Area, Organic & Printed Electronics Convention) is the leading, fully industry-sponsored annual conference and exhibition of organic and printed electronics. The convention focuses on the production and application of organic and printed electronics, including the latest developments in OPV. LOPE-C is held at the Congress Center of Messe Frankfurt, Germany. It is jointly organized by the Organic Electronics Association (OE-A) and Messe Frankfurt.
▶ www.lope-c.com

Bayer CEO Named Employer of the Year

Bayer CEO Greg Babe was named "Employer of the Year" by the Employee Services Management (ESM) Association for his commitment to and engagement in employee services and programs that contribute to a high level of employee satisfaction and morale within the workplace. ESM Association, a national nonprofit for employee services providers, evaluated its members' top employers and made its selection based on several criteria including the depth and breadth of Bayer's program offerings in the areas of work/life, diversity, fitness and



Greg Babe
CEO Bayer

wellness, recognition, discounts and other human resources practices and programs and importantly, the commitment of the company's leadership in the value of these programs in attracting and retaining top talent. ■

DSM Engineering Plastics Recognized

DSM Engineering Plastics has been recognized as a leading solutions provider that supports and enables the electronics industry to move away from chemicals that can lead to health and environmental problems. In a new research report "Greening Consumer Electronics: Moving Away from Bromine and Chlorine," the International Chemical Secretariat (ChemSec) and U.S. based environmental organization Clean Production Action (CPA) identified seven companies who have engineered environmental solutions that negate the need for most – or in

some cases all – uses of brominated and chlorinated chemicals. The seven companies include, amongst others, Apple, Sony Ericsson and DSM Engineering Plastics. DSM Engineering Plastics worked together with suppliers to overcome manufacturing and design challenges that inhibited the replacement of BFRs and PVC. This has resulted in a portfolio of bromine- and chlorine-free products that enable producers of electrical and electronic equipment to continue to meet higher reliability, performance, and quality requirements. ■

Dow Corning Wins Solar Award

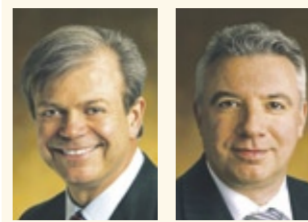
Dow Corning was named winner of the 2009 Solar Industry Award in the photovoltaic material category for its new Dow Corning PV-6100 Encapsulant Series and manufacturing process, which have demonstrated cost savings and superior protection for solar modules. The Solar Industry Awards, presented by Solar PV Management magazine, were created to acknowledge companies across the photovoltaic value chain that have pioneered new or innovative products, systems and manufacturing processes that help promote grid parity. Industry professionals selected Dow Corning to win the award from a group of seven photovoltaic



material manufacturers. The awards were presented by David Riddsdale, the magazine's editor-in-chief, at the 24th European Photovoltaic Solar Energy Conference in Hamburg, Germany. ■



PEOPLE



Rui-Artur Goerck
Dr. Hans-Peter Neumann

BASF Catalysts Leadership Appointments Announced

Rui-Artur Goerck has been appointed group vice president, Mobile Emissions Catalysts; and Dr. Hans-Peter Neumann has been appointed group vice president, Process Catalysts and Technologies. These appointments are effective immediately. Goerck joined BASF in 1985 and has held a number of product management and marketing leadership roles in Germany, the United States and Brazil. He most recently served as group vice president, Coatings Solutions, South America, BASF S.A., Sao Paulo, Brazil. Neumann has been with BASF for 20 years and has served in leadership roles in research and development, production and business management. He was most recently group vice president, Acids & Specialty Intermediates, BASF Europe. ■

Euro Chlor Appoints New Regulatory Affairs and Science Directors Euro Chlor, representing the European Chlor-Alkali industry, has appointed two new directors. Véronique Garny takes over Regulatory Affairs from Arseen Seys, who retired at the end of 2009. Dolf Van Wijk is the new science director. Garny has been science director of Euro Chlor, managing the federation's science program, encompassing environmental and toxicological research, risk assessment and product safety. She also manages other sector groups within the European Chemical Industry Council Cefic related to fluorinated chemicals. Van Wijk has been science manager at Euro Chlor since September 2001. He has provided advice and counsel to the federation's committees and working groups on chlorine-related science issues, with specific responsibility for assisting in the development of risk assessments. ■

Tessenderlo Names New Chief Executive Belgian chemicals and plastics group Tessenderlo has announced that existing chief operating officer Frank Coenen would become the group's new chief executive. He will succeed Gerard Marchand, who has been CEO since 1987. Marchand will stay on as chairman of the group. Coenen has previously worked for Belgian pharmaceutical group UCB and Cytec and started at Tessenderlo in 2006 as the head of the chemicals division. ■



Frits Eulderink

Vopak Nominates New Board Member

The Vopak supervisory board said it will nominate Frits Eulderink for appointment to Vopak's executive board for a period of four years during the annual general meeting of shareholders on April 27. Eulderink will succeed Frans de Koning, whose term will expire after the general meeting. Eulderink was until recently vice president Unconventional Oil at Shell in North America. In 1990 he joined Shell, where he held various technical and management positions in the Netherlands, North America, Africa and the Middle-East, amongst others in the field of Exploration & Production. As a Vopak board member, Eulderink will in particular focus his attention on LNG, Procurement, Safety, Operational Efficiency and Sustainable Development. ■



Fritz Oesterle

Celesio CEO Leaves Exec Board Of Owner Haniel

Celesio Chief Executive Fritz Oesterle has exited the management board of majority shareholder Haniel, part of a move by Haniel to overhaul management ties to its subsidiaries. Eckhard Cordes, Haniel CEO, had previously said he would step down as Haniel CEO at the end of 2009 to focus on his other job as head of German retail giant Metro, owned in part by Haniel. "Since Dr. Eckhard Cordes ended his dual mandate ... it is only consistent that Dr. Fritz Oesterle ... do the same," Celesio said in a statement. Haniel said in a separate statement on Friday that Cordes' successor as the conglomerate's CEO, former McKinsey executive Juergen Kluge, would also take on Cordes' roles as chairman of Celesio and of Haniel's construction equipment subsidiary Takkt. Haniel's "executive board will be a purely functional panel again, without any executives from divisions or associated companies," the family-owned conglomerate said. ■

Sanofi to Propose Weinberg as New Chairman

French drugmaker Sanofi-Aventis hopes to make Serge Weinberg its new non-executive chairman, following the retirement of Jean-Francois Dehecq. Weinberg will initially replace Gunter Thielen as a director before his planned chairmanship role, after Thielen resigned for personal reasons, Sanofi said. Weinberg's potential role as the new chairman will be put to shareholders in May 2010. Weinberg is one of France's best-known businessmen and has helped run some of the country's top companies. ■



Dr. Michael Rosenblatt

Merck Names Tufts Dean as Chief Medical Officer

Merck & Co. has named Dr. Michael Rosenblatt, the dean of Tufts University School of Medicine, as its chief medical officer. "Dr. Rosenblatt will be Merck's primary voice to the global medical community and will speak to critical issues such as patient safety," the company said in a release. Merck said Rosenblatt had held the Tufts post since 2003 and was president of Beth Israel Deaconess Medical Center from 1999 to 2001. He is a former professor of Harvard Medical School and was Harvard faculty dean and director of the Harvard-MIT Division of Health Sciences and Technology. (Photo by Tufts University) ■



Günther Eberhard

Günther Eberhard to Lead Districonsult

Districonsult, a specialist consulting company to the chemical and the chemical distribution industries, has announced that Günther Eberhard has joined the company as senior and lead partner. Günther spent more than 25 years in line and project management roles in basic and specialty chemicals manufacturing, materials technology and chemicals distribution. Marc Fermont, founding partner of Districonsult, said: "I am very glad to have Günther taking the leadership at Districonsult and ensuring the continuity of the consulting practice. He is a seasoned practitioner of marketing and strategic planning and an expert in channel management. Having worked on successful projects with producers, distributors and investors, he brings many years of professional experience to Districonsult." ■

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Chemicals

Rock The Cradle: Achieving ecological intelligence and social responsibility through good design

Page 10



Regulations

Changes have been made to the Variations Regulations. Are you up to date?

Page 12



Production

Carbon capture solutions: development of post-combustion technology

Page 15

Newsflow

DSM and U.S.-based Novomer have announced that they have signed an agreement to jointly develop a coating resin using CO₂ as a raw material. This development agreement follows a cooperation agreement and an investment by DSM Venturing in Novomer in 2007. The joint development project will benefit from the broad variety of DSM's technologies and market access, in combination with the Novomer's CO₂ polymerization technology. The chemistry and process technology for producing polymers from CO₂ and propylene oxide (PO) will be developed by Novomer, while DSM will convert the polymers into resins and formulate them for target applications such as coatings, adhesives and graphic arts. The companies report that initial results are encouraging and suggest that this project might lead to completely new and improved application properties in coatings.

Eastman Chemical has completed its acquisition of Tongxiang Xinglong Fine Chemical, a specialty polymers manufacturing facility near Shanghai. Terms were not disclosed. Eastman Chemical, based in Kingsport, Tenn., U.S., said the acquisition will provide it additional capacity to meet growing demand in China for its coatings, adhesives, specialty polymers and inks segment.

Chemtura has announced a long-term strategic sourcing agreement with global specialty chemicals company Albemarle. Under the agreement, Chemtura will source BA-59PTM, DE-83RTM, Firemaster 2100, n-propyl bromide and sodium bromide from Albemarle. Additionally, Albemarle is assigning its brine interests in Chemtura's West Brine production unit located in Union County, Arkansas (U.S.), to Chemtura, which will further strengthen Chemtura's bromine operations and maximize productivity.

The parties have also settled ongoing decabromodiphenyl ethane and bromine litigation, which will end the dispute over Chemtura's right to sell decabromodiphenyl ethane to the global market. Chemtura and Albemarle have executed a settlement agreement covering the litigation which, among other things, provides that each company will grant a cross license for their respective decabromodiphenyl ethane products. The settlement agreement has been executed by both parties but is pending Bankruptcy Court approval.

DSM has opened a new plant for the production of wet polyesters and other specialty resins in Meppen, Germany. Total investment costs amounted to €15 million. The new plant was built at the existing site of DSM NeoResins+ in Meppen. The plant allows for further expansions in the future. With the new plant DSM NeoResins+ reinforces its strong position in the fast growing and important markets such as metal packaging (can), pre-painted metal (coil), specialty decorative markets, specialty adhesives, graphic arts and industrial wood.

Symrise has completed the second phase of its \$540 million manufacturing expansion program in Singapore. The company has also announced plans to use Singapore as a hub for its Asia-Pacific business. Symrise supplies liquid flavors and fragrances to manufacturers and it is the world's fourth largest player in the industry, with a 10% market share.

