CRISIL
An S&P Global Company

Assessment of the heterocyclic and fluoro-organic compounds industry

Survival Technologies Pvt Ltd

December 23, 2022

Contents

List of figures

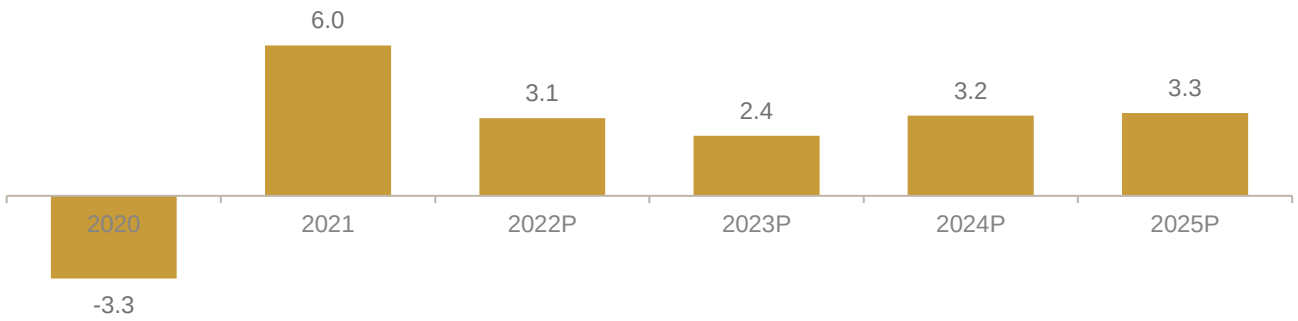
List of tables

1 Global macroeconomic overview

- Global gross domestic product (GDP) growth is projected at 3.1% for 2022. S&P Global has lowered its growth forecasts for period 2022 and 2023 and raised forecasts for inflation. Rising rates, increased European energy insecurity, and the lingering effects of COVID-19 are hitting growth almost everywhere; Asia-Pacific remains a relative outperformer.
- S&P Global expect the Russia-Ukraine war's economic impact to peak in 2022, but drag on amid on-again, off-again fighting. Financial conditions are currently tightening as central banks raise rates quickly, foreshadowing slower growth. Most leading and sentiment indicators are pointing toward slower growth as well.
- Eurozone is forecast to take the biggest hit to growth from the war, given its proximity to the war zone and higher exposure to volatile global energy costs. S&P Global expect a sharp slowdown in eurozone growth in near-term. A sharp slowdown in eurozone growth is imminent. An unprecedented deterioration in the terms of trade has pushed inflation to record highs
- Most Asia-Pacific countries have internalised Covid-19 and seem to be gaining pace in industrial activity. But they remain affected by volatile commodity prices. Core inflation has shot up in some Asia-Pacific economies, less so in others. It has soared in Australia, South Korea, and New Zealand and has remained high in India. On the other hand, it has stayed low in China and Japan and modest in Hong Kong, Indonesia, Malaysia, Taiwan, and Thailand

1.1 GDP outlook for 2022-25

Figure 1: Expected global GDP growth rate (%)



P: Projected

Source: S&P Global Economics, Oxford Economics

1.2 Trend in GDP growth across major economies

Table 1: GDP growth projection for major economies

Region	2021	2022	2023P	2024P	2025P
US	5.7%	1.6%	0.20%	1.6%	1.9%
Eurozone	5.2%	3.1%	0.30%	1.8%	1.7%
UK	7.4%	3.3%	-0.5%	1.4%	1.6%
China	8.1%	2.7%	4.7%	4.8%	4.7%

Japan	1.7%	1.6%	1.4%	1.4%	1.3%
India	-6.6%	8.7%	7.3%	6.5%	6.7%
Brazil	5.0%	2.5%	0.6%	2.0%	2.1%
Russia	5.5%	-8.5%	3.0%	1.0%	1.3%

Note: Fiscal year for India's GDP growth outlook, calendar year for other countries

Source: S&P Global, CRISIL Research

Sharp monetary tightening puts the brakes on global growth

Central banks are reversing their relaxed policy stance in response to continuing cost pressures in global supply chains, amplified after Russia's military actions in Ukraine destabilized energy, food, and other key commodity markets. As economic growth slows and financing conditions become tighter, higher interest rates, persistent inflation and renewed consumer caution could push the US, and potentially Europe, into a recession, likely in 2023.

