

# Specialty Chemicals

A special category in itself, these products reflect a century of growth.

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A history of specialty chemicals should contain a definition of the subject. However, this is something that few seem to have been able to do despite the more than 100 years of specialty chemicals research, development, and production.

Some have used performance chemicals as a synonym—meaning the chemicals improve the performance of either a manufacturing process or an end-use product. Others have called them value-added chemicals because of the high margins received against the manufacturing costs.

Andrew Boccone, retired president of the chemical consulting firm Kline & Company, says, “Despite the fact that the term ‘specialty chemicals’ has been in the chemical industry’s lexicon for more than 50 years, it is still used loosely, which can cause great confusion about just what specialties are. The terms specialty chemicals, fine chemicals, and performance chemicals are often used interchangeably.”

Boccone further breaks down these definitions into two categories: technical specialties and formulated, or market, specialties. Technical specialties include agricultural chemicals, biocides, and plastics additives—products that generally require skill in process and synthesis. They are generally used “as is,” as in the case of pesticides, or formulated with other products into a final end product—as in the case of plastic additives.

Formulated specialties are unique blends of additives packaged in a single formulation to achieve optimal performance characteristics. Requiring a high degree of field and technical service, examples include water treatment chemicals and industrial and institutional cleaning compounds.

But, according to Boccone, true specialties are products that unite the attributes of technical and performance specialties. Companies that make true specialties, such as specialty adhesives, electronic chemicals, or certain construction and oil field chemicals, combine superior technical competence with strong formulation and service skills.

Boccone says, “Specialties were historically described as differentiated performance products

offered for what they do, not for what they are. They are produced in relatively low volumes and sold at relatively high prices for their effect.”

## Born in Mauve

Whatever the definition, specialty chemicals can claim an important place in the international chemical industry. Dyes have historically been considered specialty chemicals, and when William Henry Perkin synthesized his mauve dye, arguably the first commercially successful synthetic chemical, he set in motion a chain of events that would establish the modern organic chemical industry and many of the companies that have played, or still play, an important part in the manufacture of chemicals of all stripes, especially in Europe and the United States.

In Germany, for instance, the founders of Badische Anilin und Soda Fabrik (BASF) established a fuchsin and aniline plant near Mannheim shortly after 1861. In 1863, the company that was to become Hoechst began production of fuchsin dye near Frankfurt. In 1885, it began to make azo dyes and related intermediates. Also in 1863, Friedrich Bayer began the production of fuchsin and aniline dye derivatives at a plant at Elberfeld in Westphalia.

In Switzerland, what is now one of the world’s largest specialty chemicals companies, Ciba Specialty Chemicals, began its evolution. In 1857, Johann Rudolf Geigy-Merian and Johann Müller-Pack acquired a site in Basel where they built a dyewood mill and dye extraction plant. Two years later, they built a synthetic fuchsin plant.

While Geigy was beginning production of fuchsin, Alexander Clavel started to synthesize the dye at his silk-dyeing works in Basel; he then built a new fuchsin plant in 1864.

In 1873, Geigy sold his company to Bindsched-



Top: Sodium alcoholates ad, Ethyl Corp., 1953, *Chemical & Engineering News*

Center: Alkylphenols, Rohm and Haas ad, 1963, *Chemical & Engineering News*



ler & Busch, which was transformed into a joint stock company named Gesellschaft für Chemische Industrie Basel, abbreviated as Ciba. In 1970, the two companies merged to become Ciba-Geigy, mostly noted for pharmaceuticals, but it also produced a variety of specialty chemicals.

Compatriot firm Sandoz began production of textile dyes in 1886, diversifying into other dyes and paper chemicals in 1919.

### A WORLD OF SPECIALTIES

The global specialty chemicals market has traditionally been dominated by the United States and Europe. But with trade liberalization, the spread of process technology, and the breakdown of numerous economic barriers, Asian nations, particularly China and India, are becoming key players in the specialty chemicals market. As reported at the 2004 annual meeting of the Specialized Organic Chemical Sector Association (SOCSA), a sector association within the U.K.'s Chemical Industries Association, "Whilst the EU specialty chemicals sector can be modestly optimistic about growth in the coming 12 months, this optimism is tempered by the ever-increasing competition from China, whose export growth rate in specialty chemicals is a startling 21%."