Winning Combination – The Exclusive Synthesis & Amino Acids business line within Evonik's Health & Nutrition business unit supplies the pharmaceutical and other industries with high-quality fine chemicals. In line with the concept of horizontal integration, customers get an optimal combination in terms of a good cost structure for intermediates and basic active ingredients from the production plants in Asia and for intermediates and active ingredients of higher complexity from sites in Europe and the U.S. Beginning this year, Evonik acquired a U.S. production site from Eli Lilly that further expands its technology portfolio and is currently being integrated into the existing production network. Dr. Michael Reubold spoke to Dr. Hans-Josef Ritzert, head of the Exclusive Synthesis & Amino Acids business line, about trends in the pharma market, technological progress, customer requirements, and the future strategy of the business in general.

CHEManager: In the middle of last year, Dr. Reiner Beste, head of the Health & Nutrition business unit, spoke of business being robust even in the crisis. Did business continue to be crisis-proof in the months that followed?

Dr. H.-J. Ritzert: The BU's business is indeed relatively crisis-proof, as is currently evident in the area of animal nutrition. In the Exclusive Synthesis & Amino Acids business line, we have observed that the pharmaceutical industry – our pri-

mary market – remains stable. But even here, we have noticed an increasing optimization of net working capital over the last few months, so that order postponements could occur in this area as well. Over the medium and long term, however, we will profit from the trend toward outsourcing in the pharmaceutical industry and already see clear signs of growth here. In the electronics industry, we are feeling the effects of the economic downturn more strongly and recorded a decline in business in the first half of 2009. Fortunately, order income for 2010 has once again improved.

How do you assess the innovativeness of your main market, the pharmaceutical industry?

Dr. H.-J. Ritzert: First, the pharmaceutical industry has traditionally been among the most innovative industries, because for the large pharmaceutical companies – the originators – there is simply no alternative. Second, we are seeing that more and more pharmaceutical companies outsourcing part of their API and intermediate production. This is a clear trend, arising from the desire to focus on the core competencies of research and development, sales and marketing. This opens up promising prospects for us to expand our business.

How do large pharmaceutical companies with their own research departments award projects? Do you recognize particular trends that might result in, for example, increasing your customers' requirements or expectations of you?

Dr. H.-J. Ritzert: For many pharmaceutical companies, outsourcing has become a

Finding The Balance

Evonik Industries Offers Pharma Customers the Best of Both Worlds



strategic process leading to significantly closer collaboration with vendors. And the requirements on these preferred suppliers, as we call them, are clearly higher. This is exactly our approach. We are in discussion with the pharmaceutical companies for their early pipeline products. For example, we jointly develop suitable and robust processes that are feasible on a technical scale for active ingredient molecules developed in the research labs of the pharmaceutical customer. This is far from mere tolling production; it is process optimization that continues during product development and even after market launch of the drug. We then support the customer with the entire product life cycle. Due to the breadth of our technology portfolio and the flexibility of our production sites, we are in an excellent position to do this.

Does entering the value chain at an early stage mean that you assume a certain share of risk?

Dr. H.-J. Ritzert: Yes, but we must find this balance jointly with the customer by coming in at the

optimizing processes, for instance, or even the production plants – and pass this efficiency gains on to the customer.

Where do you see your technological core competences?

Dr. H.-J. Ritzert: Our greatest core competence is the breadth of our technical expertise: We offer almost the complete range of chemical synthesis technologies. In the last few months, we have further strengthened our position in this area by establishing a fluorine laboratory. An increasing number of active ingredients in pharmaceutical products, and also in agrochemicals, contain fluorinated building blocks and we are now in a very good position – in terms of research, with the new fluorine lab in Hanau-Wolfgang, as well as our assets – to offer our customers optimized solutions.

We are currently also expanding our expertise in the field of crystallization, because we see crystal morphology is becoming increasingly important for pharmaceutical active ingredients, particularly in the scale-up from laboratory to production. In addition to chemical and optical purity, the morphology of active ingredients is playing an increasingly important role here. As reported, crystallization science is an enabling science with a high degree of

relevance to large-scale manufacturing. From my point of view, understanding of crystallization principles and techniques is an essential competence for developing large-scale API production. We will continue to develop these processes on a project-related basis together with our customers.

On the subject of active pharmaceutical ingredients, other technological trends like chiral technologies, biotechnological methods, micro reaction technology, and continuous processes are also becoming increasingly important. How are you positioned in these areas?

Dr. H.-J. Ritzert: In regard to these trends, we are supporting the developments of our customers in the pharmaceutical industry. In chiral synthesis, for example, we have synergies with other business lines within the Evonik group. In the last few years, we have worked together with our Catalysts business line to develop homogeneous catalysts that we can use to optimize processes, both for external requirements and, of course, also for internal chiral chemical syntheses. We have also pursued developments in micro reactors. Evonik Degussa has a long tradition to develop biotechnological methods for large-scale manufacturing. In

the meantime some enzymatic platform technologies are available for production of chiral compounds. Continuous production processes could play a larger role in the future, but we expect that batch processes will continue to be important for API production.

You said that there are synergies within Evonik to offer pharma customers an even more extensive technology portfolio. How are these synergies enhanced?

Dr. H.-J. Ritzert: We pursue certain activities within Evonik that target the pharmaceutical industry as customers. We recognized early on that synergies do exist here. For this reason, we have been maintaining a pharmaceutical industry team for some years that cuts across business unit boundaries and includes members from technology, marketing, and sales. The members of this experts team that belong to such business lines as Catalysts and Exclusive Synthesis & Amino Acids as well as Pharma Polymers exchange views regularly, develop synergies, and agree about joint activities that ultimately benefit our pharmaceutical customers. We plan to strengthen this approach further in the future to allow us to increase our growth in this segment.

Can you give us an example?

Dr. H.-J. Ritzert: A good example is the development of homogeneous catalysts, for example for asymmetric synthesis, which I referred to earlier. A further example is provided by amino acids, where we can map the entire value chain, partly across business line boundaries. For example, we use amino acids as starting materials in chemical reactions for producing active pharmaceutical ingredients. And here, too,



"Our focus is customized project business."

right time. Good entry points are phase II or early phase III projects in clinical trials – but that doesn't mean we can't be successful in introducing products even after market launch or for off-patent applications. And we then provide support over the life cycle of the products by, for example, subsequently developing additional solutions for cost optimization – by



Aerial view of Tippecanoe Laboratories in Lafayette, 60 miles north of Indianapolis, Ind. Evonik acquired the site from Eli Lilly last December.

Continues Page 12 ►►

Design in Harmony with Natural Cycles

The Cradle to Cradle Framework

Full Circle – An organization pursuing sustainability as a growth opportunity engenders a focus on enhancing benefits (not only reducing costs) through its decision-making and actions – taking an approach of maximization rather than minimization. The organization can understand the perspective of “people, planet and profits” as expansionist and enabling leadership through the achievement of advanced success metrics. For example, the concept of good design of products and services should move beyond typical measures of quality – cost, performance and aesthetics – to include and apply new objectives, such as ecological intelligence and social responsibility. Change towards sustainability requires a company to reorient its goals, employ innovation and creativity, prevent problems and waste from being created in the first place, utilize more comprehensive metrics, and engage all stakeholders in both the vision and implementation of a positive future.

The Cradle to Cradle framework moves beyond the traditional goal of reducing the negative impacts of commerce (“eco-efficiency”) to a new paradigm of increasing its positive impacts (“eco-effectiveness”). At its core, Cradle to Cradle design perceives the safe and productive processes of nature’s “biological metabolism” as a model for developing a “technical metabolism” flow of industrial materials. Product components can be designed for continuous recovery and reutilization as biological and technical nutrients within these metabolisms. The Cradle to Cradle framework also addresses energy, water and social responsibility through the following tenets:

- Waste equals food. Design products and materials with life cycles that are safe for human health and the environment and that can be reused perpetually through biological and technical metabolisms. Create and participate in systems to collect and recover the value of these materials following their use.
- Use current solar income. Maximize the use of renewable energy.
- Celebrate diversity. Manage water use to maximize quality, promote healthy ecosystems and respect local impacts. Guide operations and stakeholder relationships using social responsibility.

Pursuing Cradle to Cradle strategies for a product, process or entire company can spur creativity and grow new business opportunities. Expanding the definition of quality by designing eco-effective products can provide competitive advantage, differentiate a brand, attract and retain customers, and reduce long-term risks.

Starting At The Bottom

In action, the Cradle to Cradle framework can be applied to assessing the human and environmental health characteristics of materials throughout their life cycles, product recyclability/biodegradability, effectiveness of product recovery and recycling, renewable energy use, water stewardship, and social responsibility, as well as optimizing any current weaknesses.

The primary application of Cradle to Cradle by McDonough Braungart Design Chemistry (MBDC) to date, has been under the principle of “Waste equals food,” or restated, “Safe materials cycling in closed loops.” In order to understand whether materials can be safely cycled as “biological nutrients” and “technical nutrients,” they should be evaluated for their human and environmental health characteristics, from production through use and post-use disposition, and recyclability/compostability:

First, each material must be broken down into its individual



ingredient chemicals (e.g., a printing ink can contain a pigment, defoamer, surfactant, resin/polymer, wax, solubilizer, antioxidant and other additives). Simply knowing the type of material usually is insufficient for a full evaluation of material health. For example, knowing something is “high-density polyethylene” or a “printing ink with non-chlorinated pigments” does not identify the various additives that may be combined with the base material and typically are the most critical in determining the human and environmental health attributes of the finished material.

Collaboration with and education of the supply chain is critical to this inventory effort, in order to fill in the proprietary gaps not covered by Material Safety Data Sheets (MSDS). The ingredient data collection effort quickly can mushroom into numerous vendors and months of calendar time.

Second, each ingredient must be evaluated for its known or suspected human and environmental health hazards throughout its life cycle, by analyzing peer-reviewed research studies of the pure chemical’s attributes measured using the criteria and cutoff values below.

Third, the chemical “profile” as a pure chemical then is placed into the context of the chemical’s use within a material application. This in-situation (or *in-situ*) assessment may al-

leviate some of the ecotoxicity concerns associated only with the pure chemical.

Finally, the *in-situ* chemical assessments are combined together to develop an assessment of human and environmental health characteristics for a complete material and/or finished product, across their entire life cycles. In addition, the material’s recyclability/compostability is evaluated, based on its own physical properties, irrespective of the relative availability of infrastructure for closing the loop or the Federal Trade Commission definition of recyclable.

Table 1: Human Health Criteria
These criteria are subdivided into priority criteria (most important from a toxicological and public perception perspective) and additional criteria. Substances that do not pass the priority criteria are automatically considered problematic and recommended for phase-out/replacement.

Table 2: Environmental Health Criteria
These criteria have immediate or long-term effects on environmental quality, including plant or animal life.

Material Class Criteria

Table 3: The following material classes are considered problematic because, at some point in their life cycle, they may have negative impacts on human and environmental health. For

example, organohalogenes tend to be persistent, bioaccumulative and toxic, or can form toxic by-products if incinerated.

Table 4: Using available research data, each chemical, material or product is ranked using the following rating colors:

Ingredient Optimization And Beyond

Using completed material assessments, product developers can select ingredients that are safe for human and environmental health and fully recyclable/biodegradable. In cases where materials fall short, alternative formulations should be researched collaboratively with vendors. A manufacturer also should explore various strategies for fully recycling or biodegrading its product, which often requires connections with external partners, such as customers, retailers, recyclers, public agencies, and nonprofit organizations. Fully closing the loop on materials requires their safe recovery and reformulation into new products or biodegradation into the soil.