Inflation, energy security and geopolitical uncertainty are risks

Persistent supply-side price pressures in the food and energy markets may fuel inflation, and the evolving repercussions of the Russia-Ukraine conflict could undermine global trade and economic growth. Other notable risks stem from governments prioritizing energy security and affordability over sustainability in the short term.

Table 2: CPI inflation projection (annual percentage change)

Region	2022	2023P	2024P
US	8.3	3.7	1.6
Europe			
Eurozone	8.2	5.2	2.2
Germany	8.4	7.0	2.2
France	6.1	3.3	1.9
Italy	7.8	4.3	1.9
Spain	10.1	5.6	1.3
UK	9.5	5.8	1.6
Asia-Pacific			
China	2.2	2.4	2.2

P: Projected,

Source: S&P Global

Inflation relief packages unveiled by US and European economies in 2022 to combat inflation

US: The US Congress passed the Inflation Reduction Act, 2022 committing $370 billion dedicated to curbing harmful emissions and promoting green technology. The Act also aims to help individuals who need better healthcare benefits and financial stability in times of inflation, in addition to reducing the effects of inflation.

France: France unveiled a €20 billion anti-inflation package to assist struggling people deal with rising energy and food prices. The package includes increasing certain welfare payments and pensions by 4%, raising civil servants' salaries by 3.5%, fuel rebates by €0.12 a litre from September-October 2022 and promoting private companies to provide employees with tax-free bonuses of up to €6,000.

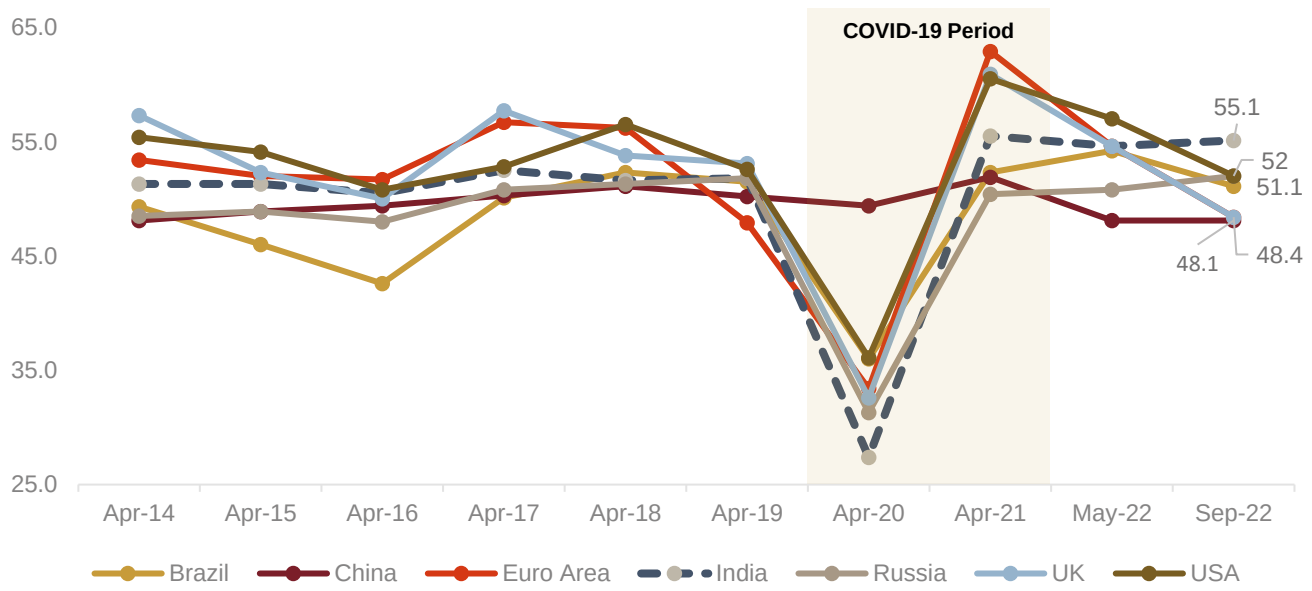
Germany: Germany unveiled a fresh €65 billion inflation relief package to help households cope with the rising prices. The package includes cheaper public transportation, one-off payment of €300 to pensioners to help them cover rising energy bills, and reduction in the tax on petrol.