Speaking at the SOCSA conference, Wei Zhongwu, chairman of the China Wanda Group, a large specialty chemicals company, stated, "There is fierce competition within China, with an estimated 20,000 enterprises manufacturing specialty and fine chemicals." Indeed, such a great demand within China for specialty chemicals may still be seen as an opportunity for U.S. and EU companies, since, according to Wei, specialty chemical imports to China are growing at 31% per year in addition to the export growth.

India is also making a major commitment to specialty chemicals. In a speech at the Conference on Specialty Chemicals: Competitiveness in the New Millennium, July 2003, New Delhi, Shyam S. Bhartia, chairman of the chemicals committee of the Federation of Indian Chambers of Commerce and Industry, stated that "[India] must use this opportunity and take the exports growth in the specialty chemicals industry to more than 50% per annum from the current level of around 20%. Only then can we double our share in the global chemical industry to nearly 4%. . . . We have the ability to be a large player in the global specialty chemicals industry and a dominant player in select segments."

### Film and Formulas

Although the United States pretty much exited the dyes business by the turn of the century, relying on supplies from Europe, it was developing specialty chemicals businesses. George Eastman, founder of Eastman Kodak, began producing nitrocellulose-based transparent film on a roll in 1899



and began to market a portable camera that would soon turn amateur photography into a big business.

Early in the new century, John F. Queeny tried to persuade his employer to manufacture saccharin instead of importing it from Germany. Rebuffed, he started Monsanto Chemical Works (named for his wife) and imported Ph.D. chemist Louis Veillon, who knew the process, from Sandoz. Veillon thus became the first Monsanto employee.

Another early entrant in the specialty chemicals arena in the United States was Rohm and Haas. In 1907, Otto Röhm and Otto Haas formed a partnership in Esslingen, Germany, to produce and sell a technologically superior leather bate, a product used by tanners after liming to remove the lime and soften hides. In

1909, Haas traveled to the United States to establish a branch office in Philadelphia.

World War I was a watershed for the company in the United States. Anti-German feeling ran high, and the company was in danger of being seized under the Trading with the Enemy Act. Haas incorporated the company in the United States and went on to show that, with its newly built factories and separate sales force and management, it was independent of the German operations.

The war had another effect on Rohm and Haas and, indeed, on the whole U.S. specialty chemicals industry. Germany was still the hub of specialty chemicals production for the world. With the coming of hostilities, the United States and other countries fighting Germany had to develop their own industry.

Rohm and Haas was quick to respond by adding other leather chemicals and textile chemicals to its nascent portfolio. In 1924, the company, together with Karl Albert Co., established the Resin Products Co. to market synthetic resins for fast-drying varnishes. And it introduced the first product developed in its own laboratories, Lethane, a synthetic organic insecticide used in household fly sprays.

It was also during World War I that another specialty chemicals sector was developed. German companies began developing surfactants so that fats, previously used in soap manufacturing, could go to other applications for the war effort.

Hercules, born out of the government's forced divestiture of much of DuPont's explosives operations in 1912, after the war acquired the assets of Yaryan Rosin & Turpentine Co., a naval stores company, giving it a start in the specialty chemicals business.

Another company that came from DuPont via forced divestiture was Ethyl Corp., maker of tetraethyl lead. From that beginning, Ethyl Corp. diversified into several specialties, including lubricant additives, alkyl amines, flame retardants, alpha olefins, and plastic additives, among others.

### SOCMA

Another outcome of the war was the formation of the Synthetic Organic Chemical Manufacturers Association (SOCMA) to protect the fledgling synthetic chemical industry against what was perceived as a rising tide of imports into the United States from Europe in the 1920s.

Over the years, SOCMA has seen one of its primary goals become the protection of small chemical manufacturers, as opposed to what is now the American Chemistry Council, which numbers the biggest chemical producers among its members.

While the large chemical giants continued their development of specialty chemicals until World War II, a great amount of work in this area was being done, especially in the United States, by small firms, including private manufacturers. This situation continued for decades.

However, the postwar period did see the trans-

formation of W.R. Grace from a shipping company to a diversified firm with chemicals to a specialty chemicals company that claimed, at one time, to be the world's largest specialty chemicals company. Grace ultimately was producing construction chemicals, catalysts, water-treatment chemicals, and sealants and coatings, among other products.

