World Fluorochemicals

Industry Study with Forecasts for 2018 & 2023

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4 China: Fluorochemical Demand by Product

5 China: Fluorochemical Demand by Market

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18 Other Asia/Pacific: Fluorochemical Supply & Demand

19 Other Asia/Pacific: Fluorochemical Demand by Product

20 Other Asia/Pacific: Fluorochemical Demand by Market

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2 Central & South America: Fluorochemical Demand by Product & Market

3 Brazil: Fluorochemical Supply & Demand

4 Brazil: Fluorochemical Demand by Product

5 Brazil: Fluorochemical Demand by Market

6 Other Central & South America: Fluorochemical Supply & Demand

7 Other Central & South America: Fluorochemical Demand by Product

8 Other Central & South America: Fluorochemical Demand by Market

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**INDUSTRY STRUCTURE**

1 World Fluorochemical Sales by Company, 2013

2 Selected Acquisitions & Divestitures

3 Selected Cooperative Agreements
World demand to rise 3.8% annually through 2018

Global demand growth for fluorochemicals is forecast to accelerate, rising 3.8 percent per year to 3.8 million metric tons in 2018. Above average growth in higher value products will help drive increases in value demand more than seven percent annually to $25 billion. Environmental regulations will continue to be the strongest force acting on the industry, shaping demand in both positive and negative ways. While regulations and consumer concerns have reduced demand for some fluorine-based products, particularly ozone-depleting fluorocarbons, they have also opened up opportunities for products such as newer fluorocarbons with low global warming potential. Improved fuel economy and reduced emissions in the motor vehicle industry will indirectly benefit demand for a variety of inorganic and specialty fluorochemicals (e.g., aluminum fluoride and lithium hexafluorophosphate) and for fluoropolymers.

Fluorocarbons to remain most dynamic sector

The fluorocarbons market remains the most dynamic sector of the fluorochemical industry for two reasons: first, the evolving regulations aimed at protecting the ozone layer and reducing global warming, and, second, a sharp contrast in the outlook between developed and developing countries. In developed countries, the phaseout of HCFCs is nearly complete, with most end users switching to HFCs. However, even HFCs now face restrictions due to their global warming potential, with new laws in developed countries expected to limit future demand. While competition from non-fluorine gases is growing, reductions in HFCs are providing growth opportunities for newer fluorocarbons such as HFOs, which offer good performance and an excellent environmental profile. Nevertheless, demand for fluorocarbons overall in the developed world will continue to decline in volume terms. In the developing world, however, demand for fluorocarbons will register strong gains due to a combination of increasing industrialization, higher personal incomes, and a relative lack of environmental regulation.

Advanced materials to drive fluoropolymers market

Lower-volume fluoropolymers account for a disproportionate share of market value due to their higher average prices. Growth in fluoropolymer demand will be driven by expanding opportunities for high-performance materials in a variety of industries, notably motor vehicles, coatings, and electronics, especially in developing parts of the world where their intensity of use remains low. In the electronics sector, demand for polymers and specialty chemicals will remain strong in the flat panel display market, but future growth will be driven by a rapid increase in production of lithium-ion batteries for automotive applications.
China: Fluorochemical Supply & Demand

Fluorochemical demand in China reached 1.1 million metric tons in 2013, making it the largest market in the world with more than twice the volume of the second place US market. Demand between 2003 and 2013 grew at a double-digit annual pace on average, reflecting growth opportunities as China’s economy and manufacturing base continues to modernize. China is also the largest market for fluorochemicals from a value perspective, after having taken the US market in 2008. China’s massive fluorochemical market stems from its position as a world leader in a number of fluorochemical-consuming industries, including aluminum smelting, cooling equipment, refrigerators and freezers, plastic foam, and motor vehicles. Additionally, the country is the largest producer of fluorspar in the world, a key ingredient in fluorochemical production, which reduces costs and makes domestic fluorochemical production more economically attractive.

China is the epicenter of the fluorochemical industry in terms of overall production and trade. The country had a massive fluorochemical trade surplus in 2013, due largely to its intense fluorocarbon and inorganic fluorochemical export activity. China also has a significant trade surplus in fluropolymers, reflecting the increasing production focus on high-value products such as FEP and PVDF as China tries to fully integrate its fluorochemical value chain from raw material (fluorspar) to high-value fluropolymers and specialty fluorochemicals. The trade surplus is expected to expand through the forecast period as major fluorochemical producers increase production capacities for fluorocarbons, fluropolymers, and inorganic and specialty fluorochemicals in China. For example, Arkema opened a new polyvinylidene fluoride (PVDF) plant at its fluorochemicals complex in Changshu in October 2011. Solvay and Shanghai 3F New Materials entered into a joint venture in August 2011.

