

Chemicals business sector



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Seeing and being seen

Specialty chemicals from Merck provide for extremely high clarity and visibility. Whether as liquid crystals in high-resolution camera displays or as shiny effect pigments for cosmetics.



Liquid Crystals



Liquid crystals from Merck are used all over the world – for example, in most LCD (liquid crystal display) televisions, computer monitors, notebooks, digital cameras and mobile phones, as well as in many other high-quality displays. Merck is the global market leader in this field and, thanks to continuous investments in research and production, also the technology leader. New lighting and display technologies such as OLEDs (organic light-emitting diodes) are another focus of our work. In addition to the core business with materials for displays, in view of climate change and high energy prices we are also active in growth markets. These include the use of solar energy and the development of innovative light sources for energy-saving LEDs.

Key product

– licristal® – Liquid crystals and mixtures for displays

Other product groups

- livilux® – Materials for OLEDs for displays and innovative lighting
- isishape® – Efficient and environmentally friendly materials for producing solar cells and touch-sensitive screens

Key events in 2008

- Market and technology leadership in liquid crystals maintained
- Economic crisis and overcapacities in the market impacted our operating result
- Total revenues were diminished by negative currency effects, yet increased by 5.6% on a currency-adjusted basis

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Leading position maintained

Total revenues of the Liquid Crystals division decreased by 4.2% to € 877 million in 2008. Apart from market correction due to overcapacities, the economic downturn and negative currency effects played a major role. Sales are generated in U.S. dollars or in local currency such as the Japanese yen. As most manufacturing costs are booked in euros but sales are booked in currencies that are presently weak, there is no natural currency hedge for the division's business. On a currency-adjusted basis, growth was 5.6%.

At € 541 million, the division's gross margin fell 12% compared with the previous year. The operating result decreased by 20% to € 391 million as currency effects directly impacted the division's profit. At 44.6%, return on sales was below the previous year's level. Free cash flow declined by only 5.3% to € 402 million.

[www.merck-chemicals.com/
lcd-emerging-technologies](http://www.merck-chemicals.com/lcd-emerging-technologies)

Markets affected to varying degrees

Merck continues to do most of its business with major display manufacturers in Asia. Merck's customers – like other consumer goods manufacturers – are affected by the global economic crisis as well as market overcapacities. However, the impact in the individual regions varies: The first signs of declining demand became noticeable in October, mainly with manufacturers in Taiwan. We saw a more positive picture in Japan and South Korea: Despite the crisis, which was also distinctly felt in these countries during the fourth quarter, full-year sales increased slightly. The reason for this are the differences in the structure of manufacturers: In Taiwan, suppliers mainly serve the electronics industry (original equipment manufacturers), which in turn cover the increased demand of the major electronics companies at peak times. By contrast, in Japan and South Korea the major brand manufacturers predominate. They also produce their own displays and mainly cover the higher-value price segment.

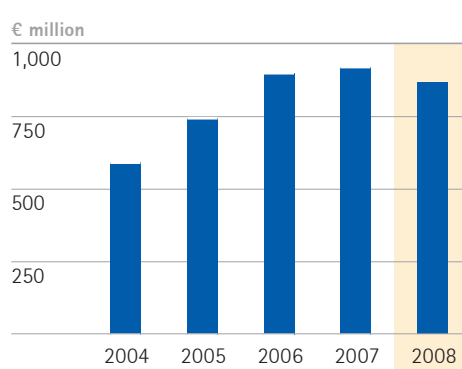
Medium-size screens dominate the market

Televisions and notebooks continue to be the most important growth drivers of the LCD industry. After the trend of the past years toward ever-larger format screens, growth of this segment is slowing and the market is increasingly settling in the medium-price segment with screen diagonals of 32 to 40 inches. For 2009, the market research firm DisplaySearch assumes an increase in total display surface area produced globally.

Liquid Crystals | Key figures

€ million	2008	2007	Δ in %
Total revenues	877	916	-4.2
Gross margin	541	611	-12
R&D	85	79	8
Operating result	391	487	-20
Exceptional items	-	-	-
Free cash flow (FCF)	402	425	-5.3
FCF before acquisitions and disposals	407	425	-4.3
ROS in %	44.6	53.1	-

Liquid Crystals | Total revenues



Investments in research and production

In order to maintain our leadership position in display materials, we continue to invest in research and development as well as in production plants. At € 85 million, the division's R&D spending exceeded the previous year's level. At the Darmstadt site we further expanded our production facilities and broke ground for a new chemical research center, which will also accommodate liquid crystal and organic light-emitting diode (OLED) research. We are expanding our site in South Korea in order to strengthen our research and development and further intensify our cooperation with customers.

