CHEManager EUROPE

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THE NEWSPAPER FOR THE CHEMICAL AND LIFE SCIENCES MARKETS

Pharma Merger

Will Daiichi-Sankyo buy Ranbaxi? Pfizer with Competing Bid?

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Catalysis

90% of today's chemical processes are based on catalytic chemical reactions

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Newsflow

Boehringer Ingelheim said it has agreed to take over U.S. company Actimis Pharmaceuticals Inc. for up to $515 million, to bolster its research into respiratory diseases, one of the drug maker's main areas of business. The purchase will be carried out in gradual steps and Boehringer will pay the full price and buy all of Actimis shares if its experimental asthma treatment AP768 progresses from the first phases of testing on humans to the third and final phase, the companies said in a joint statement. Actimis will in the meantime, receive milestone payments for reaching certain research goals, Boehringer's spokeswoman Judith von Gordon said, declining to provide further financial details.

"The main reason (for the deal) was to secure the rights" to AP768, von Gordon said, adding that the contract allows Boehringer to share the risk in trying to bring the drug to market with Actimis' current owners. The deal marks the first takeover of a biotechnology firm for Boehringer, which has remained family-owned since it was founded in 1885. Actimis was created from a former respiratory diseases research programme of Bayer's healthcare division in 2004. It was founded by Kevin Bacon, a former Bayer research executive, and financed by a group of buyout firms lead by Sanderling Ventures of California and Mitsui & Co. Venture Partners of New York. Boehringer is seeking to boost research into respiratory diseases, one of its seven main areas of drug development, trying to build on the success of its best-selling drug Spiriva, an inhalant that generated €1.79 billion in sales last year.

DSM said it will start the sale process of three non-core businesses in September as it announced the restructuring of its activities in Geleen, the Netherlands. The reorganization will see the site services and manufacturing services grouped into a new company, which will become fully operational in January. No job cuts are anticipated, DSM said. The reorganization is part of DSM's plans to sell its fertiliser, melamine and elastomers business groups as it shifts towards becoming a life and materials sciences company as part of its Vision 2010 strategy.

Making Business Better

Elemica Helps Companies Improve Supply Chains

Connect One, Connect All – Back in August 1999, when much of the world was worried about the impending fictitious Y2K virus, 22 chemical companies were busy thinking past the year 2000. Frustrated with the extra costs and errors caused by inefficient supply chains, the companies created Elemica.

The company was one of the first networks to offer total solutions focused on improving supply chain inefficiencies with a one-stop experience. Its global neutral information network built to facilitate the order processing and supply chain management of contract and repeat chemical transactions. Brandi Schuster spoke to Elemica CEO Mike McGuigan about how the company managed to prosper when the competition failed, and his plans for future growth.

CHEManager Europe: The B2B online market went through a dramatic consolidation period in the years following the creation of Elemica. Many B2B portals came on the scene, but Elemica is one of the only ones that survived.

M. McGuigan: I think somebody counted at that time 200 different companies in the chemical industry that were trying to do something similar, and pretty much all of those have failed.

Why?

M. McGuigan: Many of the companies that were founded didn't really have solutions or a working business. They also didn't have basic products, and there was no real differentiation.

What did Elemica do differently?

M. McGuigan: The solutions that we have deliver real value. The solutions we developed actually translated into real savings for our clients. And when those solutions are implemented at scale, it ensures our success. It's just like with any other business: If your clients are successful, then so are you.

In other words: We understand the business context of what we are moving around. We can link up different parts of a transaction – for example, the order and the invoice, or the logistics booking and the logistics documents – and help our clients then deliver a more reliable transaction. Through content validation and the early identification of problems, we can help companies solve those problems pre-emptively, before they become a problem in the supply chain.

Mike McGuigan
CEO of Elemica

Does Elemica face competition?

M. McGuigan: There are certainly other companies that do electronic business integration, both within the chemical industry and within other industries. However, we consider ourselves unique, particularly with our "connect one, connect all" factor. Once you connect into Elemica, you can work with any other company in the network. Other companies then can move the information around electronically, but they don't know what they are moving from a business standpoint, which means they can't eliminate errors the way we are able to.

Does this understanding come from the background of having been founded by chemical companies?

M. McGuigan: It comes from a number of things. We're not about technology – we're about delivering efficiency in the supply chain. All of the elements needed to do so were put into Elemica. We also have the process knowledge, understand supply chain operations, and what we do is designed to drive improvement within supply chains. The company was founded with the intention of driving reliability in the supply chain and not with the notion, "Hey, we've got some IT technology; let's implement it somewhere."

Your core customer basis is the chemical industry. Are you active in other industries as well?

M. McGuigan: Last year, about $50 billion of business went through Elemica in one form or another. The chemical industry buys and sells with every other industry; we can say that every

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Company Investigations

How Staff Has to Cooperate

Bribery, Cartels, Fraud or Tax Evasion – Whatever the occasion, there will be more and more company raids and internal investigations in corporate Germany. What obligations do company staff have in the course of such investigations?

When a government authority conducts investigations against the company, the company's employees have to comply with what is asked by the authorities, or by the company. Such obligation results from the inherent duties of an employment. A different and more interesting question is, whether and to what extent employees are obliged to cooperate within the course of internal investigations. Unlike other countries, such internal investigations have not been common in Germany so far, which accounts for a lack of court precedents.

In general, employees have to cooperate in the course of internal investigations, regardless whether they are conducted by the company's own internal audit department or by external auditors hired by the company. Naturally, the questions must be limited to the scope of the investigation, which is to throw light on the suspicions and charges.

Interviews With Employees

In addition to analyzing paper documents and electronic files, it is useful to conduct interviews with at least parts of the company's employees. Interviewing the "bland" employees without personal involvement in the charges does not give rise essential legal problems: Such employees have to fully cooperate and answer questions regarding their jobs and their perception at the work place (not in the private sphere).

A little more complicated are interviews with the suspects. Generally speaking, suspicious employees are also obliged vis-à-vis the company to answer any questions regarding their job conduct. However, it is yet unclear, whether the suspicious employee has to disclose information, by which he could incriminate himself. Unlike the Anglo-American legal system, the results of such a self-incriminating interview could be utilized by government authorities in a potential criminal litigation against this employee later, although he would be entitled to remain silent regarding these topics in court proceedings. In other words, by interviewing the external auditors of the internal investigation a prosecutor could obtain self-incriminating evidence about an employee by hearing the external auditor of an internal investigation as a witness, although this information would never have been obtained if the prosecutor had asked the suspect directly. Legal scholars and courts will still have to find a solution to this open problem. As a cautious assumption, however, it should be fair to assume that suspicious employees are not obliged to disclose self-incriminating evidence within internal investigations.

Dr. Mark Zimmer
German attorney and Certified Expert in Labor Law

Amnesty Program

In conducting internal investigations, some companies tend to offer an amnesty program to employees. It works as follows: The employee signing up for the program has to fully cooperate and particularly report any own wrongdoings and those of other colleagues. In return, the company waives the right to dismiss the employee for these charges or to claim any damages. Such amnesty programs have proven to be effective in bringing more employees to disclose useful information. Also, it will avoid litigation with the respective employees, which can help to create a more peaceful and thereby productive atmosphere.

A similar situation is sometimes encountered in cartel proceedings. Both German and European law provides for a leniency application, whereby the first company to notify the authorities about a cartel can get away without a penalty, if they fully cooperate with the authorities. In such a situation, it is paramount to rely on those employees who have been closely involved in the cartel. For this reason they might face employment sanctions themselves. A company applying for leniency, however, is well-advised to amicably agree with the employee to give full disclosure of the facts relevant for the cartel. Such an agreement will usually be a cancellation agreement with an extended termination date.

Data Protection Issues

In the course of an internal investigation, the auditors will usually screen all paper documents and electronic files that might be relevant. In this

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CONTENT

SALES & PROFITS

KMG Chemicals 3Q Profit Falls KMG Chemicals said third-quarter earnings from continuing operations fell to $1.8 million, or 16 cents a share, from $3.9 million, or 37 cents a share, in the year-ago period. The mean estimate of analysts polled by Thomson Reuters was for third-quarter profit of 22 cents a share. Revenue for the Houston-based specialty chemicals maker jumped to $50.3 million, meeting analysts' expectations. In the same period a year earlier, the company posted revenue of $26.7 million. For the fourth quarter, KMG Chemicals forecast earnings per share to be "significantly better" than earnings per share in the same period last year. The company expects a 10% to 20% decline in year-over-year earnings for fiscal 2008, and expects "significantly better" results in fiscal 2009, including net sales of about $200 million.

▶ www.kmgb.com

Cognis 'B' Rating Affirmed; Outlook Stable Standard & Poor's affirmed its 'B' long-term corporate credit rating on Germany-based specialty chemicals and intermediate manufacturer Cognis. "The ratings reflect the group's high financial debt, following a leveraged buyout in 2001 and subsequent debt-financed dividend payouts to shareholders," said Standard & Poor's credit analyst Tobias Mock. Cognis' cash flow protection ratios remain weak, with funds from operations to debt of about 5% at year-end 2007 and debt to Ebitda of 8.1x. The group is highly leveraged, with a debt-to-capital ratio of more than 100%. Cognis successfully refinanced its debt in May 2007 and has no contractual repayment obligations until 2013, which will benefit its liquidity.

▶ www.standardandpoors.com

Johnson Matthey Optimistic as Annual Profits Rise 16% Johnson Matthey, a UK specialty chemicals and precious metals group, said its prospects remained "very encouraging" despite the slowdown in the U.S. market after it reported a 16% growth in annual profits, buoyed by strong platinum prices and increased demand for its car emission control devices.

"We expect that the group will perform strongly again in 2008/09 despite concerns about the state of the world economy and the slowdown in the U.S. We are increasing our investment in both R&D and new production facilities to meet the growth in demand for new products which is being driven by global concerns about the environment and high energy prices," said Neil Carson, chief executive of Johnson Matthey.

▶ www.matthey.com

CVC Acquires 25.01% in Evonik

Funds advised by CVC Capital Partners (CVC) have agreed to acquire a 25.01% stake in Evonik from the RAG Foundation for a purchase price of approximately €2.4 billion, announced Wilhelm Bonse-Geuking, CEO of the RAG Foundation. The transaction is subject to antitrust approval. IPO planned through the sale of a minority stake in the business, the RAG Foundation has taken the first step in its mandate to establish a capital reserve to finance the perpetual burdens of the German coal-mining industry. Both partners plan to launch an IPO in the medium term. The Foundation has been Evonik's sole shareholder to date.

▶ www.cvc.com
www.evonik.com

Green Light for Arkema Genesis Program

The European Commission has given its green light for the funding by OSEO, amounting to €46 Mio. out of a total cost of €107 Mio., of the Genesis program, coordinated by Arkema, which is opening the way for the development in Europe of an innovative and competitive sector in nanostructured materials.

The Genesis program pools around Arkema, major industrial groups, SMEs, and several university laboratories within a partnership bringing together directly the design of materials and their applications in a number of markets earmarked for their technological innovation potential: automotive, cable, structural composites, energy, environment, as well as information and communication technologies.

"The Genesis program will allow us to speed up the industrial development of nanostructured materials in direct cooperation with the relevant user sectors. We could witness the first commercial applications by 2009/2010," announced Christian Collette, Arkema Research & Development Vice President.

In accordance with Arkema's sustainable development policy, the Genesis program favors the operation of clean processes, the use of renewable raw materials, and the inclusion of recycling considerations for end-of-life materials. It also devotes a key part to the toxicological and ecotoxicological properties of nanomaterials.

▶ www.arkema.com

Supply Activities Acquired

Brenntag came together with Yara International, Oslo to acquire the chemical supply activities at the sites in Köping, Sweden and Tertre, Belgium, as part of the commitments agreed with the EU for approval of Yara's acquisition of Finland's Kemira Grow How. The acquisition includes ammonia nitrate solution, aqueous ammonia and weak nitric acid supply activities conducted from the Köping production site and the congeneric activities plus concentrated nitric acid supply activities from the Kemira Grow How production site at Tertre.

▶ www.brenntag.com
www.yara.com

Novartis Successfully Issues Bonds

Novartis headquarters in Basel, Switzerland

Novartis announced it has successfully issued two Swiss franc benchmark bonds totaling CHF1.5 billion in the Swiss capital market, the first time ever the pharma group has issued a bond in its home market's currency. The first bond, a four-year CHF700 million benchmark bond in the international market segment with a coupon of 3.5%, was priced at 100.32%. The second, a seven-year CHF800 million benchmark domestic bond with a coupon of 3.625%, was priced at 100.35%. Novartis said the offering generated very strong demand and ranks as the largest-ever corporate offering in the Swiss franc market. The bonds were placed with a diversified range of institutional and retail investors, and they will be listed individually on the SWX Swiss exchange.

▶ www.novartis.com

Kinaxo Enters Agreement with Takeda Germany's Kinaxo Biotechnologies has entered an agreement with Takeda San Diego, a wholly owned subsidiary of Takeda Pharmaceutical in Japan. In consequence, Kinaxo will make its Kina Tor technology available to Takeda researchers involved in drug discovery, preclinical research and clinical development. Kinaxo's Cellular Target Profiling utilizes proprietary chemical proteomics technologies combined with state-of-the-art mass spectrometry to identify and characterize a drug candidate's native molecular targets in cell lines and tissue samples. This service enables pharmaceutical and biotechnology companies to make more informed decisions on which drug candidates to progress into advanced pre-clinical or clinical development.

- www.kinaxo.com
- www.takedasd.com

UCB, Otsuka to Collaborate in Japan Belgian pharmaceutical company UCB said that it has signed a collaboration agreement with healthcare company Otsuka Pharmaceutical to market its epilepsy treatment Keppra as well as its Crohn's disease drug Cimzia in Japan. Under the agreement, UCB receives up to €113 million up front and milestone payments as well as funding for the clinical development of Keppra and Cimzia. The companies plan to submit filing dossiers for Keppra in epilepsy and Cimzia in Crohn's disease to the Japanese Pharmaceuticals and Medical Devices Agency by early 2009.

- www.ucb.com

EDF, Dow Chemical Sign Agreement Dow Chemical and EDF Trading, a unit of French company EDF said they signed a four-year agreement allowing each access to the other's liquefied natural gas regasification terminals. In a joint statement, the two groups said energy trader EDF Trading will grant Dow Chemical access to its European terminals and will in turn gain access to Dow's terminal at Freeport, Texas. The two groups gave no precise financial details, but said the accord will permit them to sell gas at the highest European and U.S. prices.

- www.dow.com

Sun Chemical: New Partners Sun Chemical has officially launched three partnerships for its new consulting division. Environ, Radius Solutions and SBTI have all joined forces with the ink, pigment and services supplier in an initiative that shares expertise to benefit customers. Felipe Mellado, Sun Chemical's vice-president group managing director said: "Sun Chemical is dedicated to help printers and converters moving towards operational excellence. We are delighted to have announced at drupa these important partnerships, which is all part of our continuous commitment to working for the customer."

- www.sunchemical.com
- www.environcorp.com
- www.radiussolutions.com
- www.sbtionline.com

PwC and Royal Haskoning to Join Forces Pricewaterhousecoopers (PwC) and Royal Haskoning have signed a joint venture agreement to combine their knowledge in the field of Reach. The collaboration combines Royal Haskoning's technical knowledge of chemicals with PwC's financial and administrative knowledge about Reach and the management of risks. PwC and Royal Haskoning have set up a shared service desk. 'For example, companies will need an independent party who can perform the role of third party representative for their Reach registration or a party that can act for a consortium of companies working together on the registration of a particular chemical,' said Arno Pouw, member of PwC's board of management.

- www.pwc.com
- www.royalhaskoning.com

CDT, Sumitomo Chemical, Novaled to Co-develop CDT and Sumitomo Chemicals, both suppliers of polymer organic light emitting diode (P-OLED) devices, and Novaled, a provider of high efficiency PIN OLED structures and dopant materials, have signed to collaborate under a joint development agreement to investigate the feasibility and benefits of new materials and Novaled PIN OLED structures in P-OLED devices. CDT, Sumitomo and Novaled plan to co-develop hybrid OLED devices combining both new polymer emitting layers and doped electron transport layers. It is expected that these hybrid devices will offer further improvements in power efficiency without additional manufacturing complexity. Each company will remain responsible to market its own materials resulting from this co-development.

- www.novaled.com
- www.sumitomo-chem.co.jp

Shell and Arrow Plan Gas Alliance Shell and Arrow Energy have signed a preliminary agreement to jointly develop projects to extract clean-burning natural gas from coal deposits in Australia, China, Indonesia, Vietnam and India. The memorandum of understanding calls for Shell to acquire a 30 % interest in Arrow's CSG acreage in Queensland, Australia, as well as a 10 % stake in Arrow International – a wholly owned subsidiary of Arrow, which holds Arrow's international interests in CSG opportunities. The agreement also gives Shell a five-year option to acquire up to 50 % of individual Arrow International projects, which includes activities in China. Under the deal Shell would also acquire the right to negotiate an agreement to purchase any liquefied natural gas that may potentially be produced from the CSG operations.

- www.shell.com
- www.arrow-energy.com

Skyepharma: Royalties on Drug Approval British drug delivery specialist Skyepharma has announced that it is in line for low-to mid-single digit royalties after development partner Glaxosmithkline (GSK) announced that US authorities have given approval for its Requip XL Parkinson's Disease drug. The drug uses Skyepharma's patented Geomatrix technology which allows for continuous delivery of ropinirole, the active ingredient of Requip KL, over 24 hours to provide smooth blood levels. The drug is expected to hit the US market in mid July. The Requip XL approval is a major milestone for Skyepharma, providing it with a much-needed further revenue stream. The company is waiting for all of the phase III results for its asthma treatment Flutiform before it starts talks with holders of put options for £69 million convertible bonds which are due at the earliest in May 2009, and further put options for £20 million due in June 2010 at the earliest. Requip XL is currently approved in 23 countries in Europe for the treatment of Parkinson's disease.

- www.skyepharma.com

BASF Presents Sustainable Solutions in China BASF is an official partner of the "Germany and China – Moving Ahead Together" initiative in Chongqing, southwest China. A BASF Pavilion focusing on sustainable urbanization was open to the public at the Germany esplanade in the city. In addition, BASF is sponsoring a forum at Chongqing University at which stakeholders are invited to share their ideas about a sustainable future. Chongqing is the second station of the "Germany and China" initiative, which started in Nanjing in October last year. The Germany esplanade is touring major cities in China to promote technological, scientific and cultural aspects of Germany and to strengthen the partnership between the two countries. www.basf.com/germanweeks

Making Business Better

Elemica Helps Companies Improve Supply Chains

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industry is connected in some form to Elemica. So while our origin is the chemical industry, pretty much every industry is represented on our network – agricultural, automotive, retail, coatings, general manufacturing, MRO, logistics and so on.

Are there also plans to go into other industries altogether?

M. McGuigan: Yes. The unique value we can deliver in the chemical industry applies in any manufacturing supply chain. We do have clients outside of chemicals, such as in logistics, automotive, paper and pulp, petroleum and the agricultural industry.

What kind of growth has Elemica seen over the last eight years?