In order to “use current solar income,” the final manufacturing process and vendors’ manufacturing should be powered by 100% renewable energy (e.g., solar, wind, low-impact hydroelectric, biomass) produced on-site, purchased directly from a utility, or offset with Green-e certified Renewable Energy Certificates (REC).

In an effort to celebrate diversity, manufacturers and their vendors should ensure they are using as little water as possible and ideally keeping that water within closed loops. In addition, water released to the environment should be of at least the same quality as before it was removed from a water source, to promote ecosystem and watershed health. Social responsibility should guide relationships with workers, local residents, customers, vendors, the larger business community, the government and other stakeholders.

Cradle to Cradle optimization may not be achieved easily or quickly, and may require continuous improvement over time. For example, performance and cost considerations also may prevent preferred solutions from coming into use in the short term, but at least manufacturers are prepared with an eco-effective solution once other market conditions are met. The Cradle to Cradle goal may take a long time to completely realize for a par-

Table 1

Criterion	Description
Priority Criteria (rated problematic if known or suspected)	
Carcinogenicity	Potential to cause cancer
Endocrine Disruption	Potential to negatively effect hormone function and impact development
Mutagenicity	Potential to damage DNA
Teratogenicity	Potential to harm fetus
Reproductive Toxicity	Potential to negatively impact reproductive system
Additional Criteria	
Acute Toxicity	Potential to cause harm upon initial, short-term exposure
Chronic Toxicity	Potential to cause harm upon repeated, long-term exposures
Irritation of Skin and Mucous Membranes	Potential to irritate eyes, skin, and respiratory system
Sensitization	Potential to cause allergic reaction upon exposure to skin or airways
Other	Any additional characteristic (e.g., flammability, skin penetration potential) relevant to the overall evaluation but not included in the previous criteria

Table 2

Criterion	Description
Fish Toxicity	Measure of the acute toxicity to fish (both saltwater and freshwater)
Daphnia Toxicity	Measure of the acute toxicity to Daphnia (invertebrate aquatic organisms)
Algae Toxicity	Measure of the acute toxicity to aquatic plants
Persistence/Biodegradation	Rate of degradation for a substance in the environment (air, soil, or water)
Bioaccumulation	Potential for a substance to accumulate in fatty tissue and magnify up the food chain
Climatic Relevance	Measure of the impact a substance has on the climate (e.g., ozone depletion, global warming)
Other	Any additional characteristic (e.g., soil organism toxicity, WGK water classification) relevant to the overall evaluation but not included in the previous criteria

Table 3

Criterion	Description
Organohalogen Content	Presence of a carbon-halogen (i.e., chlorine, bromine, or fluorine) bond
Heavy Metal Content	Presence of a toxic heavy metal (e.g., antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, mercury, nickel)

Table 4

GREEN	Ingredient/material is preferred for use.
YELLOW	Ingredient/material is acceptable for use. Associated with slight to moderate human and/or environmental health hazards; suitable for continued use until a GREEN alternative is found.
RED	Ingredient/material is problematic. Associated with one or more serious human and/or environmental health hazards (e.g., polyvinyl chloride, toxic heavy metals, halogenated organic substances); should be phased out as quickly as possible or carefully maintained in closed-loop life cycles without any risk of leakages, if required for product performance and no viable alternatives currently are available.
GREY	Incomplete data. Complete ingredient data is not available or evaluation data is not available; data should be collected or ingredient should be phased out of use.

ticular product or industry, but designers, material fabricators and manufacturers should accept the challenge, establish a trajectory toward this ideal, and begin to implement strategies to help them achieve it. Leveraging this expanded notion of “good” design will help create materials and products that benefit the company, its stakeholders and the environment.

See also our in-depth interview with Michael Braungart on pages 1 and 7.

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ADVERTORIAL

Managing Highly Volatile Raw Material Prices: MAUSER Provides New Alternatives for Price Adjustments

The turbulent ups and downs of raw material prices in the recent past have shown the effects of delayed price adjustment mechanisms for raw materials: They cause considerable disruptions in pricing for both producers and consumers.

MAUSER CEO Dr. Clemens Willée considers it important to increase the transparency and planning reliability for all parties: “We would like to improve the situation in a joint effort with our customers, offering new solutions that minimize the distortion effect both for increasing and for decreasing raw material prices.”

Against this backdrop, the MAUSER Group – supported by the renowned consulting company Simon-Kucher & Partners – has developed two different concepts designed to increase planning reliability for MAUSER and its customers. The two models are in line with pricing solutions that have already been implemented successfully in other industrial sectors.

Model I: Responding to the Index at Closer Intervals

Most producers adjust HDPE prices monthly and steel

prices quarterly to keep up with the changes in the indices. Synchronizing customer price adjustments to this same schedule eliminates the delay (“lag effect”) of highly volatile price developments for all parties involved. In order to keep the administrative effort down to a minimum, MAUSER is now approaching its customers to explore the opportunities for adapted software solutions (Auto Data Read-in). In practical terms, this means that MAUSER would make monthly price data available in a customer compatible format. This format would enable the customer’s IT to import the data electronically, allowing for automatic adjustments requiring no manual input of prices.

Model II: Debit/Credit System

The debit/credit system offers an interesting alternative to price adjustments at shorter intervals. This model involves setting prices for a period of 6 months on the basis of the current index. At the end of every month, the difference to the actual raw material price is determined. Depending on price developments, quarterly settlements

are made by sending either an invoice or a credit note. The advantage of this model: The customer’s IT department can input prices for six months and there is no need to update price lists during this period. The administrative effort for the customer at the end of a quarter is practically identical to carrying out quarterly adjustments under the present system.

Alexander John, MAUSER Head of Global Sales & Marketing, considers conditions to be favorable for the introduction of either of the models: “Due to modified production capacities of manufacturers and the present economic situation, raw material prices are still highly volatile. The two alternative models can therefore result in immediate improvement.”

In the coming weeks, MAUSER will present these models in greater detail to all contract partners, exploring which adjustment approach will bring optimum results for them. In the meantime, some customers have already reacted and eliminated pricing thresholds in their contracts. For security reasons, the implementation of automatic IT system price up-loads still takes a little time. Customers

have already indicated their willingness to change to shorter adjustment periods, once this hurdle has been overcome.

About MAUSER

MAUSER AG is a leading producer of industrial packaging with approx. 4,000 employees and revenues of around EUR 1 billion. Its largest business is plastic packaging, followed by steel, IBC and fiber packaging, reconditioning services and machinery for packaging production. MAUSER AG operates more than 50 locations in Europe, North America, South America, Latin America and Asia. Two marketing networks – one for plastic and one for the production of steel drums – include approximately 30 members in more than 20 countries and make MAUSER quality products and services available worldwide.

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BASF Chelating Agent Plant On Stream Ahead of Schedule After 18 months of construction, the new plant expansion for BASF’s chelating agent Trilon M has now been brought on stream at the BASF site in Ludwigshafen, Germany, three months ahead of the scheduled date. Expansion of the Trilon M plant has created 18 new jobs in Ludwigshafen.

The plant now provides BASF with a global annual production capacity of 120,000 t for chelating agents, which the company says is its response to increasing global demand. The company said it expects double-digit percentage growth rates for environment-friendly chelating agents. Apart from Ludwigshafen, BASF also manufactures chelating agents in Lima, Ohio (U.S.) and Guaratinguetá, Brazil.

Chirals: The Real Deal

Is Obtaining A Chiral Molecule A Big Problem?

Getting Easier – The number of drug candidates containing a stereogenic center continues to increase, necessitating selective syntheses of aspecific isomer. As the number of methods increases, this is becoming less onerous.



David Ager
DSM Pharma
Chemicals

unless acted upon by another chiral agent.

Although these effects have been known and understood for a long time, it is only recently that we have possessed the analytical and physical methods to make chiral – or asymmetric synthesis – a viable option.

Chiral Pool

Nature is generous in providing the "chiral pool", a range of compounds, such as amino acids, carbohydrates and terpenes, which exist as just one enantiomer and are readily available. This chiral pool is somewhat restricted, and many



early asymmetric syntheses are spent in an inordinate number of steps to manipulate the functionality so that a chiral center could be incorporated into the target molecule. On the other hand, this is an efficient and

cheap approach if the chiral pool material can be readily used. In a few cases, the desired compound, or a close derivative, may be available from an organism and fermentation can provide a ready supply. This approach is now helped by yield improvements through molecular biology.

Resolutions

The other traditional method to obtain chiral compounds is resolution, where a derivative is made so that the resultant diastereoisomers can be separated. A salt break then gives the single enantiomer of the desired molecule. It is also possible to make a covalent bond between the subject molecule and a chiral derivative to allow separation. The approach can be somewhat tedious, as conditions need to be found to separate the derivative diastereoisomers. A number of adaptations have been developed in recent years, including one called the "Dutch Resolution" where a mixture of chiral agents, such as acids to resolve a base, are added at the same time and a mixture of salts is obtained.

Biocatalysts can be used to resolve a racemic mixture when one enantiomer is a substrate for an enzyme while the other is not. Another methodology that has arisen from the resolution approach is to use chromatography with a chiral stationary phase. Translation to larger

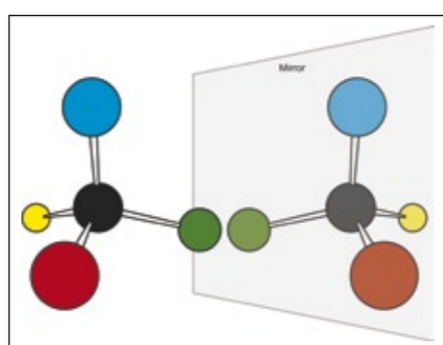


Fig. 1: Methods to chiral molecules

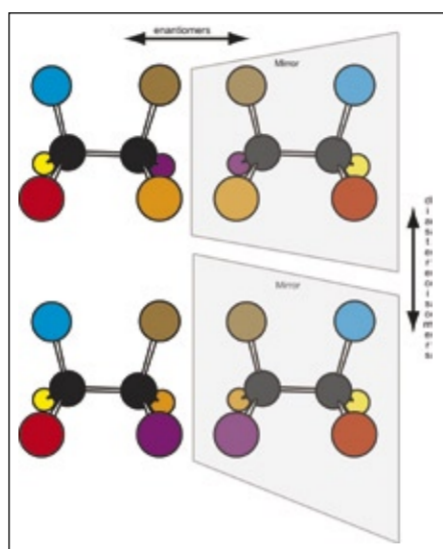


Fig. 2: Relationships between enantiomers and diastereoisomers

scale can, however, be costly as large amounts of absorbent may be required. However, this can be alleviated to a degree by the use of techniques such as simulated moving bed (SMB).

These sorts of resolutions result in a maximum of 50% yield, although it may be possible to recycle the undesired enantiomer

by a racemization – interconversion of the enantiomers – procedure. This approach is often called a dynamic kinetic resolution and the result can be 100% yield of a single enantiomer. Separation techniques have also been developed that allow the chiral agent to be recycled and reused, often in flow systems.