LC core business: Merck is technology leader

Based on more than 100 years of experience in liquid crystal manufacturing, we are the global technology leader in the LC industry and the leading development partner to the global display industry, especially for highly complex, specific LC mixtures for technically sophisticated applications. Combining our expertise with our customers' allows us to continuously develop interesting products for consumers and introduce them to the market. We are already working together on technologies for the coming decade to further significantly improve picture quality.

New technologies for displays

PS-VA (polymer stabilized vertical alignment) is the next generation in display technology. It offers better contrast, even faster switching times and, above all, better energy efficiency as backlighting can be significantly reduced. By means of an additional polymer layer, the VA molecules in the display are pre-aligned in a certain direction to achieve the above-mentioned advantages. Innovative materials from Merck have helped pioneer this technology. Some devices with PS-VA displays are already on the market, for example the new PlayStation Portable (PSP). Another innovation was presented in August at the International Consumer Electronics Trade Fair (IFA) in Berlin: the first LCD television with 200/240-hertz technology, produced with our liquid crystal mixtures. It enables even higher definition of fast moving pictures, for example sports programs.

Touch panels

The division is not only a manufacturer of liquid crystal mixtures, but also an important partner to the display industry in other areas. Our patented etching pastes for the isishape® product range are an important component in the manufacture of touch panels. The very thin films used in touch panels must be selectively processed. The layers are often only a few nanometers thick, or about one-thousandth the thickness of a human hair. Touch panels are increasingly used, for example, in high-tech mobile phones, automatic ticket and other vending machines, as well as navigation devices.

Merck is an important development partner to the global display industry.

The new generation of displays offer higher definition and energy efficiency.

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OLED materials

Aside from liquid crystal technology, our researchers are working on materials for innovative displays. Here the special focus of development is on OLED materials (organic light-emitting diodes). They are used in mobile phones, MP3 players and digital picture frames, and have been introduced in televisions. First TV prototypes with 30-inch screens have been announced. Here too, our researchers maintain a close exchange with manufacturers. Merck materials are already inside many OLED displays on the market. Merck also intends to position itself as a leading material supplier in this new display technology.

Growth market of photovoltaics

In addition to display materials, the division is active in the growth market of photovoltaics and is developing new energy-saving lighting materials. In photovoltaics, we are focusing on the development of materials for printing technologies and for the production of organic solar cells. With the isishape® range, we offer solar cell manufacturers printable etching pastes for low-cost structuring of the materials required within the production process. A new production plant was commissioned for this at the Darmstadt site in 2008. New technologies for producing organic and thin-film solar cells are gaining an increasing share of the market as a result of cost advantages.

We supply materials for the production of solar cells.

Alternative to conventional light bulbs

Under “solid-state lighting” we combine research activities focused on developing lighting materials for white LEDs (light-emitting diodes). These LEDs can be an alternative to conventional light bulbs and energy-saving lamps that consume relatively large amounts of energy and have low efficiency rates. If attempts to increase the efficiency of lighting materials succeed, experts estimate that this could eliminate the need for up to 200 coal-fired power plants worldwide. To support these developments, in July 2008 Merck acquired LITEC-LLL GmbH of Greifswald, Germany, a company specializing in the development, production and marketing of ortho-silicate lighting materials.

Our OLED materials are used not only for spot lighting but also for innovative area lighting, making it possible to illuminate large areas while saving energy. Here, prototypes have already been developed in cooperation with leading lighting manufacturers.

Active in the top research cluster

Networks between science and industry play an essential role in developing cutting-edge technologies. Merck is actively participating in several research and cooperation projects, for example the “Organic Electronics” cluster of the Rhine-Neckar metropolitan region, which was one of the winners of the top-cluster competition launched by the German Federal Ministry of Education and Research. Areas of focus include developing organic light-emitting diodes and smart labels based on printed electronic circuits.

Performance & Life Science Chemicals



Specialty chemicals from Merck are important components of the process chain from drug development to industrial production. They ensure reliable analysis in research and dependable production processes. Expertise in chemistry and customer-centric innovations have made us a successful supplier to the pharmaceutical, cosmetics, food, plastics, coatings and printing industries. We find answers to challenges in environmental protection, production safety and product protection. Our goal is to further expand our expertise in regulated markets and in markets with high barriers to entry. The division operates in three business areas:

The success of the Laboratory Business is based on a long tradition. We offer a broad portfolio of laboratory chemicals in a range of product grades including the relevant certificates of analysis, thus ensuring consistent and comparable results.

Life Science Solutions focuses on customer needs in a variety of sectors such as the pharmaceutical industry. We offer products and solutions using the latest technological expertise in chemical and biotechnological processes.