M. McGuigan: We have grown organically from scratch to the $50 billion of business we saw last year. We have also acquired companies and businesses in the past as well, for both customer expansion reasons and for functionality. For example, we acquired a company in the logistics market a few years ago. We incorporated their functionality into what we do, both for logistics and beyond.

What do the next eight years hold for Elemica? What are your plans for further growth?

M. McGuigan: We see enormous opportunities for continuous growth. When a new company joins our network, the value goes up for everyone involved because of the ability to transact electronically and integrate with everybody else on the network. We are continually adding buyers, sellers and logistics partners to our network, which means we are growing fast in terms of companies on our network. Another example is in the financial area. With 95 % of invoices still being done by paper, it's obvious that there is plenty of room to grow. Our plan for the coming years is to continue to work with our clients to enable them to convert from paper to fully integrated electronic invoices.

Let's talk numbers. Right now you've got $50 billion of business going through the company. Where do you see that figure going over the next 4–5 years?

M. McGuigan: Globally, chemicals is a $2.5 trillion industry. Given this, we are expecting dramatic growth over the next three years, in terms of both the proportion of business going electronically through our network and in terms of what kinds of services customers use. Today, only part of a transaction may be electronic, such as perhaps the invoice. From there, other parts of the transaction can be added, such as the order; the road haulage booking; status information; order amendments, etc. Adding all of those different parts is a big area of growth for us. The penetration will probably go up three to five times over the next couple of years.

Going back to the 95% still doing manual invoicing: Why are so many companies so hesitant to do things electronically?

M. McGuigan: Up to now, to do things electronically has required very detailed implementation one by one with each partner. That means a selling company and a buying company needed to work out together in detail how they were going to do business electronically, which was slow and expensive.

The difference with Elemica is again, connect once, connect to all. When clients are connected to Elemica, they can electronically invoice every other company on the network. Before our services came along, the process was slow and expensive; it only made economic sense to work with a few large partners capable of doing things electronically. Now it makes sense to do this with every partner.

What are some common mistakes that companies make with their supply chains?

M. McGuigan: Many companies try to do too many things by themselves, without having the necessary expertise. Specifically, there are companies who try to create an integrated supply chain on their own. It works for a while, if they are working with two or three companies, or up to 10 for a large company, but then it gets simply too complicated. Elemica allows companies to integrate all across the supply chain. Going it alone is definitely not the right way to go about it anymore.

BASF, started using electronic billing in December, and the plan was to go electronic with several thousand customers this year. Are there any visible results yet?

M. McGuigan: BASF have told us they found moving from paper to Elemica electronic invoicing is easy. We manage the programme for them. Each of BASF's customers is asked how they want to receive and to archive their electronic invoices. They have a range of options and can pick the one most suitable for their company. Elemica then supports BASF's customers' conversion from paper to electronic. BASF currently have hundreds of customers receiving electronic invoices via Elemica and have plenty more projects in the pipeline.

What are the benefits of having a fully integrated and automated supply chain?

M. McGuigan: It boosts the reliability of supply chain operations: eliminating errors, making a company much more reliable to do business with. It reduces internal costs, improves customer performance and reliability. It also makes people more productive: There is then no need to discuss why the invoice was wrong or the delivery late. That means the employees have more time discussing doing better business with the customer.

To sum up: When reliability improves, costs go down, working capital goes down and people become more productive: And then you have a better business.

▶ www.elemica.com

FACTS AND NUMBERS

95
Percent of all companies still do paper invoicing

15
Percent of orders done manually contain errors

15
Billion Dollars is spent each year by American companies who manually key data from forms.

Stada Continues to See Growth

Stada Arzneimittel continues to target higher sales and earnings in 2008 than last year, when results were already at a record, as it expects an expansion abroad to offset a slump in generic-drug sales in its German home market. The German generics supplier also confirmed its plan to grow through acquisitions, saying deals worth several hundred million euros could be shouldered without a capital increase.

"We are number seven worldwide and we indeed see opportunities for us to climb up one rank or more," Chief Executive Hartmut Retzlaff told shareholders at the company's annual general meeting. Stada has scope for acquisitions because its ratio of equity capital over total assets stood at 37.1 % at the end of March, more than the roughly 30 % it is targeting over the long run, he added. Still Stada, is asking shareholders in a vote at Tuesday's annual meeting to give management approval to issue up to €1 billion in convertible bonds and related options to possibly fund larger takeovers. Stada last month said first-quarter net income rose 16 % to a less-than-expected €31.3 million as an expansion in emerging markets was tempered by a decline in generic drug sales in Germany. It said at the time that it sees sales in its home market picking up again.

▶ www.stada.de

Sustainability Covenant Signed

Basell Australia, a company of Lyondellbasell Industries, has become the first plastics manufacturer in Australia to sign a Sustainability Covenant with the Environmental Protection Authority (EPA Victoria) and the Plastics and Chemical Industries Association (Pacia). The covenant calls for the parties to collectively explore how sustainable business growth principles can be incorporated into the company's business processes and management systems in Australia. It will also support product innovation for greater resource efficiency by developing life cycle approaches in the Australian polypropylene market.

▶ www.lyondellbasell.com

HC EVA Copolymer Dedicated to Photovoltaic Usages

The French Arkema now markets Evatane 33-45PV, an HC EVA (High Content Ethylene – Vinyl Acetate copolymer) specially developed for photovoltaic solar panels. This new grade is designed for the encapsulation of the materials (crystalline silicon or thin films) that make up the photovoltaic cells. Evatane 33-45PV is characterized by good light transmission which makes for a superior yield from the solar panel. Thanks to its specially developed formulation, it offers excellent crosslinking ability and processability.

▶ www.arkema

Lanxess Reiterates FY Target of 2007

Lanxess confirmed its aim to post EBITDA before exceptional items of more than €700 million in the current year and said the first quarter's strong business development carried over into the second quarter. The target, reiterated by CEO Axel Heitmann, compares with €719 million reported in 2007, a figure that included businesses that Lanxess is divesting.

"Lanxess is also sticking to its 2008 target of an adjusted EBITDA margin in line with what it describes as the industry average, and of having no business unit with an EBITDA margin below 5 %," Heitmann said. The adjusted EBITDA margin reportedly widened to 14.3 % in the first quarter, up from 12.8 % a year earlier.

▶ www.lanxess.com

Lanxess to Coordinate Leather Chemicals in Asia

Effective from July 1, the leather business unit of Lanxess will transfer its regional marketing headquarters in Asia from Hong Kong to Singapore. By pooling sales and logistics activities for the Asian market at the Singapore site, the company will optimize processes and transport. Frank Paus, head of global marketing in the Leather business unit, said, "Singapore is already the largest and most efficient distribution hub for leather chemicals in Asia, and in future it will be our most important sales location worldwide."

▶ www.lanxess.com

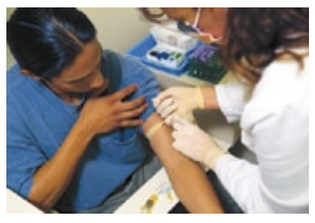
ING's €800 Million Property Fund

ING Real Estate, part of ING Group, said it has launched an €800 million European healthcare property fund targeting institutional investors. It added in a statement that the fund targets a balanced portfolio of European healthcare assets, with an internal rate of return of 8 % to 9 %. The healthcare property fund will invest mainly in Germany, France and the Netherlands, while the fund may also invest in Italy, Spain, Austria, Belgium and Sweden, depending on opportunities.

▶ www.ing.com

The Barcelona® Chair by Knoll, Inc.

Glaxosmithkline In Superbug Deal



Glaxosmithkline (GSK) has bought the exclusive license to any products for gram-negative bacterial diseases produced by Mpex Pharmaceuticals, in a deal potentially worth hundreds of millions of pounds. Mpex specialises in producing efflux pump inhibitors (EPI), which are a new technology aimed at tackling the way bacteria fight antibiotics. This is relevant as strains of antibiotic resistant so-called "superbugs" emerge. Under the terms of the agreement, Mpex will grant GSK rights to product candidates developed under the collaboration. Mpex will be responsible for the discovery of EPI drug candidates and the development of combination product candidates through clinical proof of concept, at which point GSK will have an option to exclusively license each product candidate for further development and commercialisation on a worldwide basis. Mpex will receive an $8.5 million upfront payment and a $6.5 million equity financing commitment from GSK. Contingent on achieving certain milestones, Mpex is eligible to receive development, regulatory and commercial milestones ranging up to $200 to $250 million for each product candidate. Zhi Hong, a senior vice-president at GSK, said: "Antibiotic discovery has faced tremendous challenges with the discovery of only two new classes of antibiotics over the last 3 decades. Novel discovery-enabling and paradigm-shifting approaches are needed to address the ever increasing medical needs due to life-threatening bacterial infections and drug resistance."

▶ www.gsk.com

Valeant Approves Share Buyback

Valeant Pharmaceuticals announced its board has approved the repurchase of an additional $ 100 million of the company's common stock. The increase brings the total repurchase authorization to $300 million.

▶ www.valeant.com

Ciech to Triple Net Profit by 2011

Poland's largest chemical company Ciech may sell 600 million zlotys to 900 million zlotys worth of new shares to finance growth plans, the Parkiet newspaper reported, citing CEO Miroslaw Kochalski. Ciech has said it could spend up to 4.8 billion zlotys on a series of investments and acquisitions at home and abroad as it seeks to triple its net profit to as much as 500 million zlotys by 2011. Its only major acquisition so far has been the €75 million purchase of a German soda maker Sodawerk Stassfurt. "We can see that after the German project, (the share issue) will be the only way to finance our fast growth scenario," Kochalski told Parkiet in an interview. "I'm not talking about the issue worth 200 million zlotys to 300 million zlotys but more like 600 million zlotys to 900 million zlotys," he added.

▶ www.ciech.pl

Luminex To Offer Shares

Luminex said it is launching an underwritten public offering of 3.5 million shares, and expects to grant the underwriters a 30-day option to purchase up to an additional 525,000 shares to cover any over-allotments. Austin, Texas-based Luminex, a biotechnology company, plans to use the net proceeds from the offering for general corporate purposes. J.P. Morgan Securities Inc. and UBS Investment Bank are acting as joint book-running managers for the offering.

▶ www.luminexcorp.com

Roche to Invest in Infrastructure

Roche plans to spend some CHF1.2 billion on new infrastructure and building facilities. Of the total sum, around CHF 550 million will go towards the Swiss pharma group's new skyscraper in Basel. Other investments

are planned for the production facilities, research and development facilities as well as new infrastructure.

▶ www.roche.com

Bayer: Drugs from Tobacco Plants

Bayer plans to test drugs made from tobacco plants that have been modified to meet patients' individual needs, on humans for the first time next year. The first use of the procedure will be for a treatment of non-Hodgkin's lymphoma based on antibodies that direct the body's immune system at cancer cells, Bayer said. The German drugmaker is using bacteria to transport the manipulated genetic code of a virus into tobacco plants, instructing the plant cells to produce antibodies or other proteins for specific drugs. The genetic code of the virus will be modified depending on each

patient's genetic profile. Bayer said it inaugurated a production facility in the eastern German city of Halle on Monday. The plant, in which Bayer has invested €10 million, will be operated by its subsidiary Icon Genetics, which it bought in 2006.

▶ www.bayer.com

Rohm & Haas Cuts Jobs

Rohm & Haas said it plans to implement a comprehensive set of actions to restore profitability, impacting about 925 positions, primarily in North America, and resulting in a second-quarter charge of 35 cents per share. As part of its plan, Rohm & Haas said it will cut 30% of installed capacity in its emulsions network in North America; make "significant" reductions in overhead expenses for its speciality materials group; adjust the infrastructure for its electronic materials group; and take a number of initiatives in other businesses and regions. In 2010, the company expects to deliver pretax run-rate savings of about $110 million, with less than half of the benefit realized in 2009. Rohm & Haas also expects earnings per share from operations to be reduced by 11 cents per share in the second half of 2008, primarily because of accelerated depreciation and other costs related to the above actions.

"Many of these actions have been discussed publicly in recent quarters as initiatives that would restore profitability, address the changing needs of our customers, and contribute to our growth objectives," the company said. "We are now convinced it is a more prudent course of action to accelerate the implementation of these plans due to the rapid erosion of business conditions in the U.S., and the impressive growth of our business in many rapidly developing economies."

▶ www.rohmhaas.com

Akzo Moves Chelates HQ to China

Akzo Nobel Functional Chemicals is relocating the headquarters of its Chelates business from the Netherlands to China. The move has been prompted by the growing importance of the Asian market. "It is extremely important for us to be in close proximity to our customers in China and the Asia Pacific region," explained Functional Chemicals General Manager Bob Margevich.

Currently located in Amersfoort, the Chelates business will move its head office to Shanghai this summer. Chelates General Manager Geert Hofman and Controller Prasanta Dutt will also relocate to China during the course of the year, with Hoffman taking on the additional role of Functional Chemicals' administrative representative for Asia Pacific.

▶ www.azkonobel.com

Dow Settles Lawsuit

Dow Chemical has settled all litigation between the corporation and two former executives who were fired for participating in unauthorized buyout discussions. J. Pedro Reinhard and Romeo Kreinberg acknowledged participating in discussions that were not authorized by, nor disclosed to, Dow's board of directors concerning a potential leveraged buyout of the company, and agreed they should have informed the chief executive and the board of the discussions. Reinhard, a former senior adviser and chief financial officer, and Kreinberg, a former divisional executive vice president, also acknowledged that their termination was appropriate under the circumstances.

▶ www.dow.com

Company Investigations

◀◀ Continued Page 1

regard, it might be helpful at the outset of the investigations to clearly instruct all employees not to destroy or delete any documents or electronic data.

When searching the employees' e-mails, auditors will most often have to overcome a legal obstacle resulting from German data protection law: In most companies, the private use of the company's e-mail account is allowed, be it for rare occasions only. In that case, the company or its auditors must generally not search the employees' e-mail accounts without their explicit consent.

According to legal commentaries, such searching and copying of e-mail accounts is permitted, though, if there are tangible indicators suspecting a certain employee of a wrongdoing. The other employees, however, would have to give their permission for the e-mail screening, unless it is expressly allowed by a works agreement with the works council. Screening all employees' e-mails without such consent is subject to criminal liability.

Role Of Works Councils

Despite the extensive statutory rights of German works councils, their role with regard to internal investigations has not been secured, yet. Undoubtedly, the works council does not have to be consulted or even notified, if the company conducts investigations against one or several individual suspects. However, if the investigations are conducted on a broader scale involving other colleagues, the works council will usually claim to install general procedural rules regarding the investigation. Regardless of the legal assessment, the company is well-advised to agree with the works council on the procedural rules, especially as a works council can act as an intermediary to convince the employees to cooperate in the investigation. Also, an agreement with the works council providing for rules of an internal investigation can help to overcome privacy obstacles as shown above.

Summary

Many legal aspects of company investigations have yet to be secured. However, the employees have extensive obligations to cooperate. Works council participation is advisable, especially to overcome privacy issues.

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Allessa Acquires Reflex Blue Business The Allessa Chemie agreed with Clariant to purchase the Reflex Blue business as of July 1. The Reflex Blue brands are primarily used as toning agents for black printing inks. With the acquisition, Allessa will enhance its level of recognition in the pigment market and its market position in this key industry segment.

The Reflex Blue product line has been manufactured at the Offenbach site since 1970. The production has been managed by Allessa since the origin of the company on July 1, 2001exclusively for Clariant.

▶ www.allessa.com

Nexity Reim, Natixis Venture Buys Bayer Properties Capnexi, a new sale-and-leaseback venture formed by Nexity Reim, the non-residential property unit of housebuilder Nexity, and by Natixis Capital Partners, has bought three properties at Puteaux outside Paris from Bayer for €105 million, the venture partners said. Bayer will lease back two of the buildings, with a combined area of 40 % of the total 17,000m².

▶ www.bayer.com

Pfizer Completes Encysive Acquisition Pfizer said it closed its $195 million acquisition of Encysive Pharmaceuticals. In February, Pfizer announced a $2.35-per-share cash tender offer for Houston-based Encysive. The acquisition gives Pfizer rights to Encysive's drug development pipeline, including Thelin, an oral drug to treat pulmonary arterial hypertension, or high blood pressure in the pulmonary artery. The drug has had a rocky regulatory history, with the FDA declining to approve the drug on three occasions.

▶ www.pfizer.com

Merck KGaA Strengthens Latin America Business Merck KGaA said it bought the rights to distribute 30 of Bristol-Myers Squibb's prescription drugs in Argentina, Chile and five other Latin American countries for an undisclosed price, to expand its presence in the region. The sales agreement, which covers treatments of cardiovascular and metabolic conditions, runs for three years and can be extended by mutual agreement, the German drug and chemical company said in a statement. Bristol-Myers Squibb generated more than $90 million in revenues in the region from the drugs covered by the contract last year, Merck added. The products include Pravachol against high cholesterol levels and high-blood pressure drug Monopril. Merck posted €569 million in pharmaceutical sales in Latin America last year, according to the statement.

▶ www.merck.de

Galenica Buys Stake in Renapharma Galenica said it will buy a 51 % stake in Sweden's Renapharma in a bid to strengthen its market position in Northern Europe. The Swiss pharma group did not disclose any financial details of the transaction. Renapharma – which specialises in the sale of medicines for iron deficiency therapy and enjoys a leading market position in Scandinavia – will be integrated into Galenica's pharma division.

▶ www.galenica.com

Air Liquide Acquires Chemical Management Division Air Liquide has signed an agreement to purchase the major asset parts of the chemical management division of Edwards Vacuum. The acquisition is expected to close in the end of June, pending regulatory approval and pending the satisfaction of certain closing conditions set forth in the agreement. Edwards' chemical management division is focused on designing, manufacturing, and selling chemical and slurry dispensing equipment, installations and services to semiconductors as well as original equipment manufacturers worldwide. With production based in Chanhassen, Minn., U.S., it employs about 120 people (including 20% in Asia and Europe) and has annual sales of approximately $50 million.

▶ www.airliquide.com
▶ www.edwardsvacuum.com

DSM Completes Acquisition of PTG DSM has closed the acquisition of the Polymer Technology Group, (PTG) of Berkeley, Calif., U.S., a company acting in the field of biomedical polymers. Through this acquisition DSM wants to enhance its position in the global fast growing biomedical materials market. PTG will now be known as DSM PTG. Steve Hartig, President DSM Biomedical, commented: "This acquisition will enable us to grow a unique portfolio of materials-based technologies for the healthcare market." The DSM biomedical and PTG organization will be closely linked to service the global market. To secure a smooth integration Bob Ward will stay on as president of DSM PTG.

▶ www.dsm.com
▶ www.polymertech.com

Süd-Chemie Acquires Stake of Ajay Metachem Süd-Chemie a specialty chemicals company for adsorbents, additives and catalysts, has acquired a major stake in India's supplier of foundry additives, Ajay Metachem. Ajay Metachem is a manufacturer of high-grade chemicals and other materials such as resins, coatings, additives and feeders for foundries in the Indian market. The company operates three production sites and several sales offices in the centres of the Indian foundry industry. The Indian market for high-grade foundry additives and products is growing at approximately 30 % a year in the wake of continuous strong growth in the Indian automobile industry and the rise in demand for cast iron components.