Italy: Italy approved a €17 billion package to tackle inflation arising from high energy cost and consumer prices. The package includes cutting electricity and gas bills for low-income families, tax cuts and re-evaluation of pensions. It also aims to support farmers against drought.

1.3 Impact of Covid-19 on the manufacturing sector

Manufacturing Purchasing Managers' Index (PMI) numbers across economies have followed roughly similar patterns in the past few years. The index plummeted in the wake of the initial lockdowns across the world, and rebounded sharply, even above pre-pandemic levels, as restrictions were relaxed and fiscal incentives to boost the economy became common across countries. PMI has since followed a pattern wherein the scare of each pandemic wave has impacted it severely, with the trend moderating in the later months of 2021 and continuing into 2022, even in the wake of the Russia-Ukraine conflict.

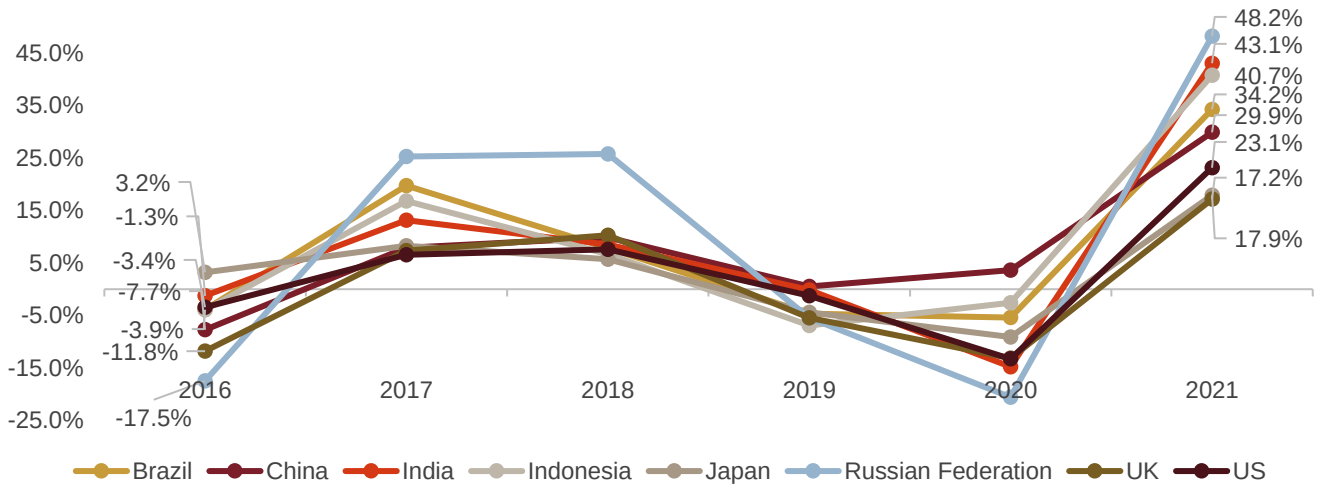
Figure 2: Manufacturing PMIs



Source: S&P Global

The Indian manufacturing industry had a strong start to fiscal 2023, with significant and accelerated increases in new orders and production. Following a decline in March, international sales increased steadily. India's PMI grew from 54.0 in March 2022 to 55.1 in September 2022. It marked the 15th straight month of expansion in the manufacturing sector due to growth in output and orders, on the back of continued easing of pandemic restrictions. Trade growth patterns for some key economies are represented below, highlighting very similar patterns for imports and exports.