The Pigments business develops and manufactures innovative effect pigments for use in coatings, packaging and product design. Not only decorative, but also security-relevant aspects, for example brand and anti-counterfeit protection, are important here.

Key events in 2008

- High sales level maintained, organic growth of 4.0%
- Operating result increases by 15%, return on sales of 13.4%
- Double-digit growth in several important Asian markets

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Efficient structures in place

Rise in operating result

Total revenues of the Performance & Life Science Chemicals division increased by 0.9% to € 1,246 million in 2008. Currency effects, particularly in the United States and Asia, impacted the division's growth, which amounted to 4.0% on a currency-adjusted basis. Gross margin increased by 2.3% to € 629 million. In comparison with the previous year, which saw restructuring costs, the operating result rose by 15% to € 167 million.

At 13.4%, return on sales was better than in the previous year. Free cash flow decreased by 56% to € 58 million, which was mainly the result of investments in property, plant and equipment, as well as changes in working capital. In 2008, the Performance & Life Science Chemicals division spent around € 58 million on research and development. We consolidated our global chemical production organization in 2008 in order to serve our markets more efficiently.

www.merck-chemicals.com

Growth in the most important markets of Asia

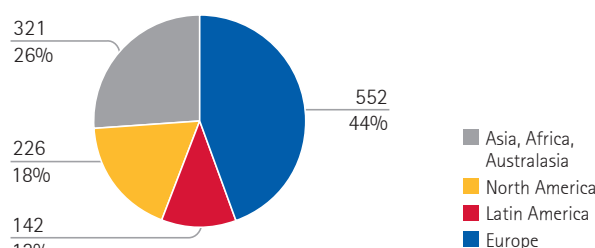
The division performed well in the most important markets of Asia, such as China and India, which recorded growth of 15% and 10%, respectively. Robust growth of 8.7% was also achieved in Latin America. In North America, sales dropped due to the economic downturn that already began in the third quarter. Laboratory Products recorded a slight nominal decline in sales compared with the previous year. The Pigments business, which accounted for around one-fifth of the division's total revenues, was the first to feel the effects of the economic crisis. The automotive coatings business was particularly impacted by declining production in the automotive industry. By contrast, the Life Science Solutions businesses, which are less dependent on economic cycles and accounted for around one-third of the division's total revenues, achieved an increase in sales.

Performance & Life Science Chemicals | Key figures

€ million	2008	2007	Δ in %
Total revenues	1,246	1,235	0.9
Gross margin	629	615	2.3
R&D	58	58	0.0
Operating result	167	144	15
Exceptional items	-46	-	-
Free cash flow (FCF)	58	132	-56
FCF before acquisitions and disposals	67	132	-49
ROS in %	13.4	11.7	-

Performance & Life Science Chemicals

Sales by region | € million



Laboratory Business

[www.merck-chemicals.com/
food-analytics](http://www.merck-chemicals.com/food-analytics)

Growth in Asia and Latin America

In 2008, total revenues of Laboratory Business decreased slightly by 1.6%. On a currency-adjusted basis, total revenues increased by 2.5%. We are represented by our own local companies in 42 countries worldwide with a broad range of laboratory chemicals. We were satisfied with growth in Asia, which reached 6.5% despite strong negative currency effects, and in Latin America, where sales rose by 7.4%. Sales in the European market remained stable, while a decline was recorded in the comparatively smaller market of North America.

Rapid food tests are easy
to use.

Innovative rapid food tests

Our microbiology business achieved sustainable growth in 2008. Rapid microbiology tests have become a special highlight of our portfolio. They are used to detect harmful and pathogenic microorganisms in foods, such as salmonella and coli bacteria. The business for food and environmental tests with the newly launched Spectroquant® Pharo spectrophotometers got off to a good start. They are used to perform tests of the Spectroquant® range rapidly, precisely and efficiently. With our U.S.-based cooperation partner Rules-Based Medicine Inc., we further expanded the bioscience business with bead-based assays for biomarker detection in pharmaceutical research.

New products for chromatography

By acquiring the Swedish company SeQuant we rounded off the chromatography portfolio. SeQuant specializes in the development of products for chromatography, namely the separation of polar chemical compounds. The focus is on innovative ZIC-HILIC® technology. This product line ideally complements our existing portfolio in HPLC (high-performance liquid chromatography). In 2008, ZIC-HILIC® products were also used to test for melamine contamination in formula, as recommended by the U.S. Food and Drug Administration (FDA).