Asymmetric Synthesis

Asymmetric synthesis is now becoming mature enough to provide competitive methodologies. The use of a chiral auxiliary or template has given some high degrees of asymmetric induction and provided mechanistic insight into a wide range of reactions. In this type of approach, a chiral moiety is attached to a substrate molecule, a reaction is performed where the

stereochemical outcome of the reaction is guided by the auxiliary, and then this moiety is removed to provide the desired enantiomer of the product. The methodology is stoichiometric and, even with an auxiliary that has the potential to be recycled, can be expensive. Two extra steps are added to the synthe-

tic sequence – attachment and removal of the auxiliary.

With chiral reagents, the stoichiometric reagent itself provides the chiral discrimination to a prochiral – a center that can form enantiomers during a reaction – substrate. In some cases, the chiral part of the reagent can be recaptured and reused, although this may involve a number of steps.

With costs and "green" methods becoming more important, current methodology is moving towards catalytic methods, be they chemical or biological. Many chemical catalysts involve the use of a transition metal with chiral ligands attached to provide a chiral "pocket" where the desired reaction occurs. High levels of selectivity can be achieved in a variety of reactions but especially reductions of carbon-carbon, carbon-oxygen and carbon-nitrogen double bonds (fig. 4). In addition, catalyst usage can be low, making the cost contribution to the process small.

Biocatalysts can also be very efficient and provide just a single enantiomer of the product. Techniques such as immobilization and biphasic systems provide means to use the catalyst in more than one batch or in a continuous process.

There is a third type of catalyst called organocatalysts, which do not contain a transition metal and in many applications mimic enzyme reaction mechanisms.

The Future

Catalytic methods will continue to grow and provide many more methods for asymmetric synthesis in the years to come. Forty years ago, obtaining a single enantiomer of a product was a major undertaking if a resolution or chiral pool approach could not be readily adapted. Today, asymmetric synthesis is not so much of a burden and can be considered no more onerous than making a strategic bond. Our understanding of reaction mechanisms and how reactions proceed in a three-dimensional array has helped with asymmetric reaction design. Presently, screening is often necessary to determine the best catalyst to use for a reaction. It is imaginable that this may become redundant as our knowledge increases so that a chiral catalyst can be predicted or designed in silico. The vast improvements in analytical methodologies and the decrease in time required to perform them will continue to play an important role in chiral method development.

For further reading see *Handbook of Chiral Fine Chemicals, 2nd edition, David J. Ager, ed. CRC: Taylor Francis, Boca Raton, 2005.*

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A Peek In the Toolbox

Asymmetric Synthesis of Chiral Building Blocks

Key Elements – Over the course of previous decades, worldwide research has continued to be focused on increasingly sophisticated novel methods for the development of chiral building blocks. These compounds are now a key element in the synthesis routes selection for the manufacture of active pharmaceutical ingredients.



Dr. Gerhard Panke
Saltigo

variant that is also available is chemical resolution via a salt, which in the end gives the same result. Furthermore, chromatographic separation may make sense on an industrial scale and certainly can be applied. Which of the methods is in conclusion used in order to enable the preparation of this building block on a multi ton scale is ultimately decided by economic efficiency. Once a process has been established for a specific chiral building block, it is also important to continue work on further optimization over the entire life cycle of this building block. This has a positive effect on the cost of goods for the customer and consequently on the duration of the business relationship.

A Saltigo example is access to chiral polyalcohols and amino alcohols by the reduction of cheap hydroxy acids and natural amino acids by metal-catalyzed hydrogenation in order to avoid the use of expensive complex hydrides, such as lithium aluminum hy-

dride. For instance, L-lactic acid, L-malic acid and L-tartaric acid can be hydrogenated easily using hydrogen at 200 bar with a ruthenium/rhenium catalyst. The advantage of the optimized ruthenium/rhenium catalyst compared with ruthenium alone is that the reaction can be carried out at low pressures and temperatures without racemization. The ruthenium/rhenium catalyst achieves an ee value of virtually 100% in this reaction at a reaction temperature of only 60 °C with a yield of 80%. Use of the ruthenium catalyst alone is not able to achieve even approximately this yield and this ee value under any of the reaction conditions selected. It is even possible to re-use the catalyst a number of times. The use of the ruthenium/rhenium catalyst can also be easily extended to the preparation of chiral amino alcohols by simply using natural amino acids in the reaction. The advantages of the ruthenium/rhenium catalyst in such reactions are clear:

- It is cheaper to use than the complex hydrides (LiAlH₄, ...)
- No racemization takes place, in contrast to with ruthenium
- High yields are obtained
- A broad range of starting materials is available



- Aromatic amino acids, such as L-phenylalanine, yield the cycloaliphatic amino alcohols in one step.

This simple optimization work achieves two important aims in one: high economic efficiency and broad applicability.

Enantioselective Synthesis

Besides these routes to chiral building blocks which use the natural chiral pool directly, enantioselective synthesis has by far the greatest significance in the modern chemical industry. This can be used to generate a new, artificial chiral pool, which then represents the basis for ever newer and better active ingredients. It is also worthwhile

investing in optimization work and new developments here in order to be able to offer chiral building blocks successfully on the market and in addition to stand out from competitors.

On the one hand, the Juliá-Colonna epoxidation, a hydrogen peroxide oxidation in basic medium induced by polyamino acids, should be mentioned at this point. The optically active compounds from these enantioselective epoxidations are particularly suitable for obtaining precursors of a large number of bioactive compounds. At Saltigo, epoxides are produced, *inter alia*, by a process variant using a phase-transfer catalyst in order to actually ensure a corresponding conversion in an acceptable time and a high ee value in the three-phase system under Juliá-Colonna conditions. The range of applications of this reaction is very broad, the best results being achieved in the reaction of aromatic enones, with base-sensitive starting materials tending to undergo side reactions.

Enantioselective hydrogenation is worthy of mention as a milestone in enantioselective synthesis on an industrial scale. For example, β -keto esters can be hydrogenated in excellent yields and selectivities by means of suitable catalysts and corresponding chiral ligands. These are used such as building blocks for the preparation

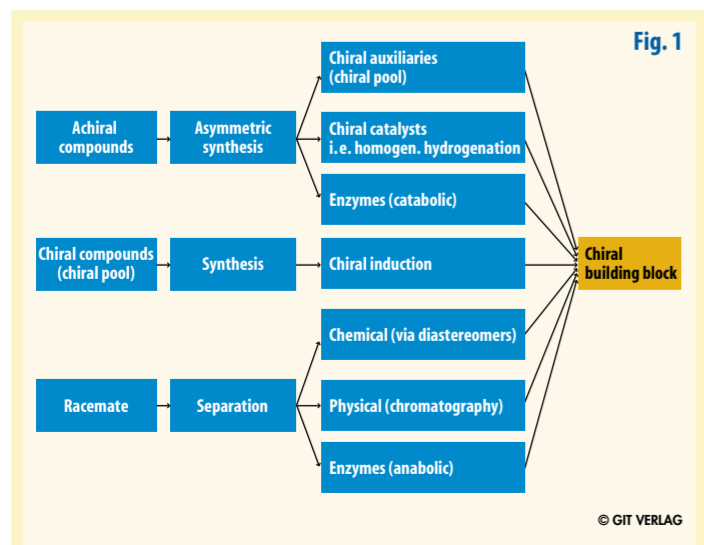
of statins. New chiral ligands, which are finally responsible for the selectivity of the reaction, have been and still are being developed for this purpose. Fig. 2 only shows a very small selection; many novel, interesting derivatives and even entirely new ligand families are in the meantime already available.

Saltigo can also develop high-performance ligands and then to make them available for commercial purposes, i.e. in the event multiton production campaigns, by up-scaling the syntheses. Cl-MeOBipheb is only one example of the few ligands that are also available on the market in multikilogram quantities and gives analogous to better results compared with a standard ligand, such as BINAP. The synthesis of Cl-MeOBipheb has been developed and optimized very suc-

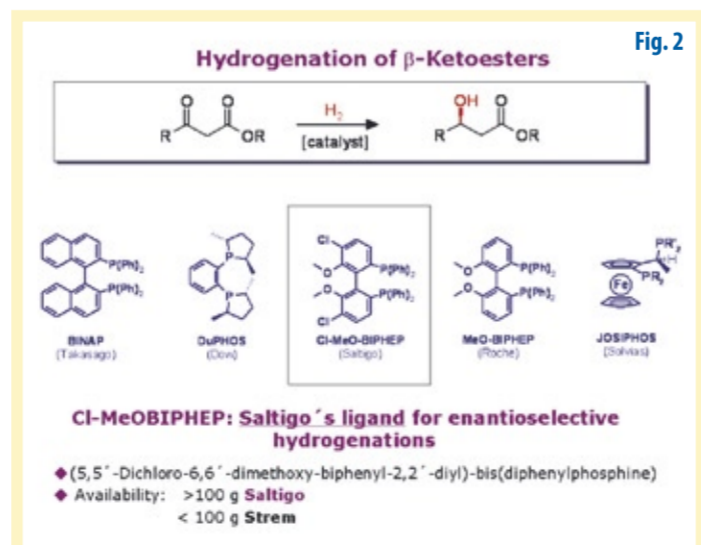
cessfully for up-scaling and gives the two isomers in >99% ee and good yields – only ten kilograms of ligand can give approximately 30–90 metric tons of the hydrogenation product (s/c 15,000–30,000:1; MW of product 150–200 g/mol). The commitment and hard work shown both during development and also during industrial-scale implementation were extremely profitable, since it is only the high economic efficiency that has made enantioselective hydrogenation attractive on an industrial scale and as a commercial tool for customers.

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University of Zurich Requests Nominations for 2010 Siegfried Medal.

The University of Zurich is accepting nominations for the 2010 Siegfried Medal Award in chemical methods which impact process chemistry. This distinguished award has been established at the University of Zurich by the Siegfried company in Zofingen, Switzerland to recognize original research in chemical processes, carried out in academic and/or industrial laboratories, that influences the way process chemistry is conducted.

The award is made biannually and consists of a gold medal, a bronze replica, and an honorarium of 10,000 CHF. This will be presented at the Siegfried Symposium scheduled for September 23rd, 2010 at the Kongresshaus in Zurich. A full description of the Siegfried Symposium can be found at

www.oci.unizh.ch/diversa/siegfriedsymposium/index.shtml or www.siegfried.ch

The general area of process chemistry drives much of the chemical industry but receives fewer than its share of highlights. The Siegfried company, in conjunction with the Organic Chemistry Institute of the University of Zurich and its Laboratory for Process Research (LPP), wish to recognize outstanding achievements in this essential branch of the chemical enterprise. Scientists who have made exceptional contributions to chemical methods or technologies with impact on the process chemistry of fine chemicals and APIs are eligible for consideration by the committee.

Nomination packages should consist of a nominating letter identifying the contribution, explaining its importance and elaborating in detail its impact on process chemistry, a CV and list of publications by the nominee, a focused set of supporting documents to substantiate the significance of the work (e.g. seconding letter; 1-3 reprints or patents).