▶ www.sud-chemie.com
▶ www.ajaymetachem.com

Sign Merger Agreement Albemarle Corporation and Sorbent Technologies Corporation jointly announced that they have signed an agreement of merger. The transaction will be an all-cash transaction in which the Sorbent shareholders could receive approximately $6.00 per share of common stock, which equates to a cumulative purchase price of $20 million plus certain adjustments. The completion of the transaction is subject to certain conditions, including Sorbent Technologies receiving shareholder approval. A Sorbent shareholders meeting is planned for July 2008 and merger closure is expected shortly thereafter.

▶ www.albemarle.com
▶ www.sorbenttechnologies.com

Daiichi Sankyo to Acquire Ranbaxy

Daiichi Sankyo said it will acquire a controlling stake in India's Ranbaxy for up to $4.6 billion to strengthen its overseas prescription drug business, in a deal touted to be the largest among listed Indian companies. Japan's second-largest drugmaker said the acquisition will cost $3.4 billion to $4.6 billion. Japanese drugmakers have been acquiring overseas rivals to expand their global presence amid stiffer competition and to boost their product pipelines with the expiry of some drug patents. Daiichi Sankyo's arch-rival, Takeda, recently bought U.S. biotech company Millennium for $8.8 billion, while smaller rival Eisai acquired U.S. drugmaker MGI Pharma for $3.9 billion. Daiichi Sankyo said it also aims to take advantage of the Indian company's network to explore business opportunities in rapidly growing emerging markets.

The Japanese company said it plans to complete the deal within the year to March 2009, subject to regulatory approval. It said it will finance the planned acquisition with cash on hand and bank loans. Takashi Shoda, president and chief executive of Daiichi Sankyo, said the company wants to attain a global presence by acquiring Ranbaxy and added it is also looking at developed markets. Shoda also said the combined entity will be the world's fifteenth-biggest pharma company. The Indian generic drugmaker posted a pretax profit before extraordinary items of 10 billion rupees on sales of 74 billion rupees in calendar 2007. "The sale price for Ranbaxy, which works out to 4.2 times sales and 20.4 times EBITDA, is very good for a generic company," said Ranjit Kapadia, head of research (private client group) at brokerage Prabhudas Lilladher. "Ranbaxy is going into good hands," Kapadia said, adding Daiichi will pursue research and development projects for Ranbaxy.

▶ www.daiichisankyo.com

Pharma Sales To Stay Buoyant

European health care industry sales look set to continue expanding in 2008, after a resilient first quarter, says Standard & Poor's Ratings Services.

"Companies with the slowest growth in the first quarter, or even sales declines, were those with the greatest exposure to the U.S., where patented drugs are suffering from aggressive generic competition," said Standard & Poor's credit analyst Olaf Toelke. For example, Glaxosmithkline PLC (A+/Stable/A-1) suffered a first-quarter like-for-like sales decline of 2 %. Companies with a primarily European focus reported the highest sales growth rates in the quarter. Markedly, Merck KGaA (BBB+/Watch Pos/A-2) sales grew 14 % and Bayer AG (A-/Stable/A-2) sales were up 7 %.

The U.S. Federal Drug Administration (FDA) has adopted a visibly tougher stance in recent years for the approval of new drugs. Consequently, a relatively large number of promising new molecules have either not been approved or have faced significant approval delay, including those of European firms. Standard & Poor's therefore expects the U.S. pharmaceuticals market to lose further global share over the next few years, after dropping to 46 % in 2007 from 48 % in 2006 and 49 % in 2008.

European pharmaceutical companies' late-stage pipelines are still considered to be comparatively healthy. Nevertheless, a mixed development in companies' credit quality for the rest of the year is foreseen, depending on whether managements adopt conservative financial policies or pursue acquisitions or share buybacks. If less conservative financial policies are accompanied by diminished cash cushions, this will leave companies more vulnerable to potential downgrades.

▶ www.standardandpoors.com

Arkema and Others Fined €79 Million

The European Commission said it has fined Arkema, Elf Aquitaine, Finnish Chemicals, Erikem, Aragonesas Industrias y Energia and Uralita a total of €79 million for cartel activity in the sodium chlorate market. Between late 1994 and 2000, the commission said the companies "fixed prices and allocated markets through a series of meetings and other illicit contacts" for sodium chlorate, an oxidizing agent used mainly for bleaching in the pulp and paper industry. Arkema and Elf Aquitaine were jointly fined €59 million, while Aragonesas and Uralita were jointly fined €10 million. Arkema said in a statement that the fine will have "no impact" on the company's results "bearing in mind both the provisions already booked and the warranty agreed with Total, on the occasion of the spin-off." Arkema said it may consider whether to lodge an appeal with the European Court of First Instance once it receives the full decision. Finnish Chemicals' and holding company Erikem Luxembourg's fine of €20 million was reduced by 50% to €10 million because it co-operated with the investigation. Akzo Nobel and its unit EKA Chemicals, originally fined €116 million, received full immunity under commission rules by acting as cartel whistleblowers. The fine imposed on Arkema was increased by 90 %, as the company is a repeat offender, having been condemned for three previous cartels before this one in the plastics industry – Peroxygen products in 1984, Polypropylene in 1986 and PVC in 1994.

It is the first time under the commission's rules from 2006 that the European Union executive increased the fine for a company because of its previous involvement in three cartels. EU competition commissioner Neelie Kroes said: "These companies have to learn the hard way that the Commission will impose high fines when they rip off their customers, and ultimately consumers, by forming a cartel." The commission's investigation was triggered by an application for immunity lodged by EKA Chemicals in March 2003. Finnish Chemicals also made an application under the leniency programme.

Dow Declares Force Majeure

The Dow Chemical Company has announced force majeure for 50 % Liquid Caustic Soda. North American and some Latin American customers sourced from the U.S. Gulf Coast will be placed on approximately 90 % allocation immediately. The force majeure will stay in effect for a minimum of three months.

The force majeure at the Freeport manufacturing site was caused by a potential production issue that resulted in an involuntary shutdown.

"At the Freeport site, we identified and avoided a critical production issue, but we must shut down the unit until we can make the necessary repairs," said John Sampson, business director, Chlor-Alkali. "Our employees in Freeport are working to resolve the issues and remain committed to safe and efficient production of caustic soda."Caustic soda (sodium hydroxide) is a crucial ingredient in an array of industrial operations, including pulp and paper, textiles, soap and detergents, bleach, petroleum products and alumina.

Dow, also declared to its customers that force majeure is being issued for several ethyleneamine products due to unexpected contingencies beyond Dow's control at St. Charles Operations (SCO) located in Taft, La., U.S.. Effective immediately and likely through early July 2008, Dow said it will distribute available product in a manner that is fair and reasonable in agreement with contract terms.

▶ www.dow.com

Bayer Healthcare Closes Acquisition of Sagmel Bayer Healthcare has announced that its consumer care division has successfully closed the acquisition of the over-the-counter (OTC) brand portfolio and related assets of the US-based Sagmel. The Sagmel OTC business became part of Bayer Healthcare in Russia, the Ukraine, Kazakhstan, the Baltic's and several Caucasian and central Asian countries.

The transaction, which was announced in March 2008, recently received the necessary regulatory approvals of the Russian and Ukrainian authorities and will place Bayer among the top five OTC companies in the Commonwealth of Independent States (CIS).

▶ www.bayer.com
▶ www.sagmel.com

Coatex Purchase Ethacryl Business Arkema has announced the acquisition by its subsidiary Coatex of Lyondellbasell's ethacryl business. With annual sales of the order of €4 million, this activity will enable Coatex to strengthen its know-how in the concrete and plaster additives markets. The acquisition will furthermore allow Coatex to complement its product line by offering a wider range of molecules (polycarboxylates) to its client formulators and producers of construction materials. Coatex joined Arkema in October 2007 to form its specialty acrylic polymers business unit, specializing in the production of mostly acrylic-based polymers, used as dispersants and thickeners in many applications.

▶ www.arkema.com
▶ www.lyondellbasell.com

Brenntag Acquires Chemical Supply Activities Brenntag has confirmed the formal approval from the Swedish and German competition authorities for the acquisition of the chemical supply activities of Yara at the sites in Köping, Sweden and Tertre, Belgium. The acquisition, announced by the two companies in April, includes ammonia nitrate solution, aqueous ammonia and weak nitric acid supply activities conducted from the Köping production site in Sweden and the ammonia nitrate solution, aqueous ammonia, weak nitric acid and concentrated nitric acid supply activities conducted from the Kemira Growhow production site at Tertre, Belgium. In each case, related production and distribution assets form part of the purchase package.

▶ www.brenntag.com
▶ www.yara.com

Eastman Changes Gasification Projects Eastman has acquired Green Rock Energy's 50 % ownership interest in the Beaumont, TX, U.S. industrial gasification project. With this acquisition, Eastman becomes the 100 % owner of the Beaumont industrial gasification project and remains the sole developer. In addition, Eastman announced the divestiture to Green Rock of its 25 % ownership interest in the St. James Parish, La, US industrial gasification project and will no longer participate in the project. Terms of the transactions were not disclosed. Eastman expects to complete the front-end engineering and design for the Beaumont gasification facility in the second half of 2008, and to obtain non-recourse project financing by the end of 2008.

▶ www.eastman.com
▶ www.greenrock.com.au

Thermo Fisher Strengthens Presence in India Thermo Fisher Scientific has acquired the analytical technologies and environment instrumentation divisions of Chemito Technologies. Headquartered in Mumbai, India, Chemito is a large local supplier of analytical instruments for life sciences and environmental monitoring applications. In addition, Chemito manufactures its own analytical instruments, including gas chromatography, atomic absorption and UV-Vis spectroscopy. Chemito's analytical technologies and environment instrumentation divisions have annual revenues of approximately $10 million, and will be integrated into Thermo Fisher's analytical technologies segment.

▶ www.thermofisher.com
▶ www.chemito.net

Oxford Instruments Acquires Link Analytical Oxford Instruments plc announced the acquisition of the business and assets of Link Analytical. Link's primary activity is the distribution and after-sales support of Oxford Instruments NanoAnalysis equipment in Scandinavia.

"The acquisition of Link Analytical is consistent with our five year strategy, which we commenced in 2006, to double the size of the Group and improve EBIT margins by 10 percentage points. We have now established an improved route to supply our customers in Scandinavia as well as further growth opportunities." Said Jonathan Flint, Chief Executive of Oxford Instruments plc. The acquisition will also provide the Group with opportunities to distribute complementary analytical instruments on behalf of a number of third party manufacturers in the region.

The consideration is an initial cash payment of £0.6m with a cash earnout of up to £0.6 million payable over three years should the business meet specific sales growth targets. For the year ended Dec. 31, 2007, Link reported a profit before tax of £0.5 million and gross assets were £1.7 million. However, the profit included a number of one off contracts and provision releases that are not expected to be repeated. It is expected that the acquisition will be earnings enhancing in its first full year.

▶ www.oxford-instruments.com

Medicis Buys Liposonix Medicis has agreed to buy Liposonix, a privately held medical device company, for $150 million in cash. Liposonix's body contouring ultrasound technology is designed to treat areas of fat which may not respond well to diet or exercise, Medicis said. Subject to approval by the FDA, Medicis said it expects to enter the U.S. marketplace with the Liposonix technology in the 2011 timeframe, if not sooner. Scottsdale, Arizona based Medicis has agreed to pay up to an additional $150 million if the FDA approves Liposonix technology and if various commercial milestones are achieved on a worldwide basis. Bothell, Washington based Liposonix has a staff of 40 scientists, engineers and clinicians.

▶ www.medicis.com

European Commision Clears JV The European Commission said it has cleared Renolit and Evonik's chemicals division's proposed acquisition for joint control of Suncoat. The two companies intend to acquire more than 50% of Suncoat to achieve joint control. The transaction was reviewed under the European Union's 'simplified' merger review procedure for cases which the commission believes do not pose competition concerns. Renolit specialises in the manufacture of thermoplastic films and products.

▶ www.evonik.com

Clarifying the EU Regulations

Finding the Precise Regulatory Pathway for Biosimilars

Biosimilars – Since November 2005, similar biological medicinal products or "biosimilars" benefit from a particular abridged procedure for Marketing Authorization (MA). A good understanding of the regulatory framework surrounding biosimilars is key to the success on the market for any potential applicant.

Isabelle Dupuis
Bird & Bird

Marc Martens
Bird & Bird

A biosimilar is a biological medicinal product which is similar to a reference medicinal product, leading some people to name them "biogenerics." Biosimilars however present important differences with generics which have brought the European legislator to treat biosimilar differently.

First, biosimilars are biological medicines, which means that their active ingredients are biological substances derived from living cells. Whereas generic medicines are constituted by small, simple and stable molecules, biosimilars are mostly large, complex and instable entities. Secondly, with biosimilars "the product is the process." Biosimilar products are indeed very much defined by their manufacturing process: they are very sensitive to any manufacturing process variations as well as to differences in the living cells or organisms used, and are therefore inherently variable.

Biosimilars are "similar" to the reference products but are made according to different processes. Thus, there may be differences between the biosimilar product and the reference product, to the contrary of a generic medicine. Biosimilars do not meet the condition of bioequivalence in the definition of generics and biosimilar approval does not mean interchangeability with the reference product.

EU Regulatory Framework

Directive 2001/83 establishing the Code for Human Medicines (as modified by Directive 2004/27, 31 March 2004) and its Annex 1 define the global regulatory framework applicable to biosimilars. Directive 2001/83 gives the general principles whereas its first annex aims at specifying the practical requirements.

Pursuant to Section 10.4 of Directive 2001/83, biosimilars applicants can benefit from an abridged procedure in order to obtain a MA. The right to apply for MA according to an abridged MA procedure means that, due to the clinical experience accumulated over the years with the use of the reference product, the biosimilar applicant is not compelled to submit a complete dossier in order to obtain the MA but is allowed to rely, to a certain extent, on the original data (pre-clinical and clinical trials results) of the reference medicinal product. However, the abridged procedure for biosimilars has to be more complete than for generics, given the particular nature of biological medicines.

The wording of both section 10.4 of Directive 2001/83 and its annex remain vague as to what data is required in order to obtain a MA, leaving a great margin of appreciation to the regulatory authorities (EMEA). Annex 1 provides that the type and amount of supplementary data to be provided shall be determined on a case-by-case basis, taking into account the specific characteristics of each medicinal product and in accordance with the specific guidelines.

Accordingly the EMEA has issued a number of Guidelines to provide guidance to the biosimilar applicants as to the type and quantity of information required. Three different kinds of guidelines can be identified. First, there is the "Overarching Guideline" which merely introduces the concept of similar biological medicine and provides the basic principles to be applied as well as a kind of user's guide for the biosimilar applicant. Secondly, the "general guidelines" applying to all biosimilars and setting out the general principles for assessing the quality and (non-) clinical aspects of biosimilars. Ultimately the most useful is the third kind: the product-class specific guidelines which constitute annexes to the general guideline on (non-) clinical issues and which address specific pre-clinical and clinical issues relating to specific products. At the moment only four product specific guidelines have been adopted, relating respectively to somatropin, insulin, granulocyte-colony and erythropoietins. More product class-specific guidelines are expected in the future. For instance, two new guidelines concerning respectively Recombinant Interferon Alpha and Low Molecular Weight Heparin are in preparation.

Biosimilars most generally follow the centralized MA procedure before the EMEA. According to the annex of Regulation No 726/2004, the central route has to be used where a product is developed using certain types of biotechnological processes which are enumerated, i.e. recombinant DNA technology, controlled expression of genes coding for biologically active proteins from a cell culture and hybridoma and monoclonal antibody methods. Biosimilars products developed using any of these biotechnological processes have to follow the centralized procedure described in Regulation 726/2004 to obtain a MA. But products not developed according to these biotechnological processes will not have to follow the central route. Other possible routes are decentralized procedure, mutual recognition, and national procedure.

Required Data For MA

In order to obtain a MA for a biosimilar some extra information is required and, applicants have to submit results of tests to show the risk/benefit balance of these products. In terms of quality data, the dossier for a biosimilar must meet the same standard as any other medicinal product

Given the particular nature of biosimilars, the applicants for a MA for biosimilars must indeed submit comparability data in addition to the data required for all biotechnology products. Comparability data are required to demonstrate that the alleged biosimilar and the reference product have similar profiles in terms of quality, safety and efficacy. For this purpose, comparability programs need to be defined and agreed upon with the EMEA according to their Guidelines.

As stated above, it is not possible to define the exact amount and type of required data since it depends of each specific product and is therefore determined on a case-by-case basis. However, it can be generally stated that:

- (i) pre-clinical data shall be provided but are generally achieved by means of abbreviated programs of in vitro and in vivo testing.
- (ii) data from abbreviated clinical trials shall be deemed sufficient in certain cases.

Like all medicinal products, biosimilar medicines are subjected to a monitoring of their clinical settings after the product has been put on the market. Therefore, a description of the Pharmacovigilance Systems and a post marketing surveillance plan must be provided in the application and in the Risk Management Plan.

Role of the Pharmaceutical Industry in the Development of Guidelines

Even if the Guidelines are not legally binding, they set out standard practices which if they are followed by the applicant will facilitate the grant of a MA by the EMEA. It is therefore easy to understand the interest that the industry would have to influence the development of Guidelines.

The good news is that pharmaceutical industry can act proactively in the development and drafting of guidelines. This opportunity is particularly interesting for biotech companies considering to develop or developing biosimilars for which no product class-specific guidelines has been issued or companies' whishing to amend a guideline already adopted.

The standard adoption procedure comprises 10 steps summarized in table 1. and shows in bold the steps where pharmaceutical industry can give direct inputs.

Companies can influence the adoption of a guideline is the selection of topic and inclusion in the relevant work programs. Each year, the scientific committees and working parties of the EMEA determine their work programs and consider the Guidelines that need to be developed, reviewed or updated. Any interested party is welcome to give input.

Pharmaceutical companies can also influence guidelines by commenting on a concept paper or a draft guideline. Both documents are generally released for consultation and the industry should definitely use this opportunity since the comments received are considered for the drafting of the guideline. The EMEA may even convene a meeting to discuss aspects of the draft with the interested parties.

10 steps of the development procedure of EU Guidelines

1. Selection of topic and inclusion in the relevant work programme(s)
2. Appointment of rapporteur and (if necessary) co-rapporteur)
3. Development of concept paper
4. Adoption and release for consultation of concept paper
5. Preparation of initial draft guideline
6. Release for consultation of draft guideline
7. Collection of comments
8. Preparation of final version of guideline
9. Adoption of final guideline for publication
10. Implementation

Biosimilars such as insulin present important differences with generics, which have brought the European legislator to treat biosimilars differently.

Biosimilars in Action

The introduction of biosimilar medicines on the market raises three major issues to which one must be vigilant in the future. First, if regulatory authorities agree to say that substitution with the reference product should not be allowed for biologics, this position could however evolve in view of economic pressures. In order to ensure an appropriate introduction of biosimilars on the market, EU should also ensure that the labeling of biosimilar medicines is sufficiently clear and transparent to adequately inform patients and doctors.