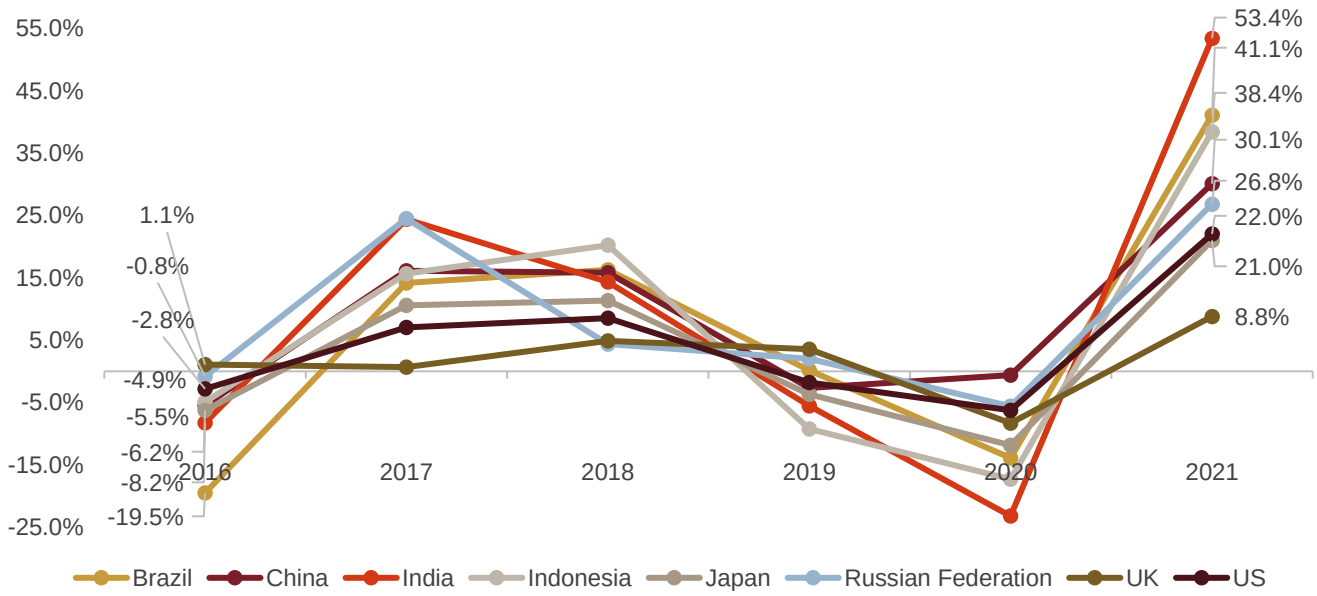
Figure 3: Annual growth (%) in exports



Note: Data for calendar year

Source: UNCTAD

Figure 4: Annual growth (%) in imports



Note: Data for calendar year

Source: UNCTAD

1.4 Changing outlook on manufacturing in China

With the recent pandemic, companies have begun to express concerns about manufacturing in China. The pandemic, which originated in Wuhan, disrupted supply chains and crippled business production the world over. The trade war between the US and China has also prompted many businesses to rethink their global supply chains. The pandemic highlighted to many multinational corporations how much they relied on Chinese manufacturing — from raw materials to contract manufacturing to production facilities, prompting many to seek alternative locations. In addition, driven by the impact of Covid-19 on the global supply chain, and geopolitical

tensions, global manufacturers are looking to diversify and expand their sourcing of products from different manufacturers across jurisdictions to minimize operational disruptions.

India to benefit from China's downturn

COVID pandemic highlighted the risk of high dominance of China in global supply chain and led to China+1 strategy taking shape. This creates an opportunity for Indian manufacturers, which have a cost advantage. This is expected to support the growth momentum for key end-user industries and augurs well for the specialty chemicals market.

Table 3: Competitiveness of India vs China

Parameter	US/Europe	China	India
Labour cost			
Environmental compliance			
Plant capex			
Government policy support			
Conduciveness of recent geopolitical landscape			

Note: Colour of the pie indicates relative advantage of a particular country/region vis-à-vis others in relation to a particular parameter. A fully coloured pie indicates maximum advantage compared with the other two regions.

Source: CRISIL Research

Several Indian companies are looking to set up global-sized plants to cater to growing domestic and global demand. The government is also supporting manufacturing in India. Initiatives such as Make in India, corporate tax reduction to 25%, and petroleum, chemicals, and petrochemicals investment regions (PCPIRs), are expected to create significant opportunities for manufacturers. This was reflected in India's Ease of Doing Business ranking improving to 63 in 2020 from 142 in 2014.

