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Fine chemicals' critical role in industry

DR SANJAY AGRAWAL

The pharmaceutical industry is critical in developing and manufacturing life-saving drugs and therapies. One key aspect of drug development is the use of fine chemicals, highly purified, specialised chemical compounds used in manufacturing pharmaceuticals.

Fine chemicals, also known as specialty chemicals, are defined as chemicals that are produced in relatively small quantities and are typically sold at a higher price compared to commodity chemicals. Fine chemicals are usually complex molecules with specific properties suitable for various applications, including pharmaceuticals. Fine chemical products with a high market value offered for their specific functions. Because an intermediate must have a concrete chemical structure and cannot have a different chemical structure, it must be a fine chemical to be employed in producing a specific API.

The production of fine chemicals involves highly specialised processes, including synthesis, isolation, purification, and characterisation. The final product must meet strict quality standards, including purity, potency, and stability.

Some of the different names for goods in the high-value end of the chemical business are fine, speciality, and performance chemicals. It's important to remember that fine chemicals are defined as (high-value) chemical products sold for what they are, i.e., for their precise chemical structure, to avoid misunderstandings.

It is simple enough to compile a list of 40-50 application areas for fine chemicals because they are used in many different market segments. Agrochemicals, flavours & perfumes, and dyes are some of the fine chemicals with larger markets. Agrochemicals, tastes, and fragrances make up about 17% of the market value for all fine chemicals.

In the pharmaceutical industry, fine chemicals produce small-molecule drugs and biological therapies. Small molecule drugs are typically synthesised using chemical reactions that require fine chemicals as starting materials. Fine chemicals are also used as intermediates in biological therapies, such as monoclonal antibodies, produced using living cells.

The use of fine chemicals in the pharmaceutical industry is essential for developing new drugs and therapies. Fine chemicals can help improve the effectiveness and safety of drugs by providing a high level of purity and quality control. They can also help reduce drug production costs by improving efficiency in manufacturing.

> The demand for fine chemicals in the pharmaceutical industry will continue to grow in the coming years

The demand for fine chemicals in the pharmaceutical industry will continue to grow in the coming years. This is due to several factors, including the increasing demand for personalised medicines, the growing focus on biological therapies, and the rising need for more complex and specialised drugs.

The pharmaceutical industry is highly regulated, and the production of fine chemicals must meet strict regulatory requirements. These requirements include compliance with Good Manufacturing Practices (GMPs), which ensure that drugs are produced to the highest quality and purity standards.

Current Situation with the Fine Chemicals Industry

The pharmaceutical industry was the major consumer of fine chemicals for many years. Agrochemicals are a different, large-scale shopper. The electronics sector is increasingly driving the fine chemicals industry.

The global chemicals market generated US$3.94 trillion in revenue in 2019. Asia currently holds most of the worldwide market share as of 2012. China is the world's largest manufacturer of chemicals, accounting for over 36% of worldwide sales in 2018. The European Union (EU) came in second with 17%, while the United States (US) came in third with 14%.

The largest segment of the global chemicals market comprises fine chemicals. Global fine chemical sales were worth US$155.55 billion in 2018; by 2024, they are projected to reach US$219.49 billion. In producing fine chemicals, Europe and North America are at the forefront.

In 2018, revenues from fine chemicals totaled US$36.17 billion in North America and US$46.31 billion in Europe. Production of fine chemicals is increasing in Asia-Pacific, particularly in China and India. The pharmaceutical business has been using fine chemicals for many years. Pharmaceutical industry purchases of fine chemicals totalled US$78.2 billion in 2016 and are anticipated to reach US$153.7 billion by 2025.

The aging of the world population and rising demand for improvements in preventive healthcare are the main drivers of the ongoing expansion. In 2019, US$630 billion were created by the world market for specialty chemicals. Between 2020 and 2027, it is anticipated to expand at a rate of 3.7%. The need for high-performance and function-specific chemicals is rising across all end-use industries, including oil and gas, pulp and paper, personal care, and cosmetics. These compounds are classified as specialties because, in contrast to the other fine and commodity chemicals, they are manufactured in smaller quantities and serve limited uses.

Consumers for fine chemicals have exacting criteria, many based on regulations or standards set by the end-use sector.

The pharmaceutical industry, for instance, is required by law to follow good manufacturing practices (GMP) at all stages of production,

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Expansion depends on trained personnel