Conclusion

We recommend having recourse to the scientific advice of the EMEA. One of the tasks of the EMEA is to advice companies on the conduct of the various tests and trials necessary to demonstrate the quality, safety and efficacy of medicinal products.

Scientific advice is not legally binding for the EMEA or the applicant with regard to any future MA of the product concerned. It is considered as confidential and the outcome is not shared with other applicants. However, a significant hurdle might be the high fees requested to obtain a scientific advice (€17,400 to €69,900).

We further recommend that small biotech companies should seek the SME (small, micro or medium-sized enterprises) status as the benefits include fee exemptions for certain administrative services etc.. The status of SME is assigned by EMEA.

Furthermore, we would like to highlight the importance of pre-submission meetings during which purely regulatory aspects will be answered by the EMEA. Good communication with the EMEA is undoubtedly a vital key to the success for any biotech companies aching for entering the market first.

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chemical reaction

A Few Words from the Team

Ana Wood

Greetings from Darmstadt

I would like to take this opportunity to introduce myself as the new member in the CHEManager Europe team. A new start can be daunting but brings with it many new challenges and I'm very excited about working on this publication. I'm not just new to CHEManager Europe but also to Darmstadt. I spent the last two years in Berlin, but originally I am a London girl and studied at Imperial College.

With the need to meet deadlines, there is no gentle acclimatization to the new job but more a sink or swim scenario.

On that note, one month in and I'm heading to the States for a press event. During my week long stay it will be interesting to immerse myself in the atmosphere of what is happening in the states. With both Barack Obama and John McCain promising to invest in the healthcare service what will be the repercussions for the pharmaceutical industry?

As reported on page six, at present the European market is stronger than the U.S. market, with companies such as Merck KGaA reporting among the highest sales. Strong competition from generic brands is one of the factors causing the slow demand of prescription drugs in the U.S.

This trend is likely to continue as more patents launched in the 1990s begin to expire. The question is will the big players in the pharmaceutical industry have valuable enough products in their pipelines to compensate for the profit cuts due to generic competition?

Pricewaterhousecoopers has just released its Pharma 2020 report in which it highlights seven major trends that the pharmaceutical industry will have to accommodate within the next few years. One of these trends is the pay-for-performance concept, which is gaining momentum. Both patients and the healthcare bodies are keen on this scheme and with the accumulative data collected in electronic medical records, it is also a viable option.

Another hurdle the pharmaceutical industry must face is the lack of innovation in recent years. The Pharma 2020 report suggests closer collaboration between industry, academia, regulators, government and healthcare providers as well as better use of new technologies to reduce both the time and cost of clinical drug development.

It seems that big pharma will have to learn to think outside the box in order to stay on top in the coming years.

Production
FACILITIES · PROCESSES · TECHNOLOGIES

BASF to Expand Bioplastics Production BASF projects a significant expansion of its production plant for the biodegradable plastic Ecoflex at the company's Ludwigshafen site. The move will raise Ecoflex production capacities from the current 14,000 by 60,000 t/y. Production at the expanded plant will commence in the third quarter of 2010.

Ecoflex is a petrochemicals-based plastic which has the properties of conventional polyethylene but it is fully biodegradable in accordance with DIN EN 13432 requirements.

▶ www.basf.com

DSM Will Invest in Powder Coating Resins Royal DSM plans to expand its polyester powder coating resin facilities and prepare its manufacturing network for the future. Including investments currently under consideration, the long term manufacturing plan would result in a total capacity expansion of 40,000 t. The investments are scheduled for the period 2007-2010. As a first step, the facilities in Schoonebeck (The Netherlands), Ping Tung (Taiwan) and Santa Margarida (Spain) will be expanded. At the site in Augusta (GA, USA), engineering has already been started to prepare for a significant augment of capacity for the American market.

▶ www.dsm.com

Evonik Expands Laurolactam Capacity Evonik will invest a two-digit million euro figure to expand the laurolactam production capacity significantly at its site in Marl, Germany. The new capacity should be available in the second half of 2009. Plans for a further capacity expansion have already begun. Laurolactam is the starting material for the polymer polyamide 12. The high performance polymers business line markets polyamide 12 as a structural material under the brand name Vestamid and as a powder under the name Vestosint.

▶ www.evonik.com

German Site Expansion After commissioning a new wafer production facility at the so-called "Jena Site 2" in mid-April, Wacker Schott Solar is continuing its production-site expansion. The company announced this during a visit by Jena mayor Albrecht Schröter. The expansion focuses on construction of a new crystal-growing facility and will create 150 new jobs at the site. The extension is a key component of a €370 million investment program aimed at ensuring the announced production-capacity expansion to one gigawatt by 2012. Construction work is expected to commence in August. In the future, the facility will produce multicrystalline silicon ingots for the manufacture of solar wafers. Silicon wafers sliced from these ingots are the starting material for the production of high-quality solar cells. The existing "Jena Site 1" will be renovated as part of the expansion. Plans have been under development since 2005 to convert former calcium-fluoride facilities, which have been producing calcium-fluoride crystals for the semiconductor sector for years. Conversion is expected to be completed by the end of the year.

▶ www.wacker.com

Mox Announces Investments Malaysian industrial gas company Mox, now a member of global gases and engineering company the Linde Group, brought on stream two new plants with an investment of approximately RM100 million. The first plant in Shah Alam was commissioned at the end of 2007, and the second plant in Penang was commissioned last month. The new plants add a further 400t/d capacity for Mox. In addition Mox will further invest around RM250 million to expand production capacity over the next two years, according to its newly appointed country head for Malaysia, Mr Wong Siew Yap.

"Another significant tranche of capacity for the production of oxygen, nitrogen and argon will also be added in the southern region in 2010, with almost 600 t/d of output," Wong said.

▶ www.mox.com.my, www.linde.com

Polyone Celebrates Opening of Plant in China Polyone has officially celebrated the opening of its vinyl compounds plant located in Chiling Industrial Zone, Houjie Town of Dongguan, a city in the Guangdong province of South China. Polyone's Dongguan plant was acquired from Ngai Hing Plastchem Company, the vinyl compounding subsidiary of Ngai Hing Hong Company. Polyone completed the acquisition of the assets and operations in January 2008. Since the acquisition, it has modified and upgraded equipment in the facility, trained the staff to produce Geon compounds, and enhanced environmental health & safety conditions to meet Chinese and Polyone standards.

▶ www.polyone.com, www.nhh.com.hk

BASF to Build Sodium Methylate Plant in Brazil BASF is planning to construct a production plant for sodium methylate in Guaratinguetá, Brazil, its largest site in South America. The plant, which will have a capacity of 60,000mt/y, will be the first such plant for this product in South America and is primarily intended to supply the regional market. Sodium methylate is an efficient catalyst for the production of biodiesel, which has developed into an alternative for diesel fuels in the past 10 years. "We expect annual global demand for biodiesel to increase to about 18 billion t in coming years. About 15 % of this amount will come from South America," said Dr. Ulrich Büschges, group vice president of BASF's global business unit inorganic specialties.

▶ www.basf.com

Manufacturing Execution Systems

Yesterday, Today And Tomorrow

Business benefits of MES – "Operational Excellence," "Leaner Operation," "Manufacturing Intelligence," and "Collaborative Manufacturing": Altogether key words highlighting the industry trend towards higher integration in computer system supported production processes and automation technology. Is it worth it? And if that is the case, how far should integration go?

Dr. Timo Slawinski
Bayer Technology Services

A general answer is hard to give. On the one hand "Manufacturing Execution System" (MES) is a synonym for a broad variety of functionalities. On the other hand the relevance of certain functionality depends on the application case at hand. Nonetheless, the increasing number of success stories today allows a better evaluation of which MES functionality supports best which production near tasks. In addition more and more big players are heading towards a global MES strategy. A good time for a summary and outlook

Business Benefit of Process Optimization

In the past, business benefits through process optimization were mainly achieved in two areas: Within the process control system (PCS) level the focus was on the optimal utilization of equipment and process control systems in certain process steps. On the enterprise resource planning (ERP) level, many initiatives aimed to optimize the overall supply chain. The introduction of central ERP-systems such as SAP R/3 was probably one trigger for this boom. However, there was still a gap between ERP and the PCS layer. Further increase of business performance can be achieved by a more comprehensive approach, which takes into account the entire chain of production including material and information flow. With this strategy technical production and the supporting business, processes can be further integrated and systematically optimized. This is the domain of Manufacturing Execution Systems.

Investment Costs Of MES

As outlined in figure 1, the potential business benefits of MES are in the range of 2–3 % of the turn-over. Considering now the investment costs for a MES implementation, it turns out that these costs are low compared to the total investment costs of a plant. As depicted in figure 2, in average only 25 % of total costs are in the area of process automation and optimization. Out of these 25 % most of the costs are related to production near process control equipment. Altogether only 2–3 % of total investment costs are related to process automation based on production near logistics and manufacturing execution systems. Note that these figures may differ depending on production type and industry at hand.

Compared to the business benefits the MES investment costs are rather low. This is one factor for the industry trend observed at the market. The increase of investments for MES and logistic systems as well as for ERP is one of the highest within the area of software industry. The ARC prognosis is an 11 % annual increase (cumulative annual growth rate), i.e. starting from €1.1 billion in 2003 to €1.9 billion in 2008. This growth rate is certainly also due to the fact, that the manufacturing industry is more and more convinced regarding the benefits of these investments. Furthermore, just looking at return of investment (ROI), which is typically in the range of 2–4 years, is convincing enough.

Potential For Process Optimization

For more detailed information regarding the business benefits we evaluated our experience of over 50 projects within the Bayer group. Realized savings were identified systematically on a quantitative and qualitative level. Basically, the result is that not all MES functions are applicable in the same way for different production/industry types. Thus, an adapted scope of MES is needed to meet various requirements. Important criteria are production type, batch size, and special process/industry requirements. The following list outlines potential savings for typical MES functions in certain application areas:

Production Planning and Execution: Cost and efficiency benefits especially in production environment as multi-purpose or pilot plants that consist of many production units and a variety of products. This may result in reduced production/lead time, increase of number of batches (up to 10 %), and better equipment utilization.

Material Management: By means of improved material management, the effort of material tracking may be reduced by 80 %. In addition the inventory costs and the risk of using the wrong material is reduced significantly.

Process Documentation: In the regulated industry, MES are used for the documentation of the manufacturing process (electronic batch records). Aside of the reduction of manual steps in the area of documentation and approval, the number of failed batches and the time to batch release could be reduced by 80 %.

Process Optimization: Assuming an operative MES in place, process data is available for analyzing and optimizing the technical processes. Depending on the application at hand this may result in reduced costs, e.g. for raw materials or energy.

Overall the benefits are not only related to certain functionality as described above. The general challenge is not only to optimize local layers or systems, but also to consider the entire integration scenario. In the best case this may lead to a comprehensive strategy to establish globally harmonized processes.

Heading Towards Global MES Strategy

As one of the Bayer business groups, Bayer Health Care (BHC) decided to establish a global MES program with regard to the anticipated investments in this area. The overall program goal is to implement a MES at all BHC core sites. A core system and core team approach, with one vendor and a standardized implementation strategy should ensure reduced cost and risk. Additionally, harmonized business processes and best practice sharing are to be established by the global approach.

- A cross functional and divisional MES Center of Excellence was introduced for:
- Leading BHC global MES Program
- Developing and conducting the core system approach
- Establishment of vendor and partners
- Project prioritization, approval, and monitoring
- Guidance and directions on MES strategy
- Networking and knowledge management in MES community

With this global initiative and in close collaboration with (internal) partners Bayer Technology Services and the vendor Werum, BHC is heading towards the global standardization of MES functions and the implementation of best practices in its production sites. Objective is to find room for improvement and reduce costs as part of the Operational Excellence Initiative.

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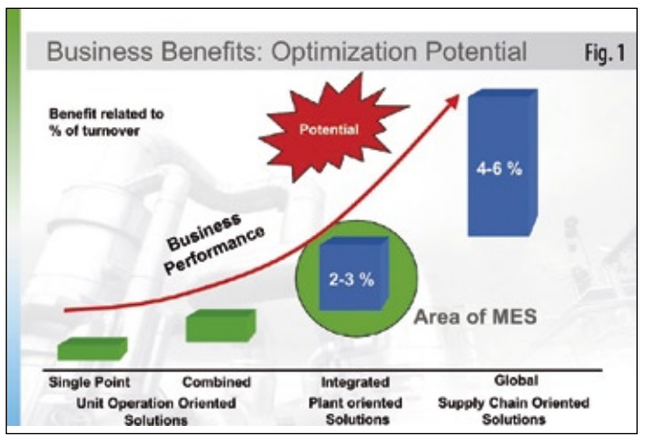

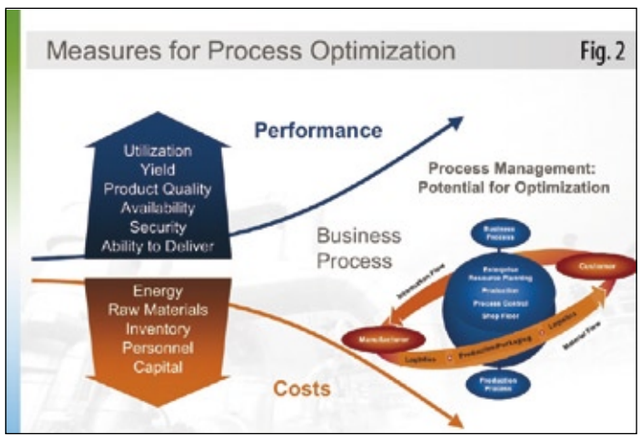

Süd-Chemie: Catalyst Production in Qatar

Hans-Joachim Müller
Süd-Chemie

Süd-Chemie, a global manufacturer of catalysts and adsorbents, commissioned the first and currently only, catalyst production plant in Mesaieed near the Qatari capital of Doha. The plant will supply catalysts to the Gulf States, with a focus on the fast-growing market of Qatar. The catalysts will be used to convert natural gas into diesel based on gas-to-liquid (GTL) processes, as well as in other processes for converting natural gas into higher-grade chemicals.

To date, Süd-Chemie has invested a low double-digit million euro figure in this plant and currently employs twenty people in Qatar. Based on forward orders, the production facilities will be working to capacity for the next two years and discussions are already underway on extending the newly-commissioned plant.

The catalysts are to be used in the region's GTL plants, as well as in chemical and petrochemical works, notably in Qatar and Kuwait. They will also be used by Shell and Qatar Petroleum in the world's largest GTL plant, PEARL, which is currently under construction in Qatar and as from 2010, is initially due to produce 140,000 barrels of diesel each day.

"We are determined to continue expanding our site in Qatar."

In view of both the increasing shortage and rising price of oil, the GTL market is highly attractive, offering technology to convert natural gas into diesel and other high-quality base materials for the petrochemical industry on an economically viable scale. At the present time, the world´s largest chemical industry network based solely on gas is emerging in the Gulf State of Qatar, the country with the third-largest gas deposits after Russia and Iran. Over the next few years, oil and chemical enterprises will be investing more than $20 billion in this venture. Qatar's first major GTL plant has already been in operation since the beginning of 2007, producing a planned capacity of 35,000 barrels of diesel per day.

Dr. Hans-Joachim Müller, a member of Süd-Chemie's managing board, said "We are very pleased that we are the first, and as yet the only catalyst manufacturer in the world to be able to start operation of a catalyst plant in Qatar. With our catalytic know-how, we will promote the commercial production of diesel from gas and of other base chemicals. We are determined to continue expanding our site in Qatar by adding other innovative products and in this way, will contribute to the region's dynamic growth."

▶ www.sud-chemie.com

Air Liquide Invests €110 Million

Due to the continuous growth in demand for industrial merchant gases in Western Europe, Air Liquide will invest €110 million in Germany and Portugal in two production units for liquefied air gases (liquid oxygen, liquid nitrogen, and liquid argon). The production units will start up between the end of 2009 and 2010.

Air Liquide plans to construct a unit in the region of Ulm (southern Germany), an area of strong growth and one of its main sites for air gas liquefaction. This represents an investment of around €60 million. In Portugal, Air Liquide is to increase its production capacity in order to meet growth in its markets. This investment of around €50 million will be made at Sines (150 km south of Lisbon) and comprises a unit that will produce liquefied air gases, as well as products in gaseous form for industries at the Sines site.

Guy Salzgeber, Vice-President European Industrial Business and member of the group's executive committee, said: "These investments in Western Europe allow us to support our customers' growing demand in these areas. These units benefit from the latest technologies in terms of the efficiency of electricity consumption and contribute to the group's global objective in this area. They are part of the €10 billion investment program for the period 2007-2011 that the group is implementing to accelerate its growth."

▶ www.airliquide.com

Specialty Chemicals

Considering five industry trends to keep ahead of the game

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SME's and Reach

Smaller companies face a disproportional impact from reach

Page 13

Reach

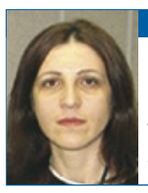
Managing reach: Proper communication is the key to success

Page 14

Integrated Catalyst Technologies

A Case Study of the Enantioselective Synthesis of an Integrin Antagonist

Catalysts – From the more traditional heterogeneous metal catalysts to the organometallic, organic, and bio-catalysts, the application of catalysis in the synthesis of fine chemicals and pharmaceuticals has witnessed a significant growth over the past decade. The continuous search for new, versatile and economical synthetic methods constitutes a major factor in driving innovative research in the area of catalysis from bench to full scale process development and consequently to market.



Gabriela A. Grasa
Johnson Matthey Catalysis and Chiral Technologies

From a process point of view, the integration of a catalytic step into a multi step synthesis has to take into consideration issues related both to the catalytic step and the overall synthetic route. Important factors include catalyst cost, activity, availability, stability and ease of handling, and any involvement of intellectual property (IP). When single enantiomers are desired, the substrate specificity and control of absolute stereochemistry become primary factors. Residual metal content in active pharmaceutical ingredients has to meet specification limits; therefore removal of metal contaminants is equally important, especially if the catalytic step is performed in the last synthetic sequences of the final molecule. The catalytic step often has to be integrated after the discovery route is established, and therefore it has to accommodate the upstream and downstream chemistries as well as multipurpose production equipment. It is often the case that the substrate cost, availability, and purity are important in determining whether a catalyst step will be considered for the production of the desired intermediate. Last, but not least, time is often a constraint, since development to market has to take place in a timely fashion.

Case Study Discussion

As a catalyst technology and catalyst process developer (fig. 1), Johnson Matthey collaborates with both academic research groups and industrial partners to promote innovative research for the development of safe, practical, and efficient catalytic processes. Collaboration projects with industrial partners are usually initiated through feasibility studies and initial optimization, followed by process development, cost modeling, technical process transfer to final specifications and catalyst supply agreement.