Electronic submissions are requested in pdf format and should be submitted to Professor Jay S. Siegel jss@oci.unizh.ch by March 31st, 2010. Award announcements will take place in May 2010.



Better Regulation of Pharmaceuticals

Towards a Simpler, Clearer and More Flexible Framework On Variations

Regulation – Medicines are regulated throughout their life-time. All changes subsequent to their placement on the EU market, for example, changes in the production process, the packaging, the address of the manufacturer, are considered in legal terms as “variations,” and must be handled according to a complex legislative framework: the “Variations Regulation.”

While regulating variations is essential to ensure that medicines remain safe and effective, prior to the revision of the Variations Regulation, a large majority of products fell outside the scope of community rules and were subject to divergent national rules. This lack of harmonization had negative consequences in terms of administrative burden, both for industry and national regulatory authorities, and in the overall functioning of the internal market.

The objective of the revision of the Variations Regulation, initiated by the EU Commission, Enterprise and Industry, was to simplify the legislative framework governing variations. The new Regulation (1234/2008) applies to variations as of Jan. 1, 2010, as per the current scope of the regulation, namely marketing authorisations (MAs) obtained via the centralised, decentralised (DCP) and mutual recognition (MRP) procedures.

Broadening Of Regulation Scope

The broadening of the scope of the regulation to include national submissions can be exercised by the EU Commission from January 2011. This will bring a major benefit to industry since the majority of

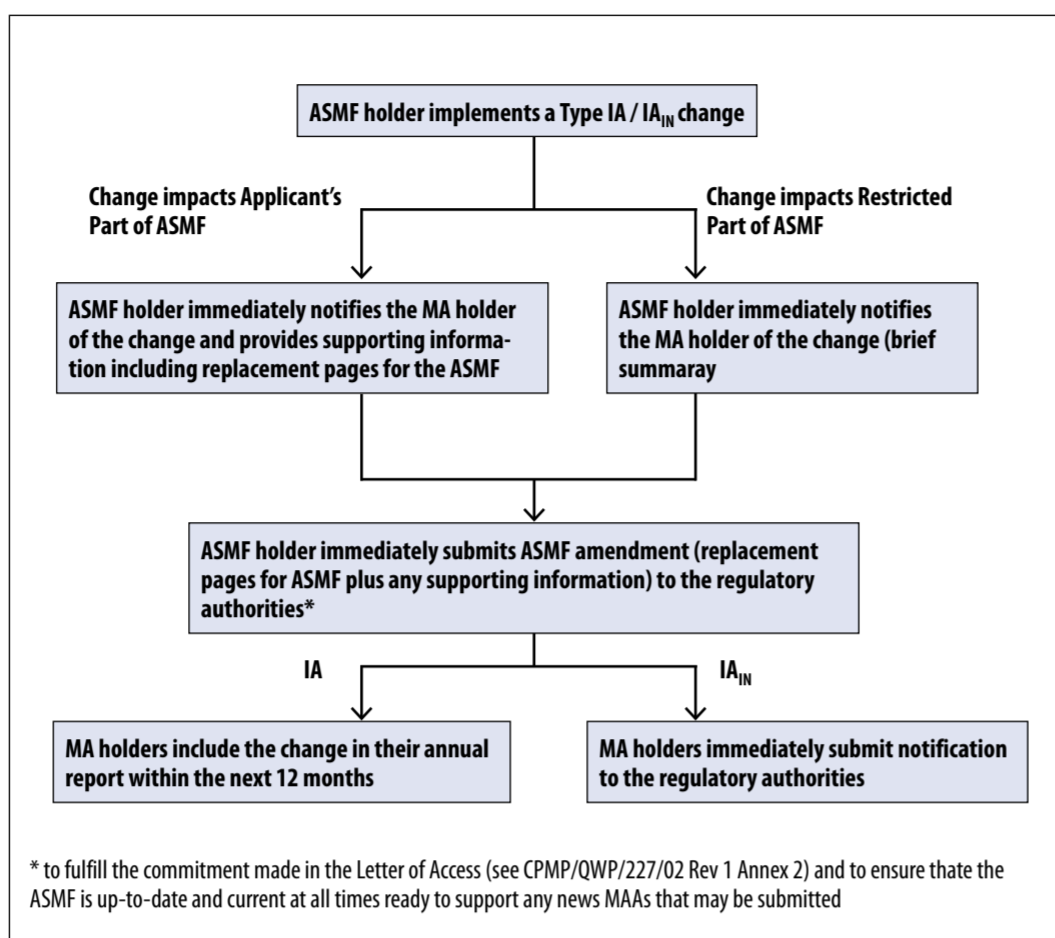


Fig. 1: Proposal for Handling Type IA/IAIN Changes to Active Substance Master Files

MAs are currently still purely national. In particular, the fixed approval timelines will be a significant benefit since these will allow implementation of the variation within a predictable timeframe.

EU Commission Recognizes That Change is Vital

Change is vital to enable innovation and continual improvement of pharmaceutical products and manufacturing processes, to increase quality and safety, reduce environmental impact and accommodate the evolution of science and technology. The manufacture of APIs is no exception to this. Change is the most important tool for industry to create sustainable growth and to remain competi-

itive in continuously changing circumstances.

In order to make changes, the dedicated API industry must work closely with the MA holder. Not only must the impact of the change to the API on the medicinal product be assessed, it is the MA holder who must submit the variation application. For the MA holder, this means the filing of variations in different countries, for different formulations, via different procedures with different approval times. It may be that full approval for implementation is only obtained after several or even many years. Under these difficult circumstances, it is easy to understand why MA holders are often reluctant to support changes proposed by their API suppliers. This may lead to the

change being blocked completely. For many API manufacturers, making a change under the old system was virtually impossible.



It is not surprising then that the Commission's initiative towards a simpler, clearer and more flexible framework on variations was very much welcomed by the API industry.

One of the changes in the new regulation is the introduction of a “do and tell” procedure for Type IA variations. Some



Type IA variations will require immediate notification after implementation (denoted by the subscript “IN”); the remainder should be notified within 12 months following implementation. Clearly, this will reduce the regulatory burden for the MA holder, however, it is imperative that the active substance master file (ASMF) holder also benefits. While it is acknowledged that the regulation does not allow for the ASMF holder themselves to submit an “annual report”, direct contact between the authorities and the ASMF holder is essential in order to keep the ASMF up-to-date and current. This is required because in a multi-customer/multi-authority environment, a new or existing customer may submit a new MA application at any time and for MRP / DCP, it is essential that all authorities have the same version of the ASMF. The direct contact is also needed in order for the ASMF holder to fulfil his responsibilities in accordance with the commitment made in the Letter of Access (CPMP/QWP/227/02 Rev 1 Annex 2).

The Active Pharmaceutical Ingredients Committee (APIC) therefore, proposes that the ASMF holder informs both the MA holder and the authorities of a Type IA change at the time of implementation. The MA holder would subsequently include the variation in his annual report at his discretion (fig. 1).

Regular Update of the Classification of the Changes

Another change in the new regulation is the omission of the detailed annex containing the classification of Type IA and IB variations. Under the old regulations, any variation that was not listed as Type IA or IB (and was not an extension) was Type II by default. Now, in order to facilitate regular revision, the classifications are listed in a guideline rather than in the regulation itself and any variation that is not listed as Type IA or Type II (and is not an extension) is Type IB by default. (Examples of Type IB variations are provided but the list is not exhaustive.) This default princi-

ple should reduce the number of changes blocked since submission and approval times for API changes will interfere less with medicinal product changes or clinical changes etc.

In conclusion, the EU Commission initiative for better regulation of pharmaceuticals is a significant step forward in harmonizing the handling of variations in the whole of the European Union and is now reaching out to the EU health authorities and industry to put this into practise in terms of timelines, documentation requirements and to engage in employing the new principles laid out in regulation 1234/2008 and its two supporting guidelines to its full extent.

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Finding The Balance

Evonik Industries Offers Pharma Customers the Best of Both Worlds

Continued Page 9

synergies exist in the business unit Health and Nutrition between Exclusive Synthesis & Amino Acids and the Bio-products business line, which produces these amino acids by fermentation.

At the end of last year, you acquired a new production site in the U.S. Where does this fit into your production network?

Dr. H.-J. Ritzert: Our business line has two sites in Germany. First, here in Hanau-Wolfgang, we operate our research center as well as the production plant, and the site also houses our global key account management. **Dr. H.-J. Ritzert:** After its synthesis, a pharmaceutical active ingredient is characterized by three value-creation steps. Standard intermediates are first manufactured; these intermediates are then converted to what is known as advanced intermediates, from which in turn the final active pharmaceutical ingredient or API is produced. In the last few years, we have focused strategically on advanced intermediates and APIs because we have recognized increasingly intense competition in the area of standard intermediates. As a result, we divested the British site Seal Sands, which focuses on standard intermediates. We have instead expanded our position in APIs, first, with the acquisition of Tippecanoe, and second, with

a new plant for production of an active ingredient, which will come on stream early this year. And of course we now have the new U.S. site of Tippecanoe Laboratories in Lafayette, Ind. (U.S.). So we have a network of production sites that is highly competitive and where we can map a variety of different processes, depending on customer requirements and technology. The sites, therefore, complement one another. We call this concept “horizontal integration”.

Could you describe the concept and its implementation in more detail?

Dr. H.-J. Ritzert: Of course, cost structures in China are different from those in Europe or North America, but we have global ESH standards that we



“We look to develop opportunistic business into strategic partnerships.”

the new facilities in Dossenheim and Wuming. Horizontal integration in this context means that we produce simpler advanced intermediates and – to a lesser extent – APIs, where we are in a more competitive environment, in China, and we make more complex final steps close to the API – or the API itself – at sites in the West.

Do the sites in China already have the background for more cost-effective production?

Dr. H.-J. Ritzert: Of course, cost structures in China are different from those in Europe or North America, but we have global ESH standards that we

apply to all sites. Of course, we take national regulations into account as well.

What was the crucial factor in the decision to acquire the U.S. site Eli Lilly?

Dr. H.-J. Ritzert: There were various reasons. The first of those, as I mentioned earlier, was to focus the production of advanced intermediates and APIs. The Tippecanoe site has both an excellent technology base and a featured quality management. The assets are of pharmaceutical standard, and that for a reactor volume exceeding 600 cubic meters of API capacity. Another important aspect was

the outsourcing partner has a critical size and be as flexible as possible with availability of production capacities. For the acquisition of the Tippecanoe site, the decisive factor was the expertise of the more than 650 employees we took over together with the existing assets.

Exclusive synthesis represents a particular challenge for the plants due to order and production characteristics. How do you plan projects so as to use synergies optimally and ensure high capacity utilization and a competitive cost level?

Dr. H.-J. Ritzert: First, we have global production planning. New projects are assigned to production sites worldwide on clearly defined criteria. This is done in close collaboration with our customers. Many of our customers have clear ideas on where the intermediates or APIs should be produced – preferring Europe or the U.S. for the last stages, for example. Other customers prefer Asia due to its more attractive cost structures. In this regard, we can satisfy customer requirements with great flexibility. We use tools that allow us to assess the various options – by simulations, for example – very rapidly and transparent to the customer, in order to offer the economically optimal capacity assignment. Moreover, at each of our sites we pursue process development, which is globally

managed. The focus is currently on rapid integration of the new site in Tippecanoe and of course also of the investments in Dossenheim and Wuming.