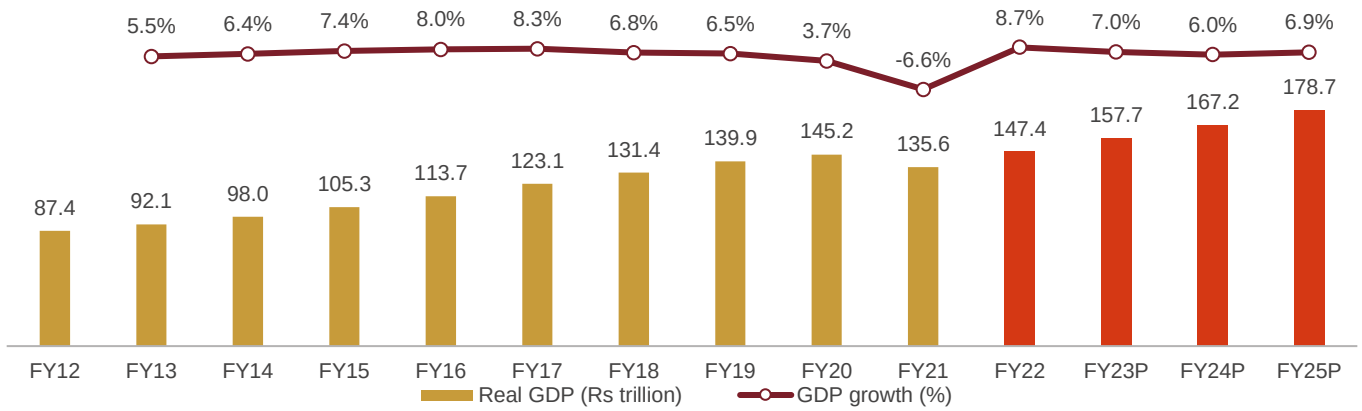
Due to India's competitive advantage in multiple industries, favourable production characteristics, a favourable business environment and positive government policies, India is expected to be the next best prospect to benefit from this changed position. The government has implemented production-linked incentive (PLI) programmes for a variety of industries, such as textiles and electronics, as well as boosting import levies on several products. Global macro tailwinds in some industries such as textiles, speciality chemicals, pharmaceuticals, metals, and electronic manufacturing, along with sensible government reforms, are projected to put India on a sustainable economic path.

2 Indian macroeconomic overview

2.1 India to remain fastest growing economy despite GDP growth of 7% in fiscal 2023

India is expected to grow at a faster clip than its peers, driven by stronger domestic demand. Investment prospects are optimistic given the government's capex push, progress of the Production-Linked Incentive (PLI) scheme, healthier corporate balance sheets, and a well-capitalized banking sector with low non-performing assets (NPAs). That said, CRISIL Research has recently revised its real GDP growth projection for India to 7% this fiscal, with downside risks of heightened geopolitical tensions. It still expects India to remain the fastest-growing economy.

Figure 5: India GDP outlook



F: Forecast

Source: CRISIL Research, Central Statistics Office (CSO), S&P Global Economics, Oxford Economics

Factors that will shape growth this fiscal and next

- The global slowdown will impact domestic industrial activity through the exports channel
- The one-time lift to contact-based services from domestic demand will abate next fiscal, but government capex will stay supportive
- Tightening domestic financial conditions will hurt growth next fiscal

2.2 The economy's path from pre-pandemic to current times

The growth outlook for fiscal 2023 is fettered by multiple risks. Global growth is projected to slow, as central banks in major economies withdraw easy monetary policies to tackle escalating inflation. This, together with high commodity prices, especially of oil (CRISIL Research expects Brent crude to average $95-105/barrel in fiscal 2023), translates into negative terms-of-trade for India. At the same time, higher and broad-based inflation domestically will create a drag on consumption. Uncertainty due to the Russia-Ukraine conflict could put some of the private capex plans on the back burner. Higher input prices could also result in lower government capex, which has already seen fiscal space shrink with attention shifting to measures to fight rising inflation.