As a specific example, Johnson Matthey Catalysis and Chiral Technologies (JM CCT) has collaborated with Johnson&Johnson Pharmaceutical Research and Development (J&J PRD) on the practical synthesis of the $\alpha_V\beta_3/\alpha_V\beta_5$ integrin antagonist 1 (JnJ-26076713). Diastereoisomer 1 showed oral efficacy in eye disease models of angiogenesis and vascular permeability, a first for an $\alpha_V\beta_3$ integrin antagonist. The discovery route to 1 suffered from several drawbacks, the most notable one being the low recovery of product due to separation by two sequential chiral chromatographies, with three of the four diastereoisomers being discarded (J. Org. Chem. 2008, 73, 2302). The efficient preparation of the stereodefined unsaturated ester 5 by a Suzuki-Miyaura coupling enabled the exploration of multiple methods of catalytic asymmetric reduction. Initial evaluation at J&J PRD of catalytic chiral hydrosilylation of 5 revealed that the Buchwald conditions ($CuCl_2$ and (*R*)-Tol-BINAP ligand) delivered compound 4 in moderate isolated yield with excellent enantioselectivity (95% ee). Despite the high enantioselectivity, the requirement for high catalyst loading and low temperatures made this approach unpractical.

In order to support further profiling of this promising candidate, a collaboration between J&J PRD and JM CCT was initiated. The first steps were the set-up of a Confidentiality Agreement with clear IP resolution (the customer owns the process) and the preparation of a research proposal containing extensive chemistry and literature review, analysis of possible routes to the desired product with defined scope, milestones, and timelines.

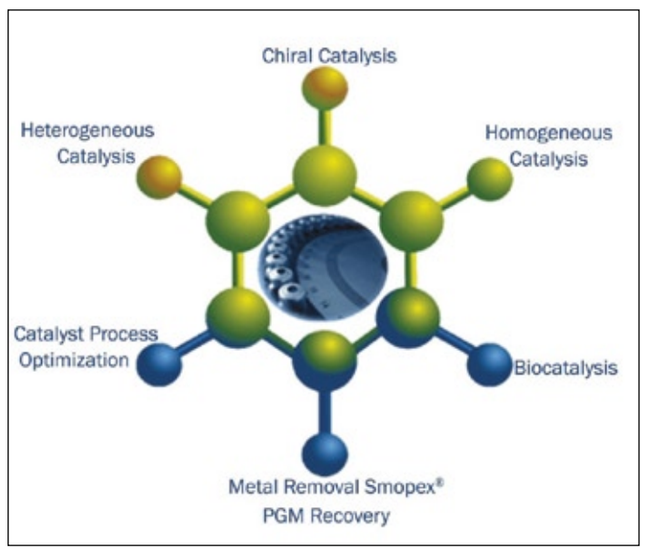


Fig. 1: Johnson Matthey integrated intelligence

The first part of the research collaboration concentrated on multiple approaches to the enantioselective synthesis of the desired enantiomer (S)-2 (Fig. 2). The problem was approached through fast identification of the optimal catalyst and selection of best reaction conditions using both ester 5 and acid 6 as substrates. Based on the current understanding of the factors that govern the activity and selectivity of the catalyst we expected, in fact, that different catalytic systems would have been required for the successful reduction of the two substrates. Generally, for proof of concept and catalyst identification, tests are run at relatively high catalyst loadings (substrate to catalyst molar ratio, S/C, of 50/1 to 100/1) and on small scale (25–100 mg substrate/reaction) using Biotage Endeavor parallel screening hydrogenation reactors. In this specific project, time constraints and substrate availability limited the number of tests that could be carried out and imposed early choices on the combinations of metal, ligand and reaction conditions that could be pursued for further optimization.

A structurally diverse selection of ligands in combination with different metal precursors was investigated (Fig. 3) in two parallel months of research focused on the hydrogenation of the unsaturated ester 5 and unsaturated acid 6.

In the case of unsaturated ester 5, while the well-established rhodium cationic hydrogenation catalysts gave limited activity and selectivity, enantioselectivities as high as 95% were achieved in the presence of neutral Me-BoPhoz rhodium and iridium catalysts. The application of these classes of catalysts to asymmetric hydrogenation was unprecedented. The use of coordinating counter-ions (chloride, acetylacetonate) and aprotic solvents was found to be crucial for achieving high enantioselectivity. Compound 3 (two diastereoisomers only), which features a reduced quinoline moiety, could be obtained either from 4 or directly from 5 by refining the reactivity of the BoPhoz-Ir catalyst with the addition of iodine while operating in an appropriate solvent (Tetrahedron: Asymmetry: 2008 19, 938). While highly enantioselective Ir- catalyzed asymmetric reduction of 2-substituted quinolines is well established, there are no previous examples of asymmetric reduction of 3-substituted quinolines. Unfortunately the strategy using ester 5 as the substrate was found to be of limited practical applicability due to the high catalyst loading required to achieve full conversion (S/C 100/1).

In the case of the unsaturated acid 6, a ruthenium-based catalyst prepared with the (*R*)-XylPhanePhos ligand and in the presence of acetic acid gave excellent conversions (>99%). Full conversion at low catalyst loading (S/C 1000/1) on multi-gram scale reactions (10 and 3 bar H_2) was achieved by careful optimization of the use of additives (acetic acid). The optimized procedure in the case of Ru-(*R*)-XylPhanePhos catalyst provided mild conditions, good volume-efficiency, and acceptable catalyst loadings and residual metal content. When combined with the ee upgrade procedure, it offered a practical procedure for preparing the key chiral intermediate 7. Again, during this study we found a catalyst system that had not been previously reported for the asymmetric hydrogenation of unsaturated acids (J. Org. Chem. 2008, 73, 2302).

With the hope that the chiral substrates 4 or 7 might assist the catalysis towards the desired diastereoisomer, attempts were made to reduce stereoselectively these compounds by using heterogeneous or homogenous hydrogenation catalysts. However, no diastereoselective bias towards the desired diastereoisomer (*S,S*)-2 was observed. Instead, compound 4 was converted to the mixture of diastereomers 3, which could be separated by chiral HPLC. In summary, while the use of homogeneous catalysis had not completely removed the need for chromatographic separation, we were able to cut by half the number of distereoisomers to be separated. In addition, it was demonstrated that the undesired diastereoisomer (*S,R*)-2 could be recycled to the quinoline 4 by controlled oxidation with 10% Pd/C and air. Then, the diastereomeric mixture 3 could be regenerated again, offering a practical means of generating (*S,S*)-2.

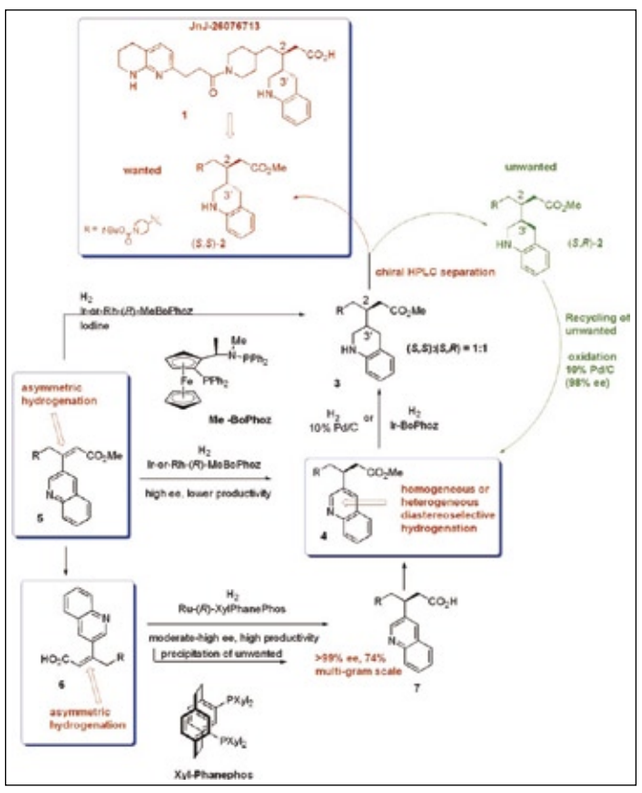


Fig. 2: Integrated catalyst technologies in the synthesis of JnJ-26076713

Conclusions

Fast feasibility studies of catalyst technologies on two different precursors aided the route selection, while catalyst process optimization led to a practical scale-up of an API using a Ru-(*R*)-XylPhanePhos catalyst system. The asymmetric hydrogenation of 3-substituted quinolines 4 and 7 proved challenging with the existing catalyst systems and further research into new catalytic systems for this transformation might be required. Nevertheless, the quinoline moiety could be reduced to an equal mixture of diastereomers. The yield was further improved through recycling of the undesired diastereoisomer to the desired one. These results demonstrate that fast, knowledge based- screening in conjunction with process optimization allows the identification of effective catalytic systems for each transformation. However, in order to continuously improve catalytic processes and find new applications, design of new ligands and catalyst technologies is still required.

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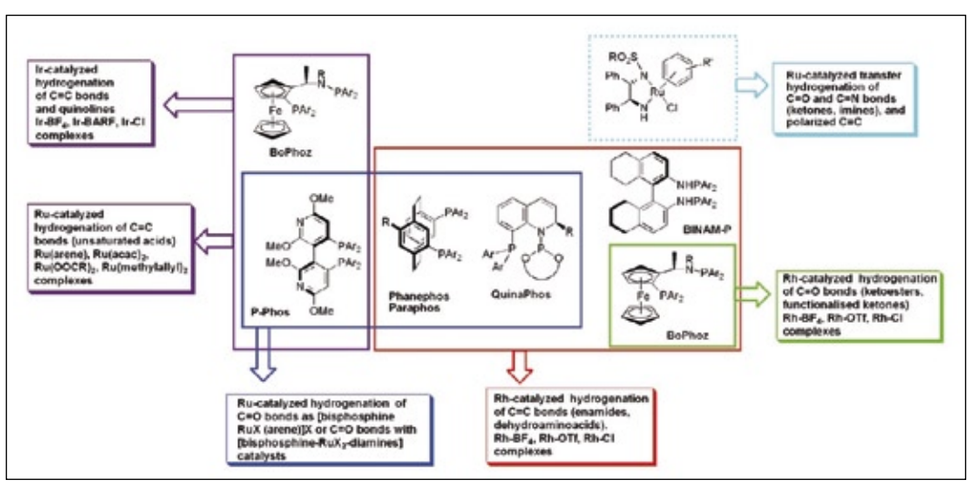

Fig. 3: Examples of families of chiral ligands used in initial screening

Principles Of Heterogeneous Catalysis

Part I: Steps in a Heterogeneous Catalytic Reaction, Definitions of Catalysis and Turnover

Catalysis – It is estimated that 90% of today's current chemical processes are based on catalytic chemical synthesis, thus, heterogeneous catalysis is very pervasive in modern day chemistry.

Heterogeneous catalysis is of vital importance to the world's economy, allowing us to convert raw materials into valuable chemicals and fuels in an economical, efficient, and environmentally benign manner. For example, heterogeneous catalysts have numerous industrial applications in the chemical, food, pharmaceutical, automobile and petrochemical industries*, and it has been estimated that 90% of all chemical processes use heterogeneous catalysts. Heterogeneous catalysis is also finding new applications in emerging areas such as fuel cells, green chemistry, nanotechnology, and biorefining/biotechnology. Indeed, continued research into heterogeneous catalysis is required to allow us to address increasingly complex environmental and energy issues facing our industrialized society.

Discussing the principles of heterogeneous catalysis is difficult, because catalysts are used for a wide range of applications, involving a rich range of surface chemistries. Moreover, the field of heterogeneous catalysis is highly interdisciplinary in nature, requiring the cooperation between chemists and physicists, between surface scientists and reaction engineers, between theorists and experimentalists, between spectroscopists and kineticists, and between materials scientists involved with catalyst synthesis and characterization. Furthermore, industrial catalysts are complex materials, with highly optimized chemical compositions, structures, morphologies, and pellet shapes; moreover, the physical and chemical characteristics of these materials may depend on hidden or unknown variables. Accordingly, principles of heterogeneous catalysis are typically formulated from studies of model catalysts in ideal reactors with simplified reactants under mild pressure conditions (e.g., 1 bar), rather than from catalytic performance data obtained with commercial catalysts in complex reactors using mixed feed streams under industrial reaction conditions. The principles derived from these more simplified studies advance the science of heterogeneous catalysis, and they guide the researcher, inventor, and innovator of new catalysts and catalytic processes.

Definitions of Catalysis and Turnover

The definition of a catalyst has been discussed many times. For example, a catalyst is a material that converts reactants into products, through a series of elementary steps, in which the catalyst participates while being regenerated to its original form at the end of each cycle during its lifetime. A catalyst changes the kinetics of the reaction, but does not change the thermodynamics. Another definition is that a catalyst is a substance that transforms reactants into products, through an uninterrupted and repeated cycle of elementary steps in which the catalyst participates while being regenerated to its original form at the end of each cycle during its lifetime.

The main advantage of using a heterogeneous catalyst is that, being a solid material, it is easy to separate from the gas and/or liquid reactants and products of the overall catalytic reaction. The heart of a heterogeneous catalyst involves the active sites (or active centers) at the surface of the solid. The catalyst is typically a high-surface area material (e.g., 10–1000 $m^2\ g^{-1}$), and it is usually desirable to maximize the number of active sites per reactor volume. Identifying the reaction intermediates – and hence the mechanism – for a heterogeneous catalytic reaction is often difficult, because many of these intermediates are difficult to detect using conventional methods (e.g., gas chromatography or mass spectrometry) because they do not desorb at significant rates from the surface of the catalyst (especially for gas-phase reactions).

Heterogeneous catalysts typically contain different types of surface sites, because crystalline solids exhibit crystalline anisotropy. Equilibrated single crystals expose different faces with different atomic structures so as to minimize total surface energy. It would be surprising, in fact, if different crystallographic planes exposing sites with different coordination environments possessed identical properties for chemisorption and catalytic reactions. Moreover, most catalytic solids are polycrystalline. Furthermore, in order to achieve high surface areas, most catalysts contain particles with sizes in the nanometer length scale. The surfaces of these nanoscopic particles contain sites associated with terraces, edges, kinks, and vacancies. If the catalyst contains more than one component (as is generally the case), the surface composition may be different from that of the bulk and differently so for each exposed crystallographic plane. Solids normally contain defects of electronic or atomic nature; in addition, they contain impurities which are either known or unknown in the bulk, but are mostly unknown at the surface. Finally, the surface atomic structure and composition may change with time-on-stream as the catalytic reaction proceeds. In short, it is normal to expect that a catalytic surface exposes a variety of surface sites, in contrast to displaying a single type of active site. Indeed, it is so normal today to expect such complexity that it seems surprising that, in 1925, when Taylor formulated his principle of active sites or active centers, the report created so much attention and remains one of the most often cited in heterogeneous catalysis. The relative importance of surface structure – as influenced by crystalline anisotropy, surface defects, and surface composition – underlines the difficulty of identifying the active sites, either simple or complex, that are responsible for turning over the catalytic cycle. The identification and counting of active sites in heterogeneous catalysis became the "Holy Grail" of heterogeneous catalysis in 1925, and the situation remains the same today.

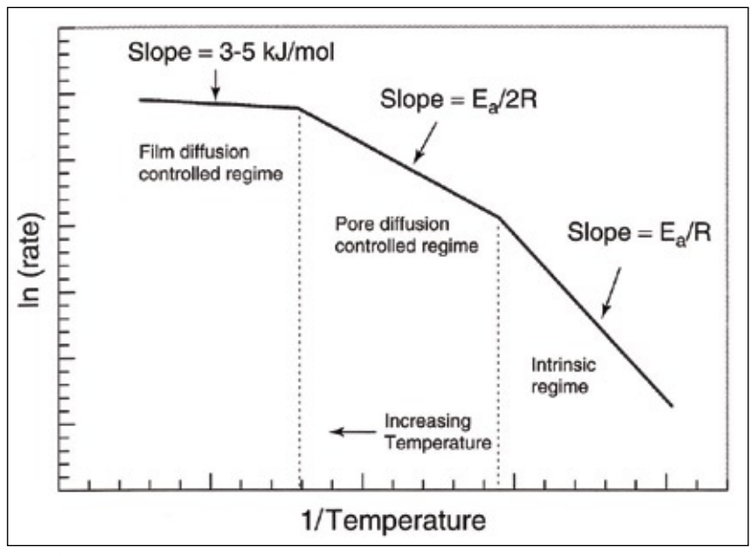

Figure 1: General effects of temperature on catalytic activity. The intrinsic activation energy is equal to E_a, and R is the gas constant.

(Photo: Süd-Chemie)

The activity of a catalyst is defined by the number of revolutions of the catalytic cycle per unit time, given in units of turnover rate (TOR) or turnover frequency (TOF). In cases where the rate is not uniform within the catalytic reactor or within the catalyst pellets, it is useful to report the rate as a site time yield (STY), defined as the overall rate of the catalytic reaction within the reactor normalized by the total number of active sites within the reactor, again in units of reciprocal time. Catalysis by solid materials has been observed quantitatively at temperatures as low as 78 K and as high as 1500 K; at pressures between 10^{-9} and 10^{3} bar; with reactants in the gas phase or in polar or non-polar solvents; with or without assistance of photons, radiation or electron transfer at electrodes; with pure metals as unreactive as gold and as reactive as sodium; with multicomponent and multiphase inorganic compounds and acidic organic polymers; and at STYs as low as $10^{-5}\ s^{-1}$ (one turnover per day) and as high as $10^{9}\ s^{-1}$ (gas kinetic collision rate at 10 bar). TOFs of commonly used heterogeneous catalysts are commonly on the order of one per second. The life of the catalyst can be defined as the number of turnovers observed before the catalyst ceases to operate at an acceptable rate. Clearly, this number must be larger than unity, otherwise the substance used is not a catalyst but a reagent. Catalyst life can either be short, as in catalytic cracking of oil, or very long, corresponding to as many as 10^{9} turnovers in ammonia synthesis.

Steps in a Heterogeneous Catalytic Reaction

During an overall catalytic reaction, the reactants and products undergo a series of steps over the catalyst, including:

- Diffusion of the reactants through a boundary layer surrounding the catalyst particle.
- Intraparticle diffusion of the reactants into the catalyst pores to the active sites.
- Adsorption of the reactants onto active sites.
- Surface reactions involving formation or conversion of various adsorbed intermediates, possibly including surface diffusion steps.
- Desorption of products from catalyst sites.
- Intraparticle diffusion of the products through the catalyst pores.
- Diffusion of the products across the boundary layer surrounding the catalyst particle.

Accordingly, different regimes of catalytic rate control can exist, including: (i) film diffusion control (Steps 1 and 7); (ii) pore diffusion control (Steps 2 and 6); and (iii) intrinsic reaction kinetics control (Steps 3 to 5) of catalyst performance. In addition to mass transfer effects, heat transfer effects can also occur in heterogeneous catalysis for highly exothermic or endothermic reactions (especially in combustion or steam reforming).