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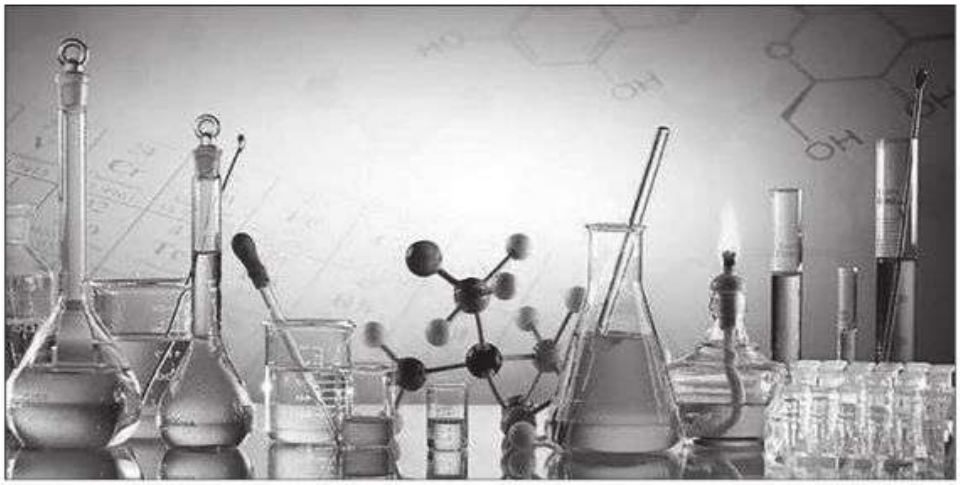
including the composition, concentration, purity, and stability of active pharmaceutical ingredients (API), inactive components, and packaging materials. The agrochemicals industry is also required by law to follow strict standards for active pesticide ingredients, including composition, concentration, purity, and stabilisation.



Future Possibilities for High-Purity Fine Chemicals

The expansion of the healthcare and pharmaceutical industries depends on the availability of trained personnel, appropriate infrastructure, adequate equipment, and high-purity chemicals. Clinical laboratories, the production and testing of pharmaceutical products, biopharmaceutical research and development, the food and cosmetics sectors, and clinical laboratories all employ these high-purity chemicals. The consistent availability of high-purity chemicals, such as high-purity excipients, biochemicals, analytical reagents, and microbiology culture mediums, is one of the critical drivers of innovation and productivity in the pharmaceutical business.

Some recently introduced solvents, such as GC HS grade, are appropriate for analysing residual solvents found in pharmaceuticals. High-purity mineral acids are devoid of metallic contaminants and are utilised to detect heavy metals in API, medication formulation, food, and drinks up to ppb levels. It has become a worry for both the environment and human health as the use of pesticides in agricultural goods has contaminated drinkable water and soil and increased chemical concentrations. Agriculture products are regularly checked for pesticide content to ensure they are safe for eating; to monitor pesticides by GC with an ECD detector in agricultural goods and soil, pesticide residue grade solvents are utilised.

The expansion of the pharmaceutical, biopharmaceutical, chemical, food, and beverage industries and research and development spending on privately funded and publicly funded initiatives all contribute to the growth of the high-purity fine chemicals market. Currently, 0.25 per cent of India's GDP is allocated to R&D. The government wants to increase this to 2% of GDP, with the private sector contributing 50% and the public sector contributing 50%.

The companies are coming up with the cutting-edge manufacturing facility for solvent purification and producing organic and inorganic salts to address the growing demand for high-purity fine chemicals in domestic and international markets for drug formulation, chemicals analysis of raw material and finished products in the pharmaceutical industry. The business boasts of a strong sales force, a trained technical services department, and a nationwide distribution network. The companies want to provide customers with affordable, high-quality goods that arrive quickly.

In conclusion, fine chemicals play a critical role in the pharmaceutical industry. They are essential for the development and production of life-saving drugs and therapies. The use of fine substances in drug development and manufacturing is expected to grow, driven by the increasing demand for personalised medicines and the growing focus on biological therapies. The pharmaceutical industry will continue to rely on fine chemicals to ensure that drugs are safe, effective, and of the highest quality. ❍

(The author is leading pharmaceutical consultant)

Cross-section of fine and speciality chemicals industry

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feature the full spectrum of fine and speciality chemicals for various applications and industries, including pharmaceuticals, agrochemicals, polymers, food and feed ingredients, flavours and fragrances, pigments and dyes, paints and coatings, household and cleaning chemicals, adhesives and sealants, leather and textile chemicals and electronics.

Exhibitors represent an excellent cross-section of the fine and speciality chemicals industry, with international organisations coming mainly from Germany, India, USA, France, United Kingdom, Switzerland and Belgium. The exhibitor list includes Albemarle, CABB AG, Dottikon Exclusive Synthesis AG, ESIM Chemicals, ICL Europe Coöperatief U.A., Ivict Europe GmbH / Mitsubishi Corporation, Robinson Brothers Ltd, Saltigo GmbH, Socma, Solvay and WeylChem.

Throwing more light on the event, Christiane Beck, Chemspec Europe, event manager, said, "The chemicals industry operates in a rapidly changing market. In particular, EU Green Deal presents the chemical industry in Europe with major challenges and huge investments necessary to realise a climate transition to sustainable chemicals whilst adapting to changing legislative measures and a circular economy by 2050. In this scenario, Chemspec Europe reconfirms its place as a stepping stone in the market to allow the exchange of knowledge within the international fine and speciality chemicals community and support the sector in finding the right suppliers to keep up-to-date with this fast-evolving industry."

Matchmaking Programme

All participants will be invited to access a free-of-charge Matchmaking Programme designed to directly connect visitors and exhibitors with complementary buyer and seller interests. The platform will allow visitors to search and find the right suppliers who provide the products, services or equipment they are interested in. In addition, a built-in compatibility function will display product recommendations based on visitors' preferences and allow them to connect directly with exhibitors for enquiries or to arrange private meetings ahead of the event, making the matchmaking programme a powerful planning tool to enhance business networking. ❍