You mentioned off-patent products. Do you also target generics producers for collaboration?

Dr. H.-J. Ritzert: As already discussed, our focus is customized project business. But there is also business that is to be regarded rather as product business. Here we produce advanced intermediates or active pharmaceutical ingredients that are off-patent. In this field, especially for technically more sophisticated products, we are able to be competitive with our organization and technologies.

How do you view the long-term prospects for your business?

Dr. H.-J. Ritzert: In the future, Evonik Industries will, among other things, focus on pharmaceuticals and health care as growth topics, and this is reflected in the strategy of our business line. We will become, to an even greater degree, the partner of choice for pharmaceuticals customers, and we look to develop opportunistic business into strategic partnerships. After all, this represents a further logical step of the strategy that we have followed very successfully over the last few years.

www.evonik.com/exclusive-synthesis



UNDER CONSTRUCTION

Lanxess Brings Forward Rubber Facility Project Lanxess has brought forward its plans to build a new butyl rubber facility in Singapore. The company will hold a groundbreaking ceremony in May, and production is expected to start in the first quarter of 2013. The 100,000 tons per annum plant on Jurong Island will require an investment of up to €400 million. In June 2009, the company postponed the production start of the plant until 2014 due to the effects of the global economic crisis. This led to a period of de-stocking and high volatility of customer ordering. However, demand has stabilized in the last six months and the global butyl rubber market is expected to grow again annually by an average of more than 3% in the coming years. Additionally during 2010, Lanxess will relocate the global headquarters of its Butyl Rubber business unit to Singapore from Fribourg, Switzerland, in order to better serve the rising demand in Asia. ■

Ineos: JV with Sinopec to Build 400,000 t/y Phenol Plant in China Ineos Phenol, Lyndhurst, UK, and Sinopec Yangzi Petrochemical, Beijing, China, are planning a joint venture to build and operate China's largest phenol and acetone manufacturing site at the Nanjing Chemical Industrial Park. The new facility will produce 400,000 t/y of phenol and 250,000 t/y of acetone along with 550,000 t/y of cumene. Ineos Phenol CEO Leen Heemskerk said that building capacity in China was strategically important for the company and that its partnership with Sinopec would offer benefits in technology and feedstock and supply chain integration. The project is expected to be completed in 2013. ■

Eastman Completes Netherlands Expansion Eastman Chemical Company has successfully completed the expansion of Regalite capacity of its hydrogenated hydrocarbon resin facility in Middelburg, The Netherlands. With this expansion, the original capacity has increased by 65%. Regalite hydrogenated hydrocarbon resins produced at Eastman's Middelburg facility meet the growing need for high quality tackifier resins that are compatible with a wide range of thermoplastic polymers used extensively in adhesives, sealants and polymer compounds. "The end markets in which Regalite is sold have performed with strength even during the economic downturn which further justifies Eastman's investment in these growing markets," said Rien Jonker, Middelburg's site manager. The Middelburg tackifier resin plant is one of the largest in the world, producing a range of rosin and hydrocarbon resins and dispersions. ■

Kayan in Initial Deal With Daelim for Jubail Plant Petrochemical Co said it signed a preliminary agreement with South Korea's Daelim Industrial to build a petrochemical plant. The plant will have the capacity to produce 300,000 tons per year of low density polyethylene, and will be part of Kayan's giant petrochemical complex. Kayan, a unit of Saudi Basic Industries Corp (Sabic), signed a letter of intent with Daelim for the engineering, procurement and construction (EPC) of the plant in Jubail, on the Gulf's east coast. Kayan said in a statement. The preliminary agreement will last for three months. The project was re-tendered along with an amines plant project Kayan plans to build at the complex. The first tender was awarded to UK Simon Carves, a unit of Indian Punj Lloyd, in 2007 as a fixed-price services contract while the amines plant was awarded to Samsung Engineering. The complex will have an annual production capacity of six million tons of petrochemicals including ethylene, propylene and ethylene glycol from 16 plants. ■

SDL to Build Israel's Biggest Desalination Plant SDL Desalination has won a government tender competition to build Israel's largest desalination plant, its parent company said. SDL will build the desalination plant in central Israel and will produce some 150 cubic metres of water each year, conglomerate Delek Group said in a statement. SDL is 51% held by IDE Technologies and 49% by Hutchison Water, a unit of Hong Kong group Hutchison Whampoa, with offices in Israel. Delek owns 50% of IDE, with the other half owned by fertiliser maker Israel Chemicals. Israel is in the process of building a number of plants to desalinate water from the Mediterranean Sea as poor rainfall in recent years has led to a drought. The Ministry of Infrastructure awarded the build-operate-transfer (BOT) contract to SDL, which will run the plant at Sorek near the central Israeli city of Rishon Lezion for 25 years before handing it back to the government. ■

Shell Opens Mono-Ethylene Glycol Plant in Singapore Royal Dutch Shell has opened its mono-ethylene glycol plant on Singapore's Jurong Island, the latest milestone towards the completion of the firm's refinery and petrochemicals hub next year. With a nameplate capacity of 750,000 tons of mono-ethylene glycol (MEG) per annum, the wholly owned unit is a key element of the Shell Eastern Petrochemicals Complex, slated to be fully operational in early 2010. The MEG plant will use the OMEGA processing technology, which offers the highest commercial yields of MEG from ethylene and lower operating costs compared to traditional plants. Most of the output from the new plant will be sold in the Asia-Pacific region, which accounts for 70% of global MEG consumption. The Shell Eastern Petrochemicals Complex will be the oil major's largest, fully integrated refinery and petrochemicals hub, and represents its biggest downstream investment in Singapore. The complex comprises the MEG plant, a new 800,000 ton per year ethylene cracker complex, a butadiene plant, and modifications to the existing Pulau Bukom Refinery. ■

Industry Perspectives

Current Trends and How They are Affecting Product Development

Outlook – With the dawn of a new decade, CHEManager Europe asked a selection of prominent companies who supply the chemical and industrial process industry about their expectations on the development of different trends in their industry and how this is reflected in product development and the services companies are expected to offer their customers. We also spoke about what key events will be of importance in 2010.

CHEManager Europe: What is your strategy for 2010?

B. Schulte-Ellerbrock: Maag Pump Systems strategy is to strengthen and extend the market share with their latest development. Overall we do expect to slightly increase our numbers in 2010. The V-Series, launched at the Achema 2009, was specially developed for low inlet pressures and high viscous fluids. This new pump series combines the well established properties of our polymer pumps with the high demand in industrial and chemical processes. This pump series is heatable and available for sizes from 28 to 70. In recent weeks there has been an increasing demand for "small" pumps in

the prepolymer business. We see great success potential for this new pump, especially for

demand for flexible and customized solutions. Due to our broad knowledge and long last-

Our Application Engineering Department, especially dedicated for demanding applica-

we are participating in emphasize the importance of certain markets. China is an important market, this is not only visible through the official market data but also company figures. The Achemasia 2010 in Beijing, China will therefore be one highlight where we will show our latest developments. Furthermore, we invite our customers to share their ideas with our engineers in order to create new customized solutions.

Another big exhibition will be the K 2010 in Duesseldorf, Germany in October where we will introduce the revolutionary products for the prepolymer and extrusion market.

www.maag.com

"The feedback of our customers in the chemical and industrial processes shows an increasing demand for flexible and customized solutions."

Bodo Schulte-Ellerbrock, Product Manager Industrial, Maag Pump Systems

laboratory-scale-solutions due to its size.

What trends do you see developing in the sector?

B. Schulte-Ellerbrock: The feedback of our customers in the chemical and industrial processes shows an increasing

ing experiences we can support our customers with our pump systems to optimize their processes. Our modular construction system provides the customer the best adaption to their process conditions and environment. The customer can choose between different solutions of materials, bearings and seals.

tions, supports our customers to evaluate best suitable pump solutions.

What key events are on the agenda for this year?

B. Schulte-Ellerbrock: 2010 is an important year for Maag Pump Systems and the shows

CHEManager Europe: What can we expect from Aerzener Maschinenfabrik in 2010?



Stephan Brand
 Aerzener
 Maschinenfabrik

S. Brand: The strong point of Aerzener Maschinenfabrik was and is the quality and innovation leadership in the manufacturing of blowers, compressors and gas meters. A look into the success story of 145 years proves this. Just during the current economic crisis we will strengthen the innovation force and in 2010 we will be launching many new products on the market.

How is product development being influenced by this?

S. Brand: Our blower and compressor units will face up to the new trends and challenges and will be able to offer special solutions in the field of energy efficiency. In addition we will

"In view of the current environmental discussions and the simultaneously increasing energy consumption, the subject of energy efficiency will be very important for application branches on a worldwide scale."

Stephan Brand, Aerzener Maschinenfabrik

What trends do you see developing in the sector?

S. Brand: In view of the current environmental discussions and the simultaneously increasing energy consumption, the subject of energy efficiency will be very important for application branches on a worldwide scale. This concerns the saving of energy by optimal selection of plants, energy reduction by the use of efficient components as well as steps for energy recovery.

offer an environment package, where we offer a premium for the exchange of old and inefficient machine technology.

What key events are on the agenda for this year?

S. Brand: In 2010, our main focus will be on the international fairs Powtech, Nuremberg and IFAT, Munich. We will concentrate on the presentation of our product innovations.

www.aerzener.com



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Operating advanced infrastructure

CCS Solutions

Development of Post-combustion Technology

Future Technology – The long-lasting resources of coal and the worldwide growing energy demand suggest that coal will continue to play an important role in the world's energy supply for decades to come. To comply with global emission reduction targets, the development of carbon capture and storage technologies (CCS) is necessary and represents a "no regret" option for clean coal usage. Efficiency increases of steam power plants have been a key factor in making power plants more economical and will continue to be crucial going forward, particularly when considering the impact that fossil-fueled power plants have on climate and the environment.

For several years, Siemens has been intensively developing its own post-combustion technology based on amino acid salt formulations. Successful process development requires reliable data of the process synthesis, optimization and the equipment design. Therefore, Siemens has developed a rigorous simulation model for the process and has built a fully-automated absorption plant in laboratory scale to perform extensive testing and validation of the simulation model operating at the Hoechst Industrial Park. The laboratory-scale plant ("lab plant") for CO₂ capture can be used to analyze absorbent properties. This lab plant is characterized by continuous operation of the complete absorption and desorption process under a wide range of operating conditions. Besides the model validation, the lab plant has delivered valuable information on the behavior of the different flue gas by-products with the solvent. Long-term observations confirmed the superior stability of the solvent when combined with oxygen. Since the lab plant runs on synthetic flue gas, the influence of gases such as NO_x and SO₂ have been observed sepa-

rately in order to gain a deeper understanding of the underlying absorption mechanisms of these sour gases. Furthermore, corrosion experiments with the potential plant materials were carried out inside the columns. Due to the fact that the plant is partly made of glass, process behavior can be easily observed during operation. Last but not least, extensive operational experience has been gained during the more than 8,000 plant operating hours.