Figure 1 shows a general effect of temperature on the reaction rate for a heterogeneous catalyst. At low temperatures, diffusion through the film and pores is fast compared to rates of surface reactions, and the overall reaction rate is controlled by the intrinsic reaction kinetics. As the temperature is increased, the rates of surface reactions typically increase more rapidly than the rates of diffusion, and the overall rate of the catalytic process becomes controlled by intraparticle diffusion. The apparent activation energy in this regime is equal to the intrinsic activation energy divided by two. As the temperature is increased further, mass transfer through the external boundary layer becomes the controlling step. The onset of diffusion limited regimes can be altered by changing the reactor design, the catalyst pore structure, the catalyst particle size, and the distribution of the active sites in the catalyst particles. Values of various dimensionless groups can be calculated to estimate the extents to which transport phenomena may control catalytic performance for specific operating conditions; however, these calculations are most reliable for cases where the intrinsic reaction kinetics are known. In these cases, it is possible to make catalysts with structures designed to provide adequate rates of diffusion and yet offering high surfaces areas, leading to high rates of reaction per reactor volume, such as the design of specific pore size distributions (e.g., bi-modal distributions containing large pores leading to high accessibility of the active sites within the interior of the catalytic pellet, and small pores that branch from the larger pores leading to high surface areas), the formulation of unique pellet shapes (that lead to high accessibility of the active sites but do not cause large pressure drops through the catalytic reactor), and the synthesis of catalyst pellets containing a spatial distribution of the active material within the catalyst pellet. In some cases, transport effects can be used to improve the selectivity of a catalyst, such as in the case of shape-selective catalysis in zeolites. In the following sections, we focus on various factors controlling the intrinsic reaction kinetics of catalysts, and we refer the reader to other articles for further discussion on transport effects in heterogeneous catalysis.

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* References available on:
www.interscience.wiley.com/reference/hetcat

Part II (Desired Characteristics of a Catalyst) will be published in CHEManager Europe 9/2008 (Aug. 21).

Competence And Creativity

Evonik is Fully Integrated in Catalysis

Under One Roof – For more than 40 years, the Catalysts Business Line of Evonik Industries AG has been a leader in chemical catalysts, then and today customers all over the world rely on Evonik as a competent and trusted partner. Today, Evonik is fully integrated in catalysis as it has bundled all three disciplines under one roof: homogeneous and heterogeneous catalysis and biocatalysis. This not only makes Evonik unique, it gives the customers the flexibility to find the most efficient solution for their needs.

The Catalysts business line of Evonik produces globally at seven production sites. R&D centers are attached to five of them which provide technical services. The sales network spans even further by being represented at 14 sites.

The customers are served based on two fundamental business models: product business and project business.

Product Portfolio

The product business of Evonik is focused on homogeneous and heterogeneous catalysts. The homogeneous catalysts are used in CX coupling reactions, asymmetric hydrogenations and metathesis. In addition Evonik also offers Deloxan Metal Scavengers which are used for the removal of transition metal traces.

The Competence Centre Catalysis in Hanau/Germany

The product portfolio for heterogeneous catalysts comprises

- Activated Base Metal Catalysts
- Continuous Process Catalysts
- Olefin Polymerisation Catalysts
- Precious Metal Powder Catalysts

Important and integral parts of the product portfolio are technology platforms which provide customers solutions for specific catalytic processes.

Activated Base Metal Catalysts are inter alia often used in the hydrogenation of nitriles. An old problem is that secondary amines are formed as by-products instead of the desired primary ones. Evonik has solved this problem with a technology which is called "Nickel Ensemble Control". The surface of the Activated Base Metal Catalyst is modified in such way that small Nickel ensembles are located on top. These ensembles are so small that only the primary amine is formed. This technology is applied particularly in the manufacture of Vitamin B1 (hydrogenation of pynitrile) and of fatty amines.

Precious Metal Powder Catalysts are used in the hydrogenation of dinitrotuoluene (DNT) to toluenediamine (TDA). In a consecutive step TDA is reacted with phosgene to toluenediisocyanate (TDI) which is used as a component for polyurethanes. Crucial for customers are catalysts which produce few tars as by-products, show a long activity profile and can be filtered easily. Evonik offers a set of highly specialised Precious Metal Powder Catalysts based on carbon black and activated carbon for this particular application.

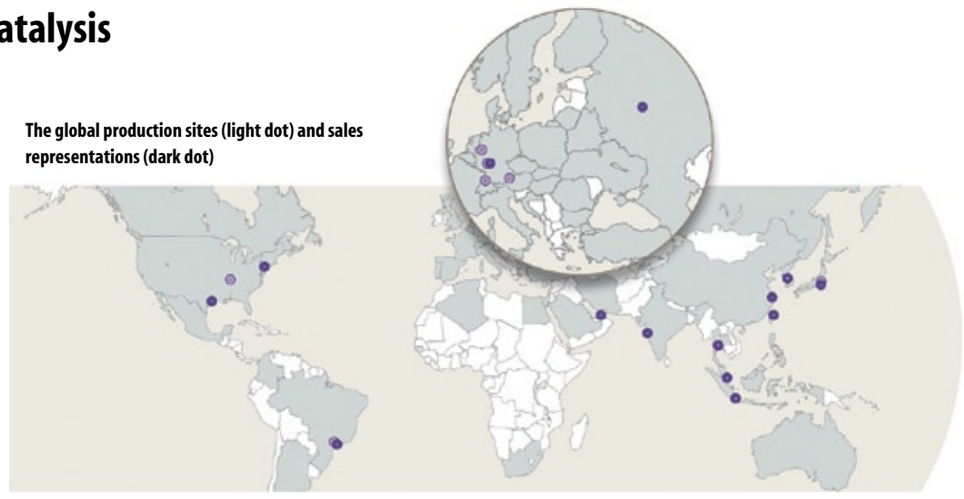
Basis for the production of polyvinylchloride (PVC) is the manufacture of the monomer vinylchloride (VCM). In the respective process hydrochloric acid (HCl) is kept in a cycle which contains also ethylene and acetylene. Noblyst E 39 H and Noblyst E 39 KHL are tailor made fixed bed catalysts for this process which selectively hydrogenate acetylene to ethylene. These systems are characterised by high selectivity and a lifetime of up to nine years.

Project Business

In the project business the Catalysts business line of Evonik has developed four models, with which to run projects with customers: Toll Manufacturing, Custom Manufacturing, Custom Design and Joint Development. Characteristic for projects is the 1:1 relationship between the customer and Evonik. Secrecy and collaboration agreements form the legal framework.

In toll manufacturing projects the catalyst composition, its manufacturing process and the process where the catalyst is applied are well defined and elaborated. Evonik transfers the catalyst production to their site and produces the catalyst according to the specification.

In custom manufacturing projects a lab recipe of a new catalyst exists, but the catalyst has not been produced on commercial scale yet. Evonik transforms the lab recipe into a procedure which can be applied in a commercial catalyst plant. Sometimes modifications of the recipe are necessary to make it work. Once this is achieved, Evonik produces the catalyst according to your specification.



The global production sites (light dot) and sales representations (dark dot)

In custom design projects a new catalyst needs to be developed for an existing commercial application. Evonik develop this catalyst using their know-how and catalyst expertise. Typically, the starting point is an Evonik catalyst technology which is systematically modified leading to an optimised catalyst. The large catalyst libraries, the high throughput preparation and screening equipment are leveraged where this is applicable. The testing and qualification of the catalysts happens both at the customer and at Evonik. The result of the project is a catalyst tailored for a specific application. Once the lab recipe is elaborated, the catalyst is scaled up and taken to commercial production.

Finally, in joint development projects a new catalyst needs to be developed, but in contrast to custom design projects the process in which the catalyst is used may not be finally developed. This business model is characterised by the most intense interaction between the customer and Evonik. In joint development projects one will find all components of custom design projects, but enriched by more degrees of freedom in the process where the catalyst is applied.

Our Core Competences

In all business models, Evonik leverage their core competences such as creativity in finding new solutions and openness to ideas which are not obvious. Their specialization of the Catalysts business line in catalysis, in scale-up and production of sophisticated catalysts on commercial scale. Crucial to all catalysts is a robust and stable production process. The best catalyst in the laboratory is of no use if you can't get it in commercial quantities. Self-renewal leads to a permanent improvement of our products and business processes. Catalysts are at the very heart of catalytic chemical processes. This is the reason why a trustworthy and reliable partner is so important.

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Focus On Specialty Chemicals

Solutions & Innovations

Industry Trends – Specialty chemicals companies have to think quick in order to keep ahead of the game. Innovation is key.

Trend 1: The Field of Specialty Chemicals is Changing Faster than Ever

The specialty and fine chemical sector is characterized by individual companies and submarkets that are sometimes small, and by the high importance of services – which is continuing to increase. The wide variety of products and breadth of application areas for specialty chemicals require a great number and diversity of companies from large operations down to small specialists. At the moment, we are seeing a segmentation of the large companies parallel to a consolidation of small and medium-sized companies. At the same time as the large companies are reducing the diversity of the business, they are also acquiring suitable specialists. Thus, Altana has had a systematic process in place for some time to analyze possible takeover targets, whereby the cornerstone for this was already laid at the beginning of 2003. The subsequent restructuring led to the acquisition of the pigment manufacturer Eckart. Currently Altana operates four divisions: additives for paints and plastics (BYK-Chemie), pigments (Eckart), coatings and sealants for packaging (Actega), as well as sheet metals and wire insulations (Elantas). An exit was made from the pharmaceutical business. In addition, Altana continues to state its interest publicly in additional – suitable – acquisition targets. Private equity companies support this process. Companies such as Advent, which have established a core in specialty chemicals with Oxea and HC Starck, will expand in this area. Momentive Performance Materials is one example that shows the path of consolidation which has been taken in this area. Due to the environment described, the specialty chemicals sector in Germany is particularly affected by radical change processes – which, however, can be mastered. The players react to the wave of consolidation by reducing locations and headcount on one hand and with growth initiatives involving acquisitions and product diversification on the other. Here German companies have shown themselves to be extremely active in the movement into these locations.

Trend 2: Globalization – a 'never-ending story'

Chinese and Indian manufacturers have caught up. In the meantime they have been increasingly successful at mastering quality even in technically complex jobs. They have domestic markets with enormous potential and are growing accordingly. As a result, China is making conscious efforts to promote further development in specialty chemicals technology, for example. At the same time, the rising price of oil has increased the importance and capacity for action of the oil exporting nations in the Middle East. Manufacturers in these countries are also expanding (for example, SABIC). All these producers will look for lucrative niches in the developed countries and invest there, buying respective companies. This change is supported by the fact that there are also "overflowing" coffers in these countries, some of them government funds that want to put their money in attractive investments in the western world. Currently there is also the additional fact that the general conditions on the financial markets make it increasingly difficult for western private equity companies to invest in these markets.

At the same time, the western companies recognize the increasing importance and potential of the growing markets in these emerging nations. Thus the large European and American manufacturers of specialty chemicals depend on the PRC and corresponding locations as places of production – the race for the best locations has been going at full speed for a long time now. The international market leader BASF intends to place 20 to 25% of its investment volume in Asia in the coming years to assert its leading competitive position. This trend toward globalization will continue for the next five to ten years.

Trend 3: Solutions are in Demand Rather than Just Products

The trend toward innovative solutions can be seen clearly in the example of the leader in the sector, BASF. The announcement in December 2007 that the BASF product range was being expanded to include the chemical intermediate product tetrahydrofuran (THF) for clients in Europe shows this.

As part of this offer, BASF takes back the used THF upon delivery of fresh product. In this way the company reduces complexity for the customer and creates added value for both business partners. BASF facilitates further simplification of customer logistics with the option of collaboration based on a vendor-managed inventory (VMI) system. As part of the VMI system the company monitors the tank level at the customer site and ensures timely pickup of the used product.

Evonik-Degussa is also in the midst of a fundamental restructuring process which is exemplary for German specialty chemical companies. In this regard, the company is pursuing a strategy to turn itself into a provider of solutions in the area of pigments. Here the driving force behind the change is clearly the paradigm change which is determined in the industry, in particular by short product life cycles and competition from the Far East. Another example for the company is in the area of batteries. Previously the company supplied only the materials for manufacturing the batteries. Now Evonik-Degussa produces not only the separators but also the anodes and cathodes for the actual cell manufacturers. Similar things are taking place in photovoltaics (nanotronics) and with RFID tags.

Trend 4: Innovation is the Key to Success

An important key to success given the changes cited in the market environment is a high rate of innovation. Thus, Evonik Industries AG has improved innovation through systematic optimization of the processes in the R&D sector. To do this the company created the European Science-to-Business Award, an innovation prize at the European level aimed at top research talent who can already show outstanding results at a research institution in Europe. With the award the company is pursuing the goal of also intensifying the connection between research at university level and in practice. Top graduates and experts from universities work together with the relevant R&D personnel from client industries in science-to-business centers where products are taken from the research stage to series-production readiness in an average of five years.

The corporate group intends to expand its leading position in specialty chemicals with innovative key technologies and capture of new growth markets. Organizational elements support this approach. For example, Evonik-Degussa has established so-called "project houses", research groups for a period of about three years, in which 20-30 scientists at one location concentrate on building an innovation portfolio. As part of this effort, the company expects clear recommendations from its houses on which product group must be the target of investment and what research efforts must be undertaken. That means that the researchers in this company think beyond pure research matters and also consider market factors, because at Evonik-Degussa the view has become established that research is faster and more efficient if the customer is involved in the process. In hiring for R&D as well, candidates are preferred who demonstrate entrepreneurial thinking and communication skills, persuasive argumentation and a feel for teamwork and project work.

Furthermore, there is also a need to organize research in the global sense. Here the situation is a very mixed one. BASF maintains research centers throughout the world, each with specific technological priorities. In China, however, there is still no commitment to basic research. Evonik-Degussa carries on development activities in India and China, and Altana has already established entire units in China which develop their own solutions with customers, independently of the European operations.

Trend 5: Operational Excellence – a Perennial Topic

Due to these general conditions, along with innovating and developing new business segments, companies must not only continuously monitor costs but repeatedly optimize them as well. Therefore, operational excellence will continue to be a topic in the future. This requires flexibility on the part of employees to cope with these changes. It is also a challenge to companies to support employees in this process.

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Chemical Distribution in the CEE Countries

Challenges for Medium-sized Companies in Central and Eastern Europe

EU Goes East – the geographical expansion brings a lot of opportunities: from the historical chance of a peaceful unification after many years of conflict and war to the economic effects in both directions.

Dr. Bernd Soyke
Managing Director,
Penta Chemikalien

At first glance, one might identify a variety of benefits for the new member countries. However, a more in-depth consideration reveals that there are a great many opportunities and challenges for Western entrepreneurs as well. At Penta, the worldwide largest network of independent chemical distributors, we have achieved broad experience in converting these opportunities into economic success.

Attractiveness of CEE Markets for Chemical Distribution

According to the FECC statistics for 2006, the market volume of chemical distribution in CEE has reached a volume of 720 million Euro. Although this is only a small portion compared to the entire European distribution market of approximately €30 billion, this region has arrested the attention of chemical distribution companies of virtually every size and strategic position. So why is CEE so interesting for entrepreneurs?

The answer lies on the one hand in the high growth rate of chemical product turnover. The relevant average growth rate for the new EU-10-members, those ten countries who joined the EU in 2004, was 8.5% between 1995 and 2005. This rate is nearly twice as high compared to the "old" EU-15 countries.

On the other hand, these CEE countries have a high potential for continuing strong growth with respect to their population, industrial development and business environment.

If we compare the key factors of the "old" EU-15 and the CEE countries, it is clear why CEE is rated as a highly attractive region for chemical distribution companies (Table 1.).

Although still a small regional market, the CEE countries are also of great interest to chemical distribution enterprises as a result of the huge growth potential in combination with important side factors.

Market Entry Strategies

In order to initiate business in these countries there are 3 basic alternatives. Alterations, mixtures etc. are also conceivable and can be seen as variations of these basic strategies.

Alternative 1: Start from Scratch

The advantage here is a fast implementation of one's own company philosophy and the 100% control of the business. Furthermore, investments can be limited according to needs and long-term strategy. On the other side, one starts as an unknown player with no reputation in the market and a relatively high entrepreneurial risk at the onset.

Alternative 2: Form a Joint Venture (JV)

One can join a running business with a reduced percentage of risk. In this case, the grade of investment would be adjustable to one's own capacities. The entrepreneurial risk is very much reduced compared to the first alternative. However, one must depend on the joint-venture partner and has only limited control over the business policy. It is also a fact that the number of qualified JV partners in CEE countries is limited and must be selected carefully – a process which, in most cases, can be extremely time-consuming.

Alternative 3: Takeover of an Operating Company

This way one could immediately manage a running business and have full control. The main disadvantage would be the high investments. Additionally, there is a latent risk of non-acceptance of the new owner's policy. It should also be mentioned that in CEE countries we only see a limited number of qualified companies for sale.

According to medium-sized chemical distributors the evaluation of the above mentioned alternatives gives the following picture:

Alternative 1: moderate risk with moderate investments, but effects must be seen on a mid or long term basis.

Alternative 2: calculable risk with an adjustable investment grade; accurate evaluation of the JV partners is a must.

Alternative 3: immediate market entry, but paid with a high utilization of internal resources.

In most of the cases, the companies which form the Penta network prefer to work with the first two alternatives. Their success in the CEE countries clearly show that this way is also feasible for medium-sized chemical distributors.

PRO	CONTRA
Limited investment, according to needs	Unkown player with no reputation in the market
Fast implementation of own company policy/culture	First years with high entrepreneurial risk
100% control of the business	

Pros and Cons of alternative 1.

PRO	CONTRA
Join a running business	High dependence on the JV partner
Grade of investment adjustable according to own capacities	Limited control over the business policy
Reduced entrepreneurial risk	Limited number of qualified JV partners

Pros and Cons of alternative 2.

PRO	CONTRA
Manage a running business	High investments
Full control on the company	Risk of non-acceptance of the new owner´s policy
	Limited number of qualified companies for sale

Pros and Cons of alternative 3.

	EU-15	CEE
Economy	Slow	Fast
Customers	De-investments	New
Distribution	Consolidated markets	New
Producers	Defined distribution	Looking for new partners
Workforce	Specialists available, but expensive	Few specialists, but moderate
Business environment	High costs and taxes long, approval delays	Lower costs and taxes

Outlook

We expect that growth rates will continue to be higher than in Western Europe and competition will increase further. It can also be perceived that in some, more developed markets shakeouts have already started. With a view to the economic environment, it is expected that an increase of costs will compromise profitability in addition to the increasing lack of well-trained workforces. Furthermore, the adaptation of EU law will increase administrative expenses and costs.

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Sanofi, PPF: Competing Bids for Zentiva

Czech financial group PPF launched a 950-crowns-per-share voluntary takeover bid for generic drugs maker Zentiva while leaving room open to raise the offer. PPF announced its intention last month, which has since sent shares up 10%. Insurance joint venture General PPF Holding, together with PPF, holds a 19.2% stake in Zentiva, while French company Sanofi-Aventis is Zentiva's largest shareholder with a 24.9% stake.

One day after PPF's offer, Sanofi-Aventis said it intends to make a 1,050 crowns-per-share competing cash bid. The Sanofi-Aventis bid values Zentiva at 40.043 billion crowns, or €1.655 billion, representing €1.24 billion for the 75% of the Czech company it does not already own. Zentiva said in a statement that its board will review the announcement and issue a full response once details of the Sanofi-Aventis bid are published.