### Table VI-3

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<td>Fluorochem Demand</td>
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<td>+ net exports, stock change, &amp; reuse</td>
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<td>Fluorochem Production</td>
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### Chart VIII-1

WORLD FLUOROCHEMICAL MARKET SHARE
($17.6 billion, 2013)
Mexichem SAB de CV
Rio San Javier 10
Fraccionamiento Viveros del Río
Tlahuapan, Estado de México 54060
Mexico
52-55-5366-4000
http://www.mexichem.com

Sales: $5.2 billion (2013)
Geographic Sales: (2013, as percent of total) North America 33%, Europe 33%, South America 32%, and Others 2%
Employment: 17,100 (2013)

Key Products: fluorite, hydrofluoric acid, fluorocarbons, & aluminum fluoride

Mexichem is a producer of chemical, resin, and plastic products. The Company operates through two primary segments: Fluorine Chain and Fluid Conduction Chain.

Mexichem competes in the world fluorochemical industry through the Fluorine Chain segment, which had 2013 sales of $673 million, including intersegment sales. The Fluorine segment, which does business as Mexichem Flúor SA de CV (Mexico), mines fluorite; and produces hydrofluoric acid (HF), fluorocarbons, and aluminum fluoride. Of the segment’s total 2013 sales, cooling gases accounted for 49 percent, or approximately $330 million; fluorite represented 24 percent, or about $160 million; HF accounted for 21 percent, or about $140 million; and aluminum fluoride represented 6 percent, or approximately $40 million. According to the Company, among its global markets, Mexichem has the number one market position for fluorite in the US.
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**World Catalysts**

World demand for catalysts will grow 4.8 percent per year to $20.6 billion in 2018. Growth will be led by a rebound in the chemical and polymer industries, most notably in developed economies hit hard by the recession. The fastest advances, however, will occur in developing areas such as the Asia/Pacific and Africa/Mideast regions. This study analyzes the $16.3 billion world catalyst industry, with forecasts for 2018 and 2023 by material, type, market, world region, and for 18 countries. The study also evaluates company market share and profiles industry players.

**World Biofuels**

World demand for biofuels is expected to expand at a 3.6 percent annual pace, reaching 115 million metric tons in 2018. North America and Central and South America will remain the largest regional markets, while the Asia/Pacific region grows the strongest from a relatively small base. Bioethanol will remain the leading biofuel. This study analyzes the 96.3 million metric ton global biofuel industry, with forecasts for 2018 and 2023 by product, world region, and for 22 countries. The study also evaluates company market share and profiles industry participants.

**Solvents**

US demand for solvents is expected to increase at a 1.5 percent annual pace through 2018 to 11 billion pounds. Growing environmental concerns and regulatory pressure will drive demand for “green” solvents that are derived from renewable raw materials. The paint and coatings market will replace the transportation market as the largest solvent consumer. This study analyzes the 10.2 billion pound US solvent industry, with forecasts for 2018 and 2023 by product and market. The study also evaluates company market share and profiles industry players.

**World Hydrogen**

World consumption of captive and merchant hydrogen is projected to increase 3.5 percent annually through 2018 to more than 300 billion cubic meters. Gains will be driven by the increasing use of hydrogen in refinery hydroprocessing, especially in developing countries in Asia. Petroleum refining will remain the dominant market. This study analyzes the 254.5 billion cubic meter world hydrogen industry, with forecasts for 2018 and 2023 by market, world region, and for 19 major countries. The study also evaluates company market share and profiles industry players.

**World Activated Carbon**

World demand for activated carbon is projected to rise 8.1 percent per year to 2.1 million metric tons in 2018, driven by tightening pollution regulations and rising manufacturing activity. North America will remain the largest activated carbon market, while the Asia/Pacific region will slightly outpace and overtake North America by 2023. This study analyzes the global activated carbon industry, with forecasts for 2018 and 2023 by type, application, world region, and for 18 countries. The study also evaluates company market share and profiles industry participants.