Amino Acid Salt Is the Basis of the Siemens Solvent

Solvent selection is essential because the solvent directly influences the energy demand and the environmental impact of the CO₂ scrubbing process. Mastering the environmental risks of CCS is a precondition for its implementation because the advantage of decelerated global warming through reduced CO₂ emissions should not be impaired by other environmental risks that might result from CO₂ capture. Beyond minimized environmental impact, the priorities for solvent choice are high selectivity for CO₂, low degradation, low energy demand, high CO₂ capture rate and high purity of the CO₂ stream. This is why Siemens uses an amino acid salt solution for the chemical absorption process. This substance group has the advantage of negligible vapor pressure so that, given an appropriate demister on top of the absorption column, the solvent emissions will be nearly zero. Amino acid salts have an ionic structure and are less sensitive to oxygen. As salts have no vapor pressure,

they are not inflammable. Furthermore, the solvent exhibits low thermal sensitivity, thus refill requirements are expected to be very low, which has a direct impact on the operating costs of the CO₂ capture plant. Thermal stability of the solvent also provides increased flexibility with the process design, i.e. the absorption and desorption process can be performed under a wide range of temperatures and pressures.

This second-generation solvent is well adapted to operational needs. Handling of the solvent for operation and storage is easy as it's not flammable, not hazardous, nontoxic and has good biodegradability. In addition, it is a registered chemical substance with available safety data. Tests have shown that the heat requirement for solvent regeneration is considerably lower than for MEA.

Considering these benefits, the Siemens solvent is well adapted for CO₂ capture from the flue gas of fossil-fired power plants.

Standard Process Design for Absorption and Desorption of CO₂

Besides the identification and improvement of a suitable capture solvent, Siemens' development focuses on determining an optimum capture process configuration considering the given boundary conditions and interfaces from the underlying power generation process (e.g. defined flue gas properties). It is known that the operating costs of the capture plant are mainly caused by the energy demand for the regeneration of the sol-



vent. This energy demand can be reduced by applying mature technologies that have been used for absorption and distillation systems in the chemical industry (e.g. heat integration concepts, withdrawal of side streams). Therefore, the identification of suitable process configurations was supported by an extensive survey in the open literature and in databases in print and online. The optimal process configuration was developed systematically.

During process development, approx. 50 different improvement options of the flow scheme were identified and rated according to qualitative criteria. From these approximately 30 promising process variants were selected and calculated using the simulation model,

and the operating conditions were optimized for each process scheme. The results were ranked based on energy consumption, investment and operational costs. Additionally, combinations of the most promising process variants were evaluated. The preliminary results indicated that the energy consumption of the process can be reduced from 3.5 GJ/ton to 2.7 GJ/ton of separated CO₂ by using an advanced process configuration. At the same time, costs per ton of CO₂ avoided can be reduced by about 15%. Additional process improvements can be identified for the solvent, process optimization and design and manufacturing of the required plant equipment. All of the identified improvement areas will be incorporated in the plant concept and should lead to a reduction of capital expenditures and operational expenses. With the reduction of the heat requirement in the regeneration step, we will be able to reduce the size of the equipment, piping and overall plant arrangement.

Next Major Steps

The Siemens amino acid salt post-combustion process has major advantages and offers improvement potential for a commercially viable CCS plant. Additional process improve-

ments in several development areas, such as equipment improvement, process optimization and solvent optimization, are ongoing to further minimize the efficiency decrease to 9.2 percentage points. E.ON and Siemens have started up a pilot CO₂ capture plant at the E.ON power plant Staudinger in Grosskrotzenburg near Hanau. The inauguration ceremony took place September 18, 2009. The two companies are thus pushing further ahead with the development of a process geared toward climate-friendly coal-based power generation. The lab-proven process is to be employed under real operating conditions at the power plant's hard-coal-fired Staudinger Unit 5.

Here the process will be validated in a slipstream pilot installation under real operation conditions. Siemens will also work on the plant dynamics from base load to transient load conditions.

The pilot plant will be operated with part of the flue gas from Unit 5. E.ON and Siemens intend to run the facility until the end of 2010. The results achieved and the operating performance of the pilot plant will serve as the basis for large-scale demonstration of the technology, which is scheduled to start operation in the middle of the next decade.

Reference Steam Power Plant Layout

Siemens has the in-house competence for the entire process chain, from engineering to design to implementation. Many years of experience in the construction and operation of power plants are supplemented by chemical process and plant engineering expertise, acquired with the acquisition of the process engineering from the former chemical giant Höchst.

As various important drivers for economy models, e.g. CO₂ price development, are still wide open, it is advisable to incorporate preparations for later CO₂ capture into the design of new power plants from the beginning to minimize risk. This involves finding a middle-of-the-road solution between additional investment cost and the effort required to accommodate CO₂ capture in the future. Furthermore, operation of the plant should be as efficient as possible – now and in the future. To address this issue, Siemens has developed a conceptual design of a steam power plant to be built today, which can be converted to accommodate CO₂ capture at some point in the future. This design incorporates the space requirement for the absorption/desorption plant, as well as the space required within the "normal" power plant to provide facilities for subsequent steam extraction. Additional areas to be taken into account are the higher demand for cooling and auxiliary electric power, layout planning, extended flue gas clean-up, switchgear, etc. The capture-ready steam plant owner should also apply for the appropriate licenses to obtain clarity, for example, on possible water management issues and injection into storage reservoirs. Siemens has all measures defined for the SSP5-6000, a reference Siemens steam power plant layout.

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Fully Automatic Air-based Dry CIP Concept

PRODUCT Dinissen Process Technology has developed the fully automatic air-based Dry Cleaning in Place (CIP) concept. The new method allows companies to clean their mixing and transport systems quickly, efficiently and hygienically. Weighing bunkers, mixers and storage bunkers are blow-cleaned, removing 99.9% of any residual materials. The system is especially suitable for companies in the feed, food and chemical industries. It allows them to benefit by reducing labour costs, minimizing downtime when switching from one product to another, preventing the loss of raw materials, and eliminating clumping, sticking/caking (contamination) and growth of microorganisms.

The Dry CIP concept cleans mixing systems fully automatically using powerful air pulses and an interval timer. To realize

this, Dinissen uses cylinders of compressed air and special nozzles installed at critical locations in the mixing system. The blow-cleaning process proceeds step-by-step and is controlled by an interval timer, which ensures that the cleaning programme is carried out correctly.

The blow-cleaning starts from inside the weighing bunker and proceeds to clean every component in the mixer and storage bunker with the help of compressed air pulses going from front to back (or from top to bottom). After it has been

cleaned, each compartment is automatically closed off with cut-off valves to prevent any particles from being transported back to the cleaned areas. An efficient suction system transports dirt and other particles that are blown off to a hermetically closed section. This guarantees a cleaning level of 99.9% for the mixing system and its surroundings. If an even higher level of cleanliness and hygiene is required, the Dry CIP system can be expanded to include additional cleaning methods supplied by Dinissen.



Honeywell Acquires Rights to Shell's Operator Rounds Technology

Honeywell announced it has acquired rights to technology developed by Shell Global Solutions (Shell) for gathering field data and helping industrial plants to safely increase production while reducing maintenance and operating costs. This acquisition strengthens Honeywell's reliability and operational excellence offerings and delivers an integrated solution for the mobile field worker. In combination with Honeywell's OneWireless network and Dolphin mobile computer devices, this technology will allow manufacturers to optimize communication, coordination, execution and tracking of critical field tasks and activities in real-time.

PRODUCT In flexible automation, sensors and actuators must be able to track the movements of machines. Permanently wired sensors are usually unsuitable for such applications. Contactings and cables can only withstand movement for a limited time, which frequently leads to premature wear and causes connections to break. The new inductive BIC coupler systems by Balluff are enclosed in a robust M30 stainless steel housing with degree

The operational and technical task for efficient rounds (OTTER) technology is currently used in more than 25 sites to help guide field operators as they execute key field surveillance tasks that keep assets running within safe operating limits and at optimum performance. It also delivers best practices to all field operators; provides decision support capabilities; improves regulatory reporting; and facilitates communication between groups to address problems immediately.

Honeywell will integrate the OTTER technology in its operational excellence solutions to provide operations teams com-

plete sets of relevant data for all production assets. This data can help customers optimize plant performance and comply with health, safety and environment regulations.

"By providing timely and convenient access to relevant data in the field and improving communication between teams, OTTER gives operators the information they need to make the best decisions, which can ultimately improve plant and business performance. Honeywell has a strong future vision when it comes to solutions for the integrated mobile field worker and I am sure that OTTER technology will be a strong addition to their port-

folio," said Mark Stevens, vice president downstream technology services at Shell Global Solutions.

"Honeywell understands that mobilizing the workforce means more than giving a field worker a handheld device; it means providing operators a complete solution that gives them meaningful data they can use to execute the right tasks at the right times," said Bart Winters, reliability solutions global marketing manager for Honeywell Process Solutions. "In acquiring the OTTER technology we bring our world class levels of support to all users as we provide a future vision for an integrated mobile field worker solution."

Inductive Couplers – Transferring Flexible Data And Power

of protection IP 67 and present a viable solution for the contact-free transfer of data and power. A particularly favorable price/performance ratio and high data transfer rates are just two more of the impressive features on offer. Typical areas of application include indexing tables, replaceable rubber stamps, etc. BIC systems by Balluff are capable of transferring power and signals over a gap of up to 5 mm quickly and reliably, while guaranteeing an optimized per-

formance. These systems are considerably more powerful compared to previous solutions, yet have the same design. A maximum of 12 watts is transferred, which supplies 24 V DC and 500 mA at the remote end for the sensor system.

The Plug and Play feature and convenient M12 plug connection to the base and remote unit allow for easy installation and assembly as well as replacement. Clearly visible LEDs for operating voltage

and operational readiness in the head of units make assembly and adjustment so much easier. Users will certainly be pleased to know that the systems are still able to fulfill all task requirements at a maximum offset angle of 18°, provided the gap is adjusted correspondingly. At present, designers can choose the best solution from a selection of three different BIC variants. Other variants are currently under development.

IO-Link Master Module Simplifies Integration

PRODUCT With IO-Link there is a high-performance standard available that easily integrates the entire product range of sensors and actuators into automation concepts. The new IO-Link master module (750-657) from Wago offers four channels based on this standard in a 1/2 inch

(12 mm) wide I/O module. This way, four different IO-Link devices or digital standard sensors/actuators can be simultaneously integrated into the automation using the Wago-I/O-System. The IO-Link master module provides a 3-wire connection that can communicate process data as

single bits, bytes and data blocks for input and output data with up to 230.4 kbaud per sensor and actuator. An acyclical service is available for identification, configuration, parameterization, and diagnosis of the IO-Link devices.

▶ www.wago.com

Global CO₂ Reduction – Businesses between Flood of Costs and New Market Opportunities

Efforts to reduce CO₂ emissions worldwide could result in additional annual costs in the three-digit-million range for businesses that do not start investing today in efforts to further reduce their own carbon footprint. These are the findings of a current study by the consulting firm Management Engineers (ME). The study also identifies the various market and earning opportunities that can arise due to increased climate protection.