"In the meantime, shareholders are advised not to take any action in regards to the intended competing offer or the offer recently made by (PPF subsidiary) Anthiarose Limited," Zentiva's statement said. Zentiva management holds a 5.9% stake in the company.

"Sanofi-Aventis is already established in the various markets where Zentiva operates. The intended acquisition of the control of Zentiva carries a strong strategic rationale," the French pharmaceutical company said earlier. Sanofi said the offer price represents a 14.6% premium to Zentiva's April 30, 2008, closing price of 916 crowns, the day before PPF announced its planned cash offer for Zentiva. The offer price represents a 10.5% premium to PPF's offer price. A Sanofi spokesman later told Reuters that the company plans to finance the acquisition using its cash flow and sees the deal as being earnings accretive in the first year of integration. Analysts said they did not expect PPF to raise its bid, although they suggested Sanofi might have to sweeten its offer to convince other Zentiva shareholders and ward off competitors. "There comes a price when it would be less attractive," said ABN Amro's analyst Michael Leacock. But Zentiva is "running well in a market that's rising fast, so I can see why there might be some competition for the asset. It would make sense for Sanofi to pursue it rigorously," he argued. Analysts said the deal would be moderately accretive for Sanofi but did not see it as a major strategic deal. The Zentiva deal would be "a sideshow, it won't change the dynamic" of Sanofi, which has been more focused on solving problems such as patent expirations, Leacock said. Brokers agreed that Sanofi's hand had been forced by PPF's bid. PPF has said it wants to take a more active role in the group, however at a shareholders meeting earlier this month, an appointment of a General PPF representative was voted down.

► www.sanofi-aventis.com
www.zentiva.cz

Small is Beautiful – And Vulnerable

Can Europe's Smaller Firms Survive the Impact of Reach?

SMEs And Reach – Outside the world of mobile phone handsets, it seems that small is no longer beautiful. Smaller firms, which make up 97 % of Europe's chemical sector, face a disproportional impact from Reach.

Melvyn Whyte
Refac

The new legislation is complex, highly bureaucratic and has major cost implications for business, but particularly for smaller firms without the financial, administrative or technical resources to cope easily with Reach compliance.

Cost Impact

The industry has consistently expressed its concerns about the overall cost of Reach. Its direct costs – the registration and testing fees – impose a daunting financial burden on smaller firms. The registration fees proposed by the new European Chemicals Agency (Echa) have recently been finalized. They were always excessive in principle and will shortly become excessive in practice. The Echa has been granted monopoly powers in terms of its regulatory authority – including the power to impose charges on industry which have little or no relationship to the actual costs of operating the agency.

In December last year, the European Chemical Industry Council (Cefic) said that the proposed fees would result in "excessive revenue for the Echa and an overcharging of industry" and would result in "a lack of trust in the operation of the agency and the legitimacy of its fee structure." However, there is little chance now of the European Commission suddenly realizing that it has made a big mistake. The Reach fees are here to stay and only time will tell the extent to which extent they will inflict lasting damage on the competitiveness of the European chemical sector.

Reach also has a major impact on smaller firms in terms of the administrative burden it imposes. It is the inevitable consequence of the European Commission creating such a bureaucratic regulatory system and makes nonsense of the efforts of many national governments to ease the overall regulatory burden on business. Of course, the real administrative cost will only become apparent once the compliance process actually gets underway.

Reach Awareness

The level of Reach awareness amongst smaller firms is very poor. A recent UK government-sponsored survey reveals a worrying level of understanding by smaller firms – and particularly by downstream chemical users. This situation will not just be confined to the UK and is probably replicated in other member states. With the pre-registration window which opened on June 1 and which is only lasting six months, the time available to increase the awareness of Reach and the compliance process involved is running out.

Fee Discounts

Announcing the scale of fees on April 16, 2008, the Commission made what is, no doubt, considered to be a major concession for SMEs. Günter Verheugen, its Vice-President, said, "with significant reductions of 90 % for smaller companies we ensure that they continue to be competitive." In fact, there are three-tiers of discounts. On the face of it, they appear generous but, in practice, they are of limited benefit to small and micro-businesses because of the low thresholds for annual turnover and balance sheet total.

The definitions of medium, small and micro businesses

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along with the annual turnover and balance sheet thresholds were first announced in May 2003. In the five years since these thresholds were originally set, chemicals have been subject to a period of significant price inflation. For many companies, this has resulted in sharply increasing levels of annual sales. This means that – today – only a very few firms will qualify for the 60 % and 90 % discounts because their turnover will exceed the small and micro thresholds. As an example, only 8 % of the member companies in the UK's Chemical Business Association (CBA) now qualify as micro businesses under the Commission's definition – whilst, in 2005, the percentage qualifying was 34 %.

The European Commission must have realized that basing discounts on thresholds that are five years old would – from the outset – only serve to exclude many of the businesses it intended to help. Similarly, it is surprising that the Commission apparently did not realize that, in future years, the effects of chemical price inflation would only serve to exclude many more businesses.

One way to remedy this situation would be for the Commission to adjust the turnover and balance sheet thresholds for chemical inflation. A retrospective adjustment (from 2003) would at least ensure that the thresholds represented today's values. If this principle is accepted, then the Commission should also commit itself to a further adjustment of the thresholds for chemical inflation on an annual basis throughout the Reach implementation period (to 2018).

Reach Compliance

By common consent, Reach is both complex and bureaucratic. It is the very scale and complexity of the legislation that provides major problems for SMEs. Many companies are only now coming to terms with Reach and only a few have fully grasped what Reach implementation really means in terms of financial and administrative resources. Whether we like it or not, Reach is here to stay so it is up to the industry to make it work and, whilst we are doing so, we have to ensure our businesses remain profitable.

It is nevertheless interesting to consider the approach being adopted by the Environmental Protection Agency (EPA) in the U.S. Instead of applying the precautionary principle the EPA's system, known as Champ, takes a risk-based approach which is a great deal simpler than Reach – and many would say it is more effective in protecting human health and the environment. If Champ gains support in other regions of the world, the European Commission's bid to set the standard for the global regulation of the chemical industry is likely to fail.

The first stage in Reach compliance – pre-registration – appears straightforward enough. Pre-registration allows companies to continue to manufacture or import substances for several years until their registration deadline is reached. Failure to pre-register means companies will have to suspend their activities involving the substances concerned and register them for Reach purposes right away.

But pre-registration is much more than a relatively simple bureaucratic exercise – it also has strategic implications. SMEs need to consider whether they need to pre-register a substance in order to secure its continued presence on the European market. Some non-European producers, for example, may decide for commercial reasons to stop supplying a substance. Similarly, European producers may stop supporting a substance for commercial reasons and withdraw it from the market.

It is also appropriate, at the pre-registration stage, to consider the relevant tonnage band for a substance. It will be possible to establish multiple registrations using different legal entities in order to achieve a lower tonnage band. The data requirements for substances in the higher tonnage are more onerous and will involve significantly increased costs.

SIEFs And Data Sharing

The next stage is the Substance Information Exchange Forum (SIEF). Echa will publish a list of all pre-registered substances on its website in January 2009. This will help companies identify others with an interest in registering the same substance for the purposes of sharing test data as well as negotiating the costs of generating new data.

The major problems within SIEFs will relate to the ownership of the test data, the costs that will be imposed for its use, and how the costs of generating any new data will be shared. The Reach guidance rules are vague in relation to how these costs are being shared and there is already evidence of holders of current test data demanding very large and in some cases retrospective payments for its use by other companies with an interest in the same substance.

How Will SMEs Cope?

Many SMEs will turn to external sources of help to achieve Reach compliance. Limited free help will be available from Echa in Helsinki and from the help desks of the national competent authorities – but they will only handle issues of conformity and compliance, not individual company problems. Many consultancy firms see Reach as an opportunity to generate significant fee incomes. But SMEs should beware – many of these consultancies have little or no experience either of the industry or of regulatory affairs.

Reach represents the most significant change in the industry's regulatory framework for a generation. Its scale, complexity and cost represent a major challenge for Europe's SMEs – both in strategic and regulatory terms. SMEs must focus on two key issues: protecting their product portfolio for the future and finding the most cost-effective route to Reach compliance.

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Reach Operations Begin

And Europe is Asking if We are Ready

Step-by-Step – It was yesterday when we were talking about Reach coming into force. Today we are right in the middle. But are we prepared for the challenges we are facing?

Petteri Mäkelä
European Chemicals Agency (ECHA)

The European Chemicals Agency (ECHA) is responsible for managing the registration process and it is one of the contact points in addition to the national Reach helpdesks for those seeking help. What we should keep in mind while talking about Reach.

Know Your Substances

A basic requirement for companies under the Reach regulation is that they have to know their substances and register them. Pre-registration applies to most chemicals which are currently on the market in the European Union. It involves substances individually, in formulated products (preparations), and also in finished products from which the chemicals may be intentionally released under normal conditions of use. The one tonne threshold applies to all these cases. The pre-registration allows companies to benefit from the staggered registration deadlines of 2010, 2013 or 2018.

If companies do not pre-register a chemical, they should not continue manufacturing or importing it after June 1, 2008 until they have registered it with ECHA and paid the appropriate registration fee.

Pre-registration Is Easy

Pre-registration information consists of the substance identifiers (EINECS and CAS numbers and names), company information, anticipated registration deadline, tonnage band and an indication of related substances that could potentially aid in the assessment of the substance. Unlike registration, pre-registration is free of charge.

Companies must submit their pre-registrations electronically to the ECHA via the Reach-IT portal on the ECHA website. A file can be prepared for submission either online using the Reach-IT system, by compiling the required information using an IT tool called IUCLID 5, or using other IT tools that can generate XML files. Files from IUCLID 5 or third party applications are then imported into Reach-IT in XML format specified by ECHA on its web site.

Next Steps: SIEF and Registration

The agency will publish a list of pre-registered substances by Jan. 1, 2009. Once the agency has published this list, companies will begin to form Substance Information Exchange Forums (SIEF). The purpose of a SIEF is to allow companies to share and assess data and information on the same substance, and to prepare the common parts of a registration dossier (joint submission). Participation in a SIEF allows companies to reduce costs and the need for testing, especially on vertebrate animals.

After the lead registrant has submitted the joint submission, each company in a SIEF will submit their own registration containing the company-specific information and a reference to the joint submission. Each company will also pay their own registration fee.

Fees Under Reach

The fees that will be charged for registration, evaluation and authorisation procedures were adopted by the Commission in mid April and published in the Official Journal (L 107) on April 17.

The level of the fees for registration varies according to the tonnage. The basic registration fee will range from €1,600 for substances produced in volumes below ten tonnes, to €31,000 for those above 1,000 tonnes. There will be up to 90 % discounts for smaller firms and 25 % reduction for firms that cooperate together on registrations. The fees are payable to ECHA.

A lower registration fee has been fixed for the registration of intermediates because the associated workload for the agency will be much lower than for the other registration dossiers. The fee revenue will partially finance the operations of ECHA, with the remaining finance coming from a Community subsidy. The fees will be reviewed by 2013 at the latest.

What is ECHA's Role in Pre-registration?

ECHA has published guidelines and tools for the industry on its multilingual website, and its helpdesk is assisting companies in doing pre-registration online. The agency is also responsible for the management of the Reach-IT portal – the only channel for submitting pre-registrations to ECHA.

The main source of information on Reach is the agency's website, which contains a specific section for pre-registration. The agency will also actively disseminate information through workshops, Member State and industry networks, and media activities.

Europe Has A Goal

One of the important aims of Reach is to enhance downstream industries knowledge about the chemicals they use. Another is to increase the flow of information from users to suppliers so that appropriate safety assessments can be carried out by manufacturers and importers. The resulting improved knowledge in the supply chain should ensure safer use of chemicals and lead to improved human health as well as to better protection of the environment.

The objectives of Reach will be achieved over time as chemicals have been registered, safety assessments for their identified uses have been carried out, and the information generated has been cascaded down the supply chain.

It is also worth remembering that Reach is levelling the requirements for new and existing chemicals and requiring a registration only at one tonnes level compared to notification requirement previously at 10kg for new substances. This is expected to encourage innovation in chemicals industry.

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Managing The Reach Risks

Proper Communication is the Key to Success

Reach Regulation – The new regulation brings chemical supply chain communication into a new era. Different questions apply to different stages in the supply chain.

45 % of the chemical companies believe they would need to renegotiate or alter their supplier contracts. (Photo: BASF)

While seeking answers to these questions companies are also searching for information on market conditions, information which is crucial to everyone's future. Holding on to confidential business information and being aware of changes in the markets are the keys to success in Reach-valid chemical business. The importance of complying with EU legislation on competition should also not be forgotten.

In the Reach era chemical manufacturers, importers and downstream users are required to provide and exchange far more information about chemical use and safety than in the past. With the increasing complexity of global inter-corporate networks, holding on to confidential business information also requires particular attention.

Emphasis should be placed on data security and dependable communications, as data ending up in the wrong hands could have far-reaching consequences for a company and its ability to compete. Of equal or perhaps even greater seriousness are the consequences for a company involved in these activities falling foul of EU competition legislation.

Mere fulfillment of statutory obligations will not, therefore, be enough for success with Reach. An essential part of the new era in the chemical business will be preparation for taking care of confidential business information, intellectual property rights and EU competition legislation.

Their significance will be highlighted by the fact that Reach legislation introduces noticeably more extensive obligations with regard to communications between companies. Dependable, traceable and controllable communications both in supply chains and in information exchange forums is the essential factor in management of the Reach concept.

Reach Communication and Competition Law

While preparing Reach Data Sharing guidelines (RIP 3.4) particular attention was drawn to the relationship between competition law and Reach regulation. The question is not merely one of minor details in a convoluted Reach colossus, but of a matter which will decide the future of many companies.

Perhaps for this reason the compilers of the data sharing guidelines concluded by placing separate emphasis on the fact that "Reach actors should always ensure that their activities comply with EC competition law irrespective of the form of cooperation they choose." Although the guidelines contain a list of examples of those items which at least should not be handled with regard to information exchange, experience of RIP 3.4 is not in itself sufficient for fulfilling the requirements of competition law in a changing chemical market. Top experts in jurisprudence familiar with the case have also urged for particular attention be accorded to this fact.

"SIEF communications are exchanges of information among competitors. As such, the SIEF participants must ensure that these exchanges do not create any issues from a competition law perspective, and in particular that they do not serve as means to coordinate prices or market behavior," states Ruxandra Cana, a Reach lawyer familiar with competition law, from Attorneys-at-Law Field Fisher Waterhouse.

The same applies to communications in the supply chain if participating companies are in competition with each other.

"Companies should keep in mind that often their suppliers or customers may also be competitors. In these cases, communications that would for example disclose specific quantities, territories or market strategies are very sensitive from a competition law perspective and should be avoided."

In those cases communication, according to Ms Cana, should be reduced to a minimum, made anonymous and in aggregate form as far as possible.

How To keep CBI?

While Reach obliges chemical manufacturers, importers and downstream users to increase mutual communication, it is also in every company's interest to glean information on their competitors' operations. Particular attention should be paid to maintaining the confidentiality of business information in connection with communications within the supply chain and information exchange forums, as it may be difficult to avoid its transfer into the wrong hands without the appropriate preventative measures. Serious difficulties will result if game rules for information exchange forums or within a consortium are not laid down with precision, and any discussions held cannot subsequently be traced with accuracy.

Communication in information exchange forums or the supply chain is extremely problematic without tailor-made instruments, and without dependable data storage it may subsequently reveal itself as fruitless, or entirely contrary to law and, furthermore, expensive.

"The importance of safe and secure information exchange instruments cannot be overstated: the penalties imposed for non-compliance with competition law may reach 10 % of a company's worldwide turnover. In addition, companies may be exposed to damage claims made by parties who suffer losses caused by anti-competitive behavior, and any such action would damage companies' reputation and brand name," Ruxandra Cana points out.

The significance of the traceability and infallibility of communication is also emphasized in separate provision on data storage contained in the regulation. Here it is required that "each manufacturer, importer, downstream user and distributor shall assemble and keep available all the information he requires to carry out his duties under this Regulation for a period of at least 10 years after he last manufactured, imported, supplied or used the substance or preparation."

Communication – the Key to Success

With the approach of pre-registration many questions about Reach remain to be answered. It is nevertheless clear that the regulation will stir the chemical supply chain in one way or another. Of the companies interviewed in the PricewaterhouseCooper survey in the spring of this year, 45 % believed they would need to renegotiate or alter their supplier contracts. However it should be clear that Reach will influence the supply chains of every company to some extent.

The key to success in the Reach era is efficient and appropriate communication with suppliers and customers. It is evident that companies should begin preparation for registration and the permit procedure in good time, exploit all possible sources of information and act in fluent cooperation with each other. With less than 200 days before the end of pre-registration, emphasis should be placed without delay on efforts to ensure at least the availability of all critical raw materials.

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Reachlink Ready For Pre-registration

Anticipating the next important step of Reach, Cefic's new subsidiary Reachlink is launching an IT platform supporting the creation and management of the substance information exchange forums (SIEF). "We cannot afford to miss this unique opportunity to restore public confidence in chemicals. Therefore we rely on a successful implementation of Reach and we will contribute to making the system deliver," says Lena Perenius, executive director responsible at Cefic for chemicals legislation and Reach implementation. Over two years hundreds of company managers have been trained by Cefic and the Reach Centrum, which was established in June 2006, on Reach and its implications for every business units in the companies.

▶ www.cefic.org

Threat to Reach

The former U.S. ambassador to the European Union, Stuart Eizenstat, has warned of the "chilling signal" for EU-U.S. trade if political activists are allowed to undermine European chemical legislation, after a green think-tank proposed that a range of fire safety products should be banned under EU law. Eizenstat is scathing of a recent study, carried out by the Öko Institut for the EC, which lists about 46 chemical compounds to be considered for a ban. He says many of these chemicals have already passed EU risk assessments. If this proposal by the political activists is allowed to stand, these chemicals could be banned, contrary to scientific assessments and even before Reach has had an opportunity to evaluate the relative risks and benefits.

Hexion to Back out of Merger Agreement

Hexion Specialty Chemicals said it has filed a lawsuit against Salt Lake City-based chemical company Huntsman alleging that Huntsman's financial condition precludes the two firms continuing with a $10.6 billion merger agreement. Huntsman agreed in July 2007 to the all-cash acquisition, including debt, at $28 a share. While individually each company is solvent, a combined company would be insolvent, Columbus, Ohio-based Hexion said. Huntman's net debt has increased and its earnings are lower than expected, it said. Hexion, which is controlled by an Apollo Management LP affiliate, said it doesn't believe banks would provide the financing for the merger outlined in their commitment letters and that alternate financing is unlikely to emerge. The suit also says that under the terms of the merger agreement,

Peter Huntsman
CEO Huntsman

Hexion shouldn't have to pay a $325 million deal breakup fee because of "substantial deterioration" in Huntsman's financial performance and the expectation that an ongoing, material downturn in its business amounts to a material adverse affect. In a statement, Hexion said it "will continue to use its reasonable best efforts to close the transaction." Huntman's stock tumbled in after-hours trading.