Life Science Solutions

[www.merck-chemicals.com/
life-science-research](http://www.merck-chemicals.com/life-science-research)

Emprove® premium brand portfolio expanded

Life Science Solutions achieved growth of 7.9%. On a currency-adjusted basis, the increase amounted to 10%. Sales rose by 16% in the important market of North America and by 19% in Latin America. The business with pharmaceutical raw materials generated particularly strong growth. Emprove®, Merck's premium brand of pharmaceutical raw materials, generated double-digit growth and was expanded. This brand stands for comprehensive service and excellent quality. The portfolio now comprises three application areas: "Emprove® exp" for use as a pharmaceutical excipient, "Emprove® bio" for use in biopharmaceutical production and "Emprove® api" for use as an active pharmaceutical ingredient.

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The aim is to enable customers to work even faster and more cost-efficiently with Emprove®. The new generation of Fractogel™ for protein purification and separation in pharmaceutical production is scheduled for market launch in 2009. Innovations also include new, customized solutions for cleaning biopharmaceutical production facilities.

[www.merck-chemicals.com/
pharmaceutical-ingredients](http://www.merck-chemicals.com/pharmaceutical-ingredients)

Targeted investments in innovative cosmetic actives

Business with cosmetic active ingredients sustained a decline in sales owing to weaker demand, e.g. for the self-tanning agent DHA. Here we will concentrate more strongly on innovative, patent-protected products and expand the product range by making targeted investments. The new production plant for OxyneX® ST Liquid started up in India at the end of 2008. This is a stabilizer for light-sensitive raw materials used in cosmetic products and perfumes. We are completing a new plant at the Darmstadt site for producing active ingredients used in sunscreen formulations. Eusolex® UV-Pearls are tiny glass beads in which an innovative UV filter is encapsulated.

[www.merck-chemicals.com/
cosmetic-ingredients](http://www.merck-chemicals.com/cosmetic-ingredients)

Cutting-edge technologies strengthened

In 2008, the technology platform for ionic liquids was further expanded, laying the cornerstone for future growth. Certain ionic liquids can be used as electrolytes for producing a special type of solar cells (dye-sensitized solar cells). Another cutting-edge product are evaporation chemicals (Patinal) of the Solarpur™ range, which are used to coat the surfaces of solar cells to increase their efficiency.

Pigments

Business impacted by the economy

Following good growth in the first half of 2008, the strong dependence of the Pigments business on economic trends became noticeable as of August. This was mainly reflected by weak demand from the automotive sector, to which we are an important supplier with pigments for automotive coatings. As of the fourth quarter, the economic weakening also hit the European business. Total revenues in Pigments declined overall by 9.7%.

Asia still offers potential, for example China with a growth rate of 7.5%. However, negative currency effects are impacting business there. Weak demand for consumer goods and current consumer uncertainty also affected the business with pigments for plastics, print products and cosmetics.

[www.merck-chemicals.com/
pigments](http://www.merck-chemicals.com/pigments)

Product lines rounded off

In the current economic situation, we continue to focus on high-value, profitable pigments. In 2008, we added new color tones to our portfolio of the high-growth product lines Miraval® and Ronastar®, and we implemented the widespread launch of the new Pyrisma™ product line. These pigments, which were developed in close cooperation with our customers, offer very intense effects and cover a wide color range.

Functional pigments

Functional pigments performed very well, including pigments for laser marking and antistatic applications (Minatec® range). These are used, for example, to prevent the static charging of plastic floor coverings and for coating plastic parts. Sales of Candurin® pigments, which are used for color coatings of foods and pharmaceuticals, were also strong. While the focus is on decorative effects in the foods sector, pharmaceutical coatings are used to help patients to better identify their medications and to make drugs more counterfeit-proof. Approval has been granted in the United States and some other core countries. We are now focusing on countries where approval has not yet been obtained.

Pigments make it difficult to counterfeit drugs.

Corporate and Other

The segment Corporate and Other comprises Group administrative costs with respect to holding companies, taxes as well as certain exceptional items not assigned to the individual divisions. The operating result of the segment Corporate and Other totaled € –81 million in 2008 as compared with € –72 million in 2007. The financial result was € –156 million, which was much better than in 2007. Since 2007, the financial result has been reported in full in the segment Corporate and Other. Free cash flow declined to € –581 million; free cash flow adjusted for acquisitions and disposals was € –470 million as compared with € –406 million in 2007, mainly owing to high tax payments.

Corporate and Other | Key figures

€ million	2008	2007	Δ in %
Total revenues	6.6	29	–77
Gross margin	–2.7	2.5	–
R&D	0	0	–
Operating result	–81	–72	–
Exceptional items	–	–32	–
Free cash flow (FCF)	–578	–406	–
FCF before acquisitions and disposals	–470	–406	–