CO₂: Becoming More Expensive

According to the study, the first major flood of costs related to CO₂ will hit European companies within the next three years. This is because the discontinuance of free allocations in the trading of EU emissions rights will have an impact on major, energy intensive companies – for example, the steel and chemical industries. Annual additional costs in excess of €180 million – according to ME calculations based on a typical

company – will then threaten these and many other branches of the process industry.

Yet this is only an intermediate stage. By the year 2020, the annual additional costs for these businesses could amount to more than €300 million. The presumption is that the international community is actually serious about climate protection and will establish a global emissions trading scheme based, for example, on the EU model. This would lead to a cost-driving "fight for pollution rights", with the extra costs being passed on to the market and thus impacting virtually the entire modern industry and service providers.

Using CO₂ as a Source of Income

At the same time, the study predicts that awareness of climate protection will continue to rise, as will the associated willingness of consumers to pay for it. This opens up new, profitable market opportunities in a wide range of industries



Hans-Ulrich Stamer
Management Engineers

which can now be tapped into technologically and supported by a marketing strategy that emphasizes the reduced carbon footprint.

New drive systems, less weight, greater efficiency – these are the technical challenges posed by climate protection, for example, for the automotive industry or for manufacturing and engineering. The chemical industry might offer diverse solutions in this context by providing innovative materials. The electrical engineering industry can do its part by developing energy-efficient control and drive technologies. For these and many other industries – construction or consumer goods, for example – the motto is: today's CO₂ reduction model may soon, on

the tide of technical progress, become the market standard and thus an important source of revenue.

Fast, Strategic Action is on the Agenda

On this score, Hans-Ulrich Stamer, spokesman for the management of ME, said: "Businesses need to act now. Especially now – in times when many companies already have to realign their strategies – companies need to do everything they can to systematically explore and exploit business and profit opportunities that can arise from climate change. They need a customized and holistic CO₂ strategy which also targets investing in a cost-efficient reduction of their own carbon footprint. Companies which succeed in doing both are laying the foundation for future competitive advantages in a market that will be fiercely fought over."

www.managementengineers.com

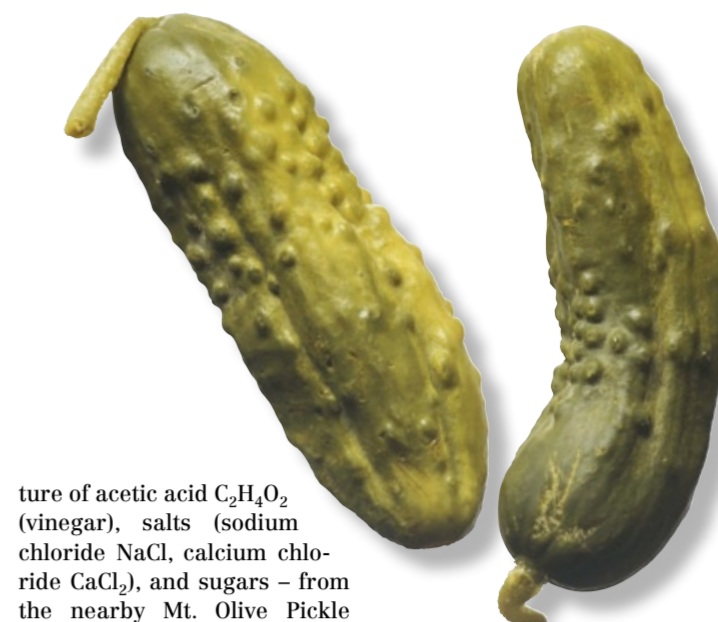
It's No Joke – Pickle Juice Cuts Costs at DuPont

Pickle juice isn't anything to laugh about at the Dupont site in Fayetteville, NC, U.S. The sour-sweet-salty solution is reducing costs thanks to some creative thinking and partnerships with both a local vendor and a pickle company.

"While it sounds like something from the movie 'Beetle-juice', we use pickle juice as a substitute for sodium acetate," said Karen Wrigley, plant manager Fayetteville Works. "To be precise, a by-product from the nearby pickle producer supplements our waste treatment plant biomass during slow production periods. That 'juice' is reducing our variable costs by around \$68,000 a year."

How did this come about? The business slowdown meant the site waste treatment facilities needed supplemental feeding of sodium acetate to the biomass to ensure its availability for sudden increases in process waste generation. To avoid additional costs, site leaders began exploring options.

That's when Steve Thomas, the site's Nalco representative, suggested pickle juice – a mix-

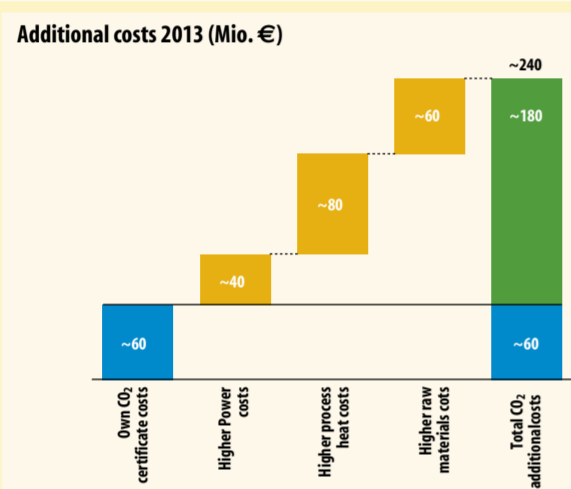


ture of acetic acid C₂H₄O₂ (vinegar), salts (sodium chloride NaCl, calcium chloride CaCl₂), and sugars – from the nearby Mt. Olive Pickle Company. Tests determined the juice would work.

"This is a great example of partnering with a vendor to create a win-win solution for us and a neighboring company," Karen said. "Mt. Olive was able to eliminate disposal costs by shipping the juice to us, and we don't have to pay for it. The only cost to the site was for minor modifications to the feed system and shipping."

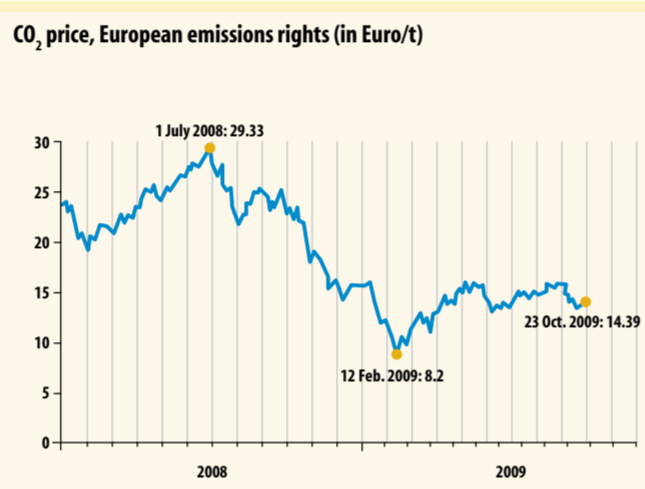
"Our waste treatment team was willing to think creatively to solve a problem," said area technology guardian Marlene Page. "The team's adherence to safety, health and environmental practices, while quickly seeking ingenious solutions to lowering costs is what makes Fayetteville Works wonderful!"

www.dupont.com



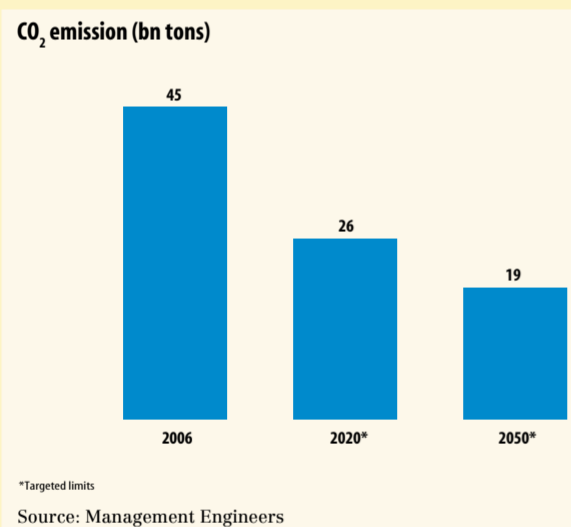
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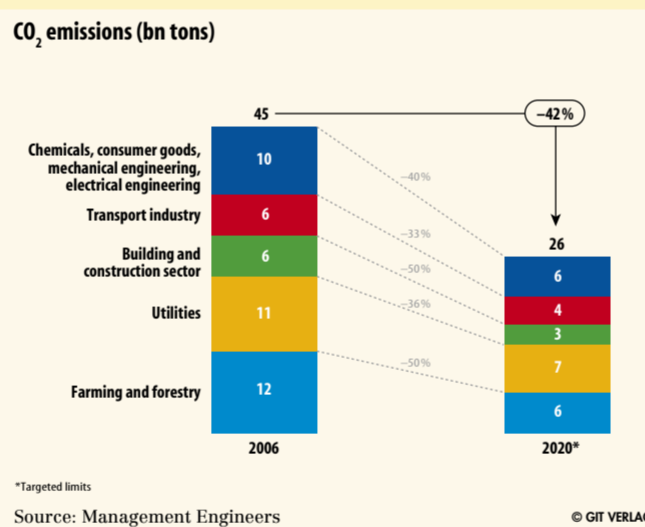
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Coming up in CHEManager Europe 2/2009:

- What to do when an emergency strikes and brings a plant to its knees? The software experts at PAS have the answer with a disaster recovery system.
- Ernst&Young begins its four-part series on Lessons In Change with a look at new trends in the pharma industry.
- Novasep's Jean Blehaut discusses the importance of biotech for API manufacturers.
- Eastman's chief sustainability officer Mark Costa offers an inside view how his company made it onto Newsweek's top 100 in the magazine's Green Rankings.
- Learn more about the latest product generation from Schütz as it opens up new transport and storage prospects.

Can't get enough CHEManager Europe? Can't wait until issue 2 comes out on Feb. 25? Stay up-to-date in the chemical industry with our portal www.chemanager-online.com. There you'll find all you need to know about the latest mergers, business trends and innovative products. Going live on Feb. 1.

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Going live Feb. 1

IMPRINT

Publisher:
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Bank Account
Dresdner Bank Darmstadt,
Germany
Account No. 01715501/00,
Routing No. 50880050
The current price list is valid
from 1 October 2009
CHEManager Europe
appears 10 times in 2009.

Print run: 15,000
Q3 2009: 14498 (tVA)
Fifth year 2009
Subscriptions
10 issues €100
incl. postage
single copy €13.50
plus postage

Students receive a discount of 50 % upon presentation of a valid certificate. Subscription orders can be canceled within 1 week in writing. Dispatch complaints are possible only within 4 weeks after publishing date. Subscription cancellations are accepted 6 weeks before end of year.

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Printed by
Echo Druck und Service GmbH
Holzhofallee 25-31
64295 Darmstadt

Volume 1, January 2010
40 GIT VERLAG
A Wiley Company
www.gitverlag.com
Printed in Germany
ISSN 1861-0404