Huntsman later said the lawsuit filed by Hexion and Apollo in which they claim they would not be required to consummate the merger agreement are inconsistent with the terms of the deal and the obligations to Huntsman and its shareholders. President and CEO Peter Huntsman said: "These actions appear to be a blatant attempt to deprive our shareholders of the benefits of the merger agreement that was agreed to nearly a year ago." Huntsman intends to vigorously enforce all of its rights under the agreement and seek to consummate the merger on the agreed terms. About a year ago, Huntsman had already agreed to merge with Dutch based Basell, however Hexion's competing bit precluded Huntsman to merge with Basell. Meanwhile, Basell and Lyondell merged their operations creating Lyondellbasell.

▶ www.hexion.com
www.huntsman.com

Furniture For Better Communication

The new, comprehensive standard work, "Planning guide for conference and communication environments: Conference. Excellence" is a guide to furnishing conference rooms and offices. New media, global markets and increasing project work have changed the character of the exchange of information and forms of cooperation within companies. In the new guide, just published by Birkhäuser Verlag, Professor Guido Englich and Burkhard Remmers show how conference, training and teamwork processes can be improved. It is a reference book for architects and facility managers and provides clearly structured and detailed guidelines for furnishing conference rooms, offices and lounges according to the latest findings.

Praxair Receives Award for Productivity

Praxair Cryomag Services, a subsidiary of Praxair Inc., was presented with a Productivity Award at the 2008 GE Healthcare Global Supplier Day.

"Praxair is a global supplier for delivering liquid helium to our MRI machines. Over the last two years, and servicing almost 600 magnets, Praxair has provided us with half a million dollars in variable cost productivity savings and cost avoidance. Praxair routinely goes above and beyond to service GE in many areas in need of support. GE Healthcare is pleased to present Praxair with the Productivity Award for their commitment to sharing their expertise and productivity," said GE Healthcare.

▶ www.praxair.com

Eight Intergraph Icon Award Recipients

Intergraph has bestowed Icon Awards, its highest customer distinction, upon eight U.S. and international industry and government leaders for their innovative use of and results with enterprise engineering and geospatially powered software. The awards honors companies and organizations that have deployed and leveraged Intergraph software in a visionary manner to yield results that have significantly contributed to their business and industry. The 2008 Icon Award winners are: Canadian Natural Resources, East China Electric Power Design Institute (ECEPDI); Genpro Engenharia; Hyundai Engineering; Kadaster, the Dutch Cadastre Land Registry and Mapping Agency; Montgomery County Emergency Dispatch Services; Progress Energy and the US Air Force Warner Robins – Air Logistics Center.

▶ www.intergraph.com

Research Funding Awarded

Akzo Nobel is part of a Dutch consortium which has just received major funding to investigate the potential of converting algae into feedstock for the chemical industry. Having partnered with energy company Essent, algae producers Ingrepo and Wageningen University, the consortium has now received more than €1 million of government funding after successfully applying for a long-term energy research subsidy. The four-year study will involve scientists at Wageningen conducting research into algal biology, growth parameter testing, separation and the subsequent upgrading of algae fractions. In addition, a pilot project will begin at Akzo Nobel's Delfzijl site in order to scale up the processes. Factors that influence the economics of algae-based chemical building blocks algae will also be investigated.

▶ www.akzonobel.com


Charlie Crews

New President and CEO – Charlie Crew Sabic Innovative Plastics announced that Charlie Crew has been promoted to president and CEO of the company, effective immediately. Crew will lead the multi-billion-dollar engineering thermoplastics business with operations in more than 25 countries and over 10,500 employees worldwide. Crew replaces Brian T. Gladden, who left the company to pursue other opportunities.

Crew has had a long and accomplished career with the company. He joined GE Plastics in 1977 as an account manager, and over the years he has held a variety of roles of increasing responsibility. Most recently Crew was vice president and general manager of Sabic Innovative Plastics' global ventures business.

▶ www.geplastics.com
▶ www.sabic.com

Tex Gunning has been appointed managing director of Akzo Nobel's decorative paints division as it expands its board of management to five members from its existing four. The appointment will be effective from Sept. 1. Gunning has been Vedior CEO since 2007, but indicated last year he would exit the company after its agreed acquisition by Randstad.


Alfred Stern

Borealis Key Personnel Changes Borealis, a leading provider of innovative, value creating plastics solutions, announces that Wim Roels, currently Vice President (VP) for Innovation and Technology, assumed the role of vice president for the Moulding Business Unit in Vienna, on June 1. Replacing Gilles Rochas who moves to the Borouge marketing and sales company in Singapore to lead its Film and Moulding business. Rochas succeeds Laurence Jones who will occupy the newly created role of VP Corporate Support at the Borouge production company in Abu Dhabi. Borouge is Borealis' Joint Venture with the Abu Dhabi National Oil Company.

Borealis also announced the appointment of Alfred Stern as Vice President (VP) for Innovation and Technology, effective June 1. He will be succeeding Wim Roels, who assumes leadership of the company's Moulding business in Linz, Austria.

▶ www.borealisgroup.com


Jack Gerard

Jack Gerard to Take over as CEO of the American Petroleum Institute Jack Gerard, president of the American Chemical Council, is to take over from Red Cavaney, who is retiring effective Nov. 1, as chief executive officer of the American Petrochemical Institute.

The oil industry group is a major player on Capitol Hill. It spent nearly $1.3 million in the first quarter to lobby on fuel economy standards and other energy issues, after spending $4 million to lobby the federal government in 2007. With petroleum prices soaring to new heights in recent weeks, the industry has been under fire in Washington, with lawmakers complaining that oil company executives are insensitive to consumers' woes as they rake in record profits.

▶ www.api.org
▶ www.americanchemistry.com

Graham Hetherington has been appointed Chief Financial Officer and Executive Board Director of pharmaceuticals company Shire effective July 1. Hetherington replaces current CFO Angus Russell, who was appointed CEO earlier this year. Russell will continue as acting CFO until the handover date. The company said Hetherington has a broad range of experience and most recently held CFO roles at Bacardi (2007) and Allied Domecq (1999–2005).


Dr Utz Tillmann

Utz Tillmann – New Director General of VCI Dr Utz Tillmann is now Director General of the German chemical industry association VCI, effective immediately. Tillmann has an industry background, combined with wide experience in association work in Brussels and Frankfurt. Now at VCI, Tillmann wants to help strengthen the position of the German chemical industry as one of the mainstays of growth and prosperity. Tillmann: "Products and innovations from the German chemical industry are major contributions to a sound future. We need competitive framework conditions in Germany Decisive points for our international competitiveness are energy and raw material costs, environmental and climate protection, innovation and company taxation."

▶ www.vci.de

Climate Change Exhibition Cefic will organize an exhibition on climate change and energy, in the European Parliament in Strasbourg, **"Building blocks for Climate Change Solution."** The exposition, sponsored by Richard Seeber, will last from July 7 to 10 at the North Gallery of the Low building. Many members of the European Parliament will be attending different events of the exhibition. On this occasion, the chemical industry will show solutions that chemicals can offer to reduce CO_2 emissions in the frameworks of housing and mobility. The companies participating with concrete cases in this display are Arkema, Bayer, Dow, ExxonMobil, Ciba, Mapei, Rohm & Haas, Shell Chemicals, Sinterama, BASF, Evonik Industries, Hexion Specialty Chemicals, Rhodia, Sanofi Aventis, Solvay and Wacker.

▶ www.cefic.org

EPCA Annual Meeting Participants of this year's annual meeting of the European Petrochemical Association (EPCA) in Monaco will discuss topics focusing on the meeting's theme of "Chemicals on the Horizon 2030 and Beyond." The meeting offers unique global networking opportunities, presentations on actual trends in business and the geo-economic environment. Top quality speakers with large experiences in the world of industry, business development and politics address the audience, questioning or challenging the business as usual approaches. A common Business Session with an industry speech and a major economic speaker will be followed by focused workshops on logistics.

▶ www.epca.be/meetings/am08
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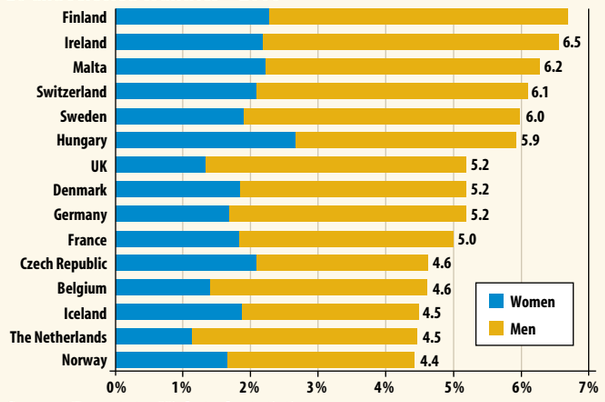
Please send your event information to chemanager-europe@gitverlag.com

Employment in High-tech Sectors

Percentage of persons employed in high-tech sectors, by gender, EU and selected countries – 2006



Source: Eurostat – High-tech statistics © GIT VERLAG

In 2006, high-tech sectors accounted for 4.4% of total employment in the EU. Finland had the highest share of persons working in high-tech sectors, making up 6.7%. In 15 Member States, Croatia and Turkey, the share of people employed in high-tech sectors was below the EU average of 4.4%. Indeed, most of the countries below the EU average are either candidate countries, Member States that have recently joined the EU (2004 and 2007) or Member States from southern Europe.

EU Agencies: A Red (tape) Carpet

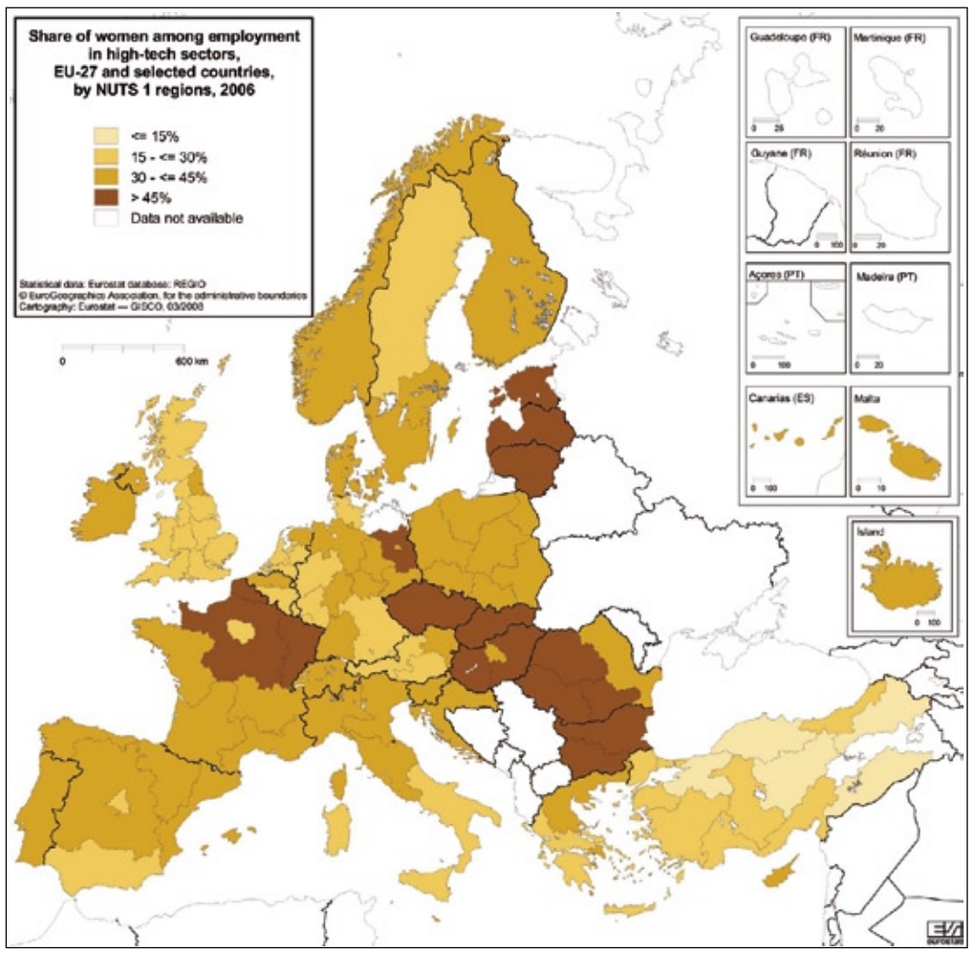
The 15 largest EU Agencies

Abbreviation	Location	Budget 2008 in million €
OHIM	The Office of Harmonization for the Internal Market	300.6
EMEA	The European Medicines Agency	165.5
EASA	European Aviation Safety Agency	85.3
FRONTEX	The European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union	69.0
ECHA	European Chemicals Agency	66.4
EFSA	European Food Safety Authority	63.5
EMSA	European Maritime Safety Agency	44.4
CDT	Translation Centre for the Bodies of the European Union	42.3
EACEA	Education, Audiovisual and Culture Executive Agency	41.9
ECDC	European Centre for Disease Prevention and Control	39.1
EEA	European Environment Agency	36.4
EDA	European Defense Agency	35.0
EUROFOUND	The European Foundation for the Improvement of Living and Working Conditions	21.2
EUROPOL	European Law Enforcement Organization	21.0
EUROJUST	an agency of the European Union (EU) dealing with judicial co-operation	20.0

Source: Cologne Institute for Economic Research © GIT VERLAG

EU Member States are normally charged with turning decisions made by the Commission and the Parliament into reality. However, in the past few years, the EU has succeeded in creating more bureaucracy for itself – of the 35 agencies, 24 have been created since 2000. The EU has apparently heard the cries of protest from sceptics; in March, the Commission decided that the transparency of the decentralization of the agencies should be improved.

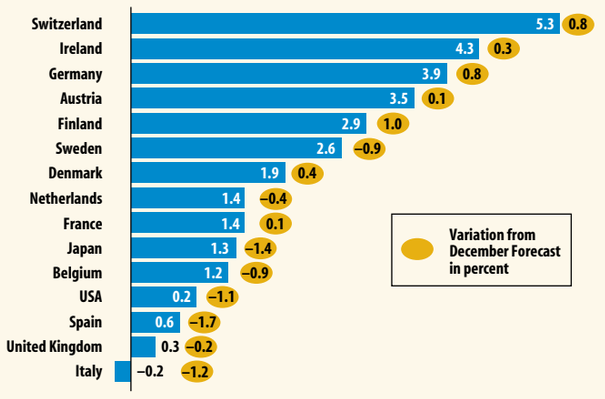
Share of Women in High-Tech Sector



The map provides an overview of women's share of employment in high-tech sectors in 2006. The main feature it highlights is that, in general, women did not reach parity (50%) in employment in the EU high-tech sectors. The regions with high proportions of women employed in high-tech sectors were located mainly in Eastern Europe.

Growth despite turbulences

Industrial Production: Forecasts revised
Growth of industrial production (prediction May 2008) expected for 2008 in %

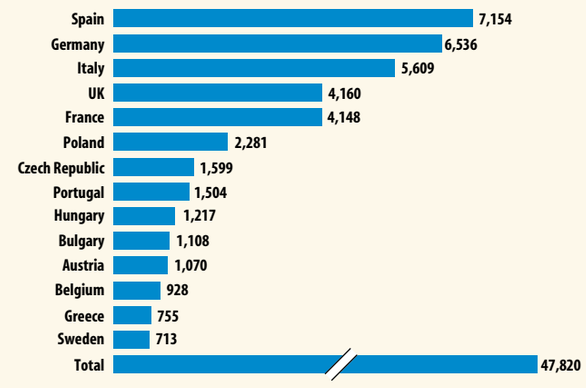


Source: Cologne Institute for Economic Research © GIT VERLAG

This year's economic outlook is not as bright as in the past, but a change in direction is not recognizable. The turbulences in the USA – the financial market crisis and the weak dollar – will only affect Europe to a certain extent. The industrial growth in Germany is good, and can only be topped by a few other countries. The high price of oil could lead to an economic slowdown.

Billions From Luxemburg

EIB: Spain receives the most
Loans in 2007 (million €)

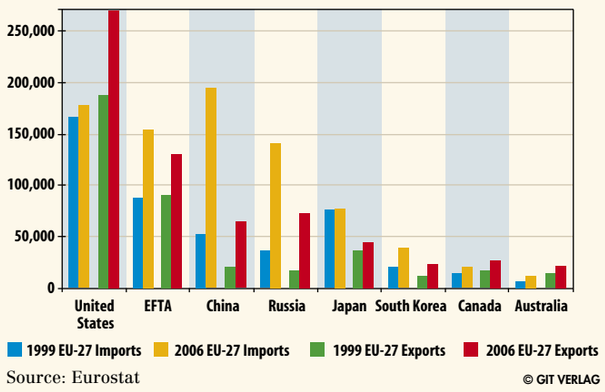


Source: EIB © GIT VERLAG

To support the common market in Europe the European Investment Bank (EIB) is allowing loans to EU-members and their collaboration partners. Last year, a total of €48 billion was spent, 5% more than 2006. The majority of the loans went to Spain, Germany and Italy. The EIB was created by the Treaty of Rome in 1958 as the long-term lending bank of the EU. The task is to contribute towards the integration, balanced development and economic and social cohesion of the EU member states.

Evolution of Trade

Evolution of EU-27 external trade with United States, EFTA countries, China, Russia, Japan, South Korea, Canada and Australia in EUR million, 1999–2006

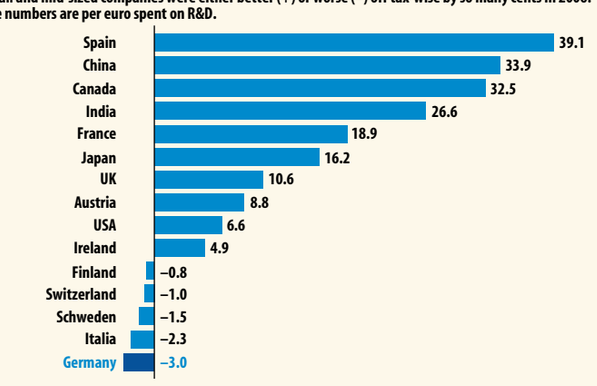


Source: Eurostat © GIT VERLAG

Developments in the patterns of EU external trade with the U.S., EFTA countries, China, Russia, Japan, South Korea, Canada and Australia over the period 1999 to 2006 reflect the wider changes in the world economy. The most prominent of these trends is that China has replaced the USA as the main source of EU imports in 2006, after a continual rise in imports from China since 1999.

R&D Tax Breaks in Europe

R&D Support: German Companies at a Disadvantage
Small and mid-sized companies were either better (+) or worse (–) off tax-wise by so many cents in 2006. The numbers are per euro spent on R&D.



Kleine und mittlere Unternehmen, weniger als 250 Mitarbeiter; Quelle: OECD

Source: Cologne Institute for Economic Research © GIT VERLAG

In 2000, the EU members set the goal to invest at least 3% of the national gross domestic product for research & development. To achieve this, the majority of the countries support companies investing in R&D by tax benefits. In addition, 21 OECD-countries support R&D in a similar way.

General tax benefits for R&D result in a better support oft SME's rather then supporting special technological fields.

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