Table 4: Demand side (Rs lakh crore at constant prices)

	GDP	PFCE	GFCE	GFCF	Exports	Imports
FY20 (2nd RE)	145.15	82.59	14.84	46.11	28.14	33.21
FY21 (1st RE)	135.58	77.63	15.37	41.31	25.54	28.62

FY22 (PE)	147.35	83.77	15.77	47.84	31.74	38.78
FY22 over FY20 (%)	1.49%	1.43%	6.27%	3.75%	12.79%	16.77%

PFCE: Private final consumption expenditure; GFCE: Government final consumption expenditure; GFCF: Gross fixed capital formation

PE: Provisional estimates, RE: Revised estimates

Source: NSO, CRISIL Research

Table 5: Supply side (Rs lakh crore at constant prices)

	GVA	Agri and allied	Mining	Manufacturing	Electricity, gas, etc.	Construction	Trade, hotels, etc.	Financial services, real estate, etc.	Public admin and others
FY20 (2nd RE)	132.19	19.82	3.21	22.61	3.00	10.38	26.89	28.97	17.27
FY21(1st RE)	125.85	20.48	2.94	22.47	2.89	9.62	21.47	29.61	16.33
FY22 (PE)	136.05	21.09	3.27	24.70	3.11	10.73	23.85	30.87	18.38
FY22 over FY20 (%)	2.92%	6.41%	1.87%	9.24%	3.67%	3.37%	-11.31%	6.56%	6.43%

PE: Provisional estimates, RE: Revised estimates

Source: NSO, CRISIL Research

2.3 Macroeconomic indicators

Table 6: Key projections

	FY17	FY18	FY19	FY20	FY21	FY22	FY23P	FY24P
Real GDP growth (%)	8.3	6.8	6.5	3.7	-6.6	8.7	7.0	6.0
CPI[1] (%, average)	4.5	3.6	3.4	4.8	6.2	5.5	6.8	5.2
CAD[2]/GDP (%)	-0.7	-1.8	-2.1	-0.9	0.9	1.2	3.0	2.7
FAD[3]/GDP (%)	3.5	3.5	3.4	4.6	9.2	6.9	6.4	9.0
Exchange rate (Rs/$, March-end)	65.9	65	69.5	74.4	72.8	76.2	78.0	82.0
10-year G-sec yield (%, March-end)	6.8	7.6	7.5	6.2	6.2	6.8	7.5	7.4

E: Estimated; P: Projected

[1]Consumer price index; [2]Current account deficit; [3]Fiscal deficit

Source: CSO, RBI, CRISIL Research

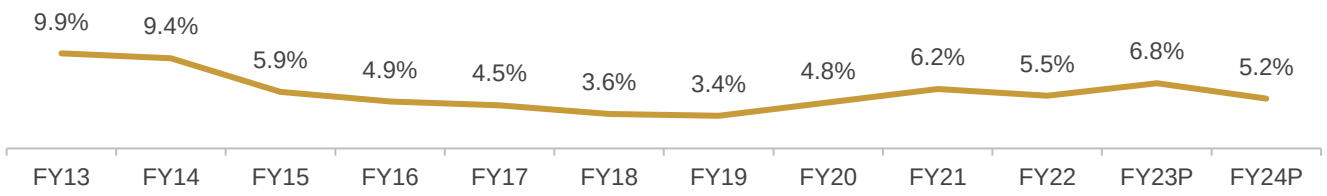
2.4 Inflationary pressures set to rise and broaden this fiscal

Headline Consumer Price Index (CPI) inflation moderated to 5.5% on-year in fiscal 2022 from 6.2% in the previous fiscal. The fall was largely driven by food, which fell sharply to 3.8% from 7.7%. The other two components, namely fuel (11.3% vs 2.7%) and core (6.0% vs 5.5%), saw inflation rise. Fuel inflation will remain high due to the sharp rise in crude oil prices. CRISIL Research expects CPI inflation to rise to 6.8% on average this fiscal. The Russia-Ukraine war has dealt a severe blow to energy and food supplies. Energy prices are projected to rise over 50% this fiscal, and non-energy prices 20%, according to the World Bank latest commodity outlook.

The average crude oil price in the first half of fiscal 2023 was $99.98 per barrel. CRISIL Research expects Brent crude to average $95-105/barrel in fiscal 2023 compared with $80 per barrel in fiscal 2022. However, there is an

upside risk as crude oil prices hinge on the ongoing conflict between Russia and Ukraine and the OPEC supply scenario.