### A Global Enterprise

After the war, however, it was much more difficult to differentiate between the European and U.S. specialty chemicals producers. U.S. companies began building plants in Europe, and European companies often produced the same products in the United States that they made in their home countries. For instance, Ciba-Geigy had a huge dye plant in Toms River, NJ. Bayer, BASF, and Hoechst all had large U.S. operations. By 1989, the U.S. sales of Hoechst and BASF alone put them in the top 10 of U.S. chemical producers.

France's Rhône-Poulenc U.S. operations had sales of just \$300 million in 1981 and operated essentially as a trading company for its parent. By the end of that decade, its U.S. sales had grown to \$2.28 billion, and the company was producing a variety of specialties, including food chemicals, pesticides, flavor and fragrance chemicals, paper chemicals, and surfactants. In addition, Britain's ICI had established U.S. headquarters in Wilmington, DE, and was making paint resins, surfactants, dyes, rubber chemicals, and pesticides.

It was during the 1980s and early 1990s that chemical companies adopted the idea that the high value-added provided by specialties could shield them from the cyclicity of basic chemicals. Chemical companies and other firms whose fortunes closely mirrored the economic cycle began to gobble up the small specialty chemicals producers. Germany's Henkel acquired Loctite, for example, and oil-field chemical producer Petrolite was acquired by driller Baker Hughes.

The period opened up a new specialty chemicals field—electronic chemicals. Rohm and Haas and Olin were quick to seize on this new possibility. Olin acquired Philip A. Hunt Chemical, a maker of photoresists and other products for the electronics industry. Rohm and Haas bought Shipley, a maker of photoresists; Rodel, which produces chemical slurries and polishing pads; and LeaRonol, a maker of specialty chemicals additives used in electronics and metal finishing.

The electronics industry also provided the chance to turn some of the output of industrial gas plants into specialty chemicals, with Air Products and Praxair, among others, supplying high-purity gases to the electronics manufacturers.

Not only were firms acquiring specialty chemicals operations, but some chemical producers were trying to cut their operations to just specialties. Chief among these was ICI, which first spun off its pharmaceuticals and some specialty chemicals into Zeneca, then bought Unilever's specialty chemi-

icals, and then sold off its various commodity chemicals operations to finally become a company with a real focus on specialties.

### Bricks to Brains

However, it was about this same time that the blush was fading from the specialty chemicals rose. The number of true chemical innovations was slowing, costs were rising, look-alike products were causing increased competition, and, most importantly, margins were shrinking. The new catch phrase was "life science." In taking Hoechst from a chemical company to a life science company, Chairman Jürgen Dorman said the company was going from "bricks to brains."

Companies were forced to focus, and at first that focus did not always include specialty chemicals. The result was a host of old specialty chemicals operations winning their independence as the old-line firms spun them off into stand-alone firms.

In Europe, the merger of Hoechst and Rhône-Poulenc into Aventis placed the latter company's chemical operations in Rhodia, and Hoechst Specialty Chemicals into Clariant, which had been formed from Sandoz's chemical operations at the time of its merger with Ciba-Geigy to become Novartis. Ciba's chemical operations became Ciba Specialty Chemicals. Ciba has since added Allied Colloids to its product mix.

Degussa, after buying and selling businesses for more than a decade, has finally emerged as the world's largest specialty chemicals company, with sales in 2003 of \$13.1 billion in five key sectors: construction chemicals, fine and industrial chemicals, performance materials, coatings and advanced fillers, and specialty polymers.

The United States also has seen new specialty chemicals companies arising from old operations. Cytec Industries is a product of the chemical operations of American Cyanamid. Its agricultural chemicals operations went to BASF, and Cyanamid was acquired by American Home Products, now Wyeth.

Olin spun off its specialty chemicals operations into Arch Chemical, keeping its chloralkali business. Ethyl Corp.'s specialty chemicals business became Albemarle.

But it is not clear whether the new strategy is going to work any better than the old. Rhodia is fighting for its survival. Ciba Specialties has outperformed Clariant practically since the beginning. Rohm and Haas and Albemarle, during the latest downturn, proved almost as cyclical as a company such as DuPont with a wider mix of product types. Specialty chemicals companies increasingly complain about the commoditization of specialties and the need for 25–30% new products in their portfolios—a worthy goal for one company, but one that is probably technologically impossible for an entire industry. ♦

## SPECIALTY CHEMICALS



Above: Significant chemicals, Hercules Powder Co. ad, 1963, *Chemical & Engineering News*