Figure 6: CPI inflation development (%, y-o-y)



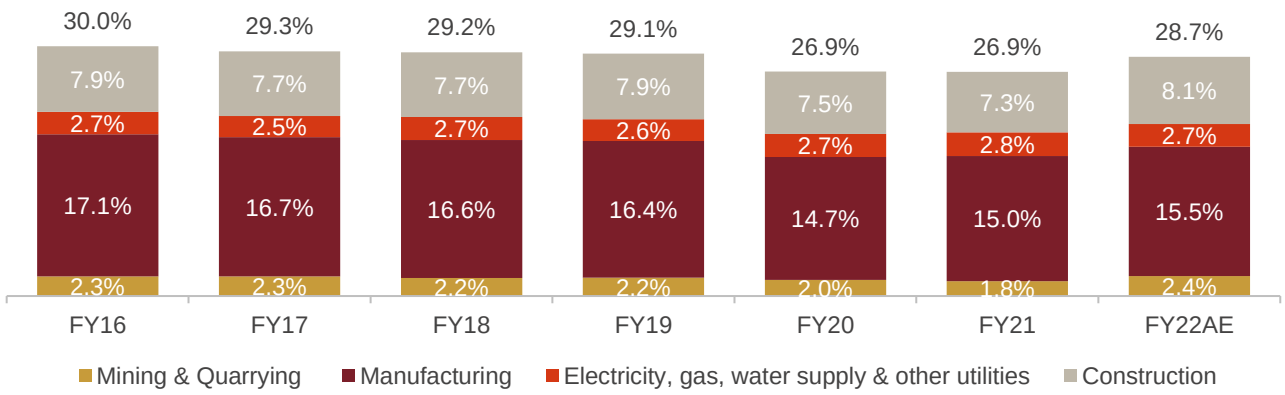
P: Projected

Source: CSO, CRISIL Research

2.5 Industrial sector to grow 11.8%, contribute 29% to GDP in fiscal 2022

In fiscal 2021, the industrial sector accounted for 26.9% of nominal gross value added (GVA), at current prices. According to the NSO's advance forecasts for fiscal 2022, the industrial sector was predicted to rebound and grow at 11.8%, increasing its contribution to GDP to 28.7% in fiscal 2022. Manufacturing dominates the industrial sector, accounting for 15.0% of nominal GVA in fiscal 2021. Manufacturing is anticipated to grow 9.9%, mining and quarrying 11.6%, construction 11.5%, and electricity, gas and water delivery 7.5% in fiscal 2022, based on advance estimates released by the NSO. This improvement comes after an industrial contraction in the previous fiscal.

Figure 7: Share of industrial and its components in GVA



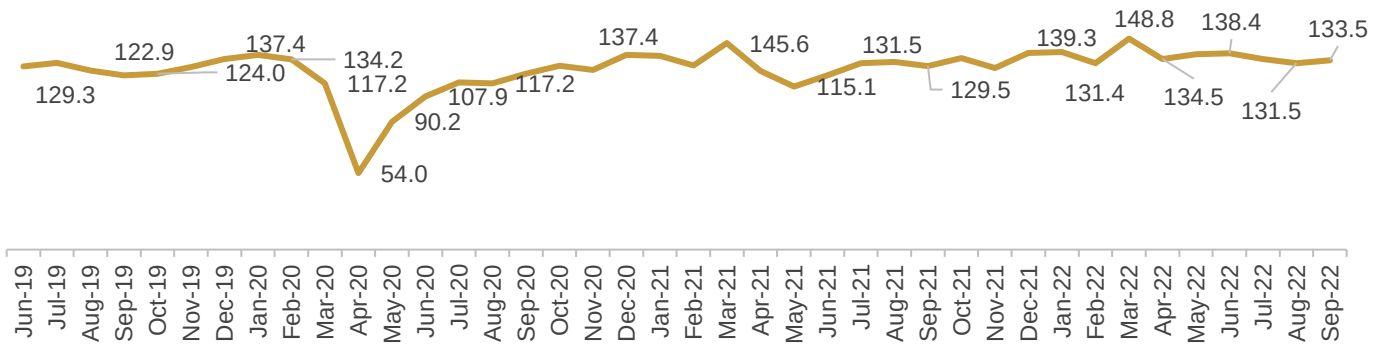
AE: Advance estimates, Note: Advance estimates for FY22; Data at current prices

Source: National Accounts Statistics, 2021

2.6 Index of Industrial Production (IIP) exhibited recovery

IIP declined 0.8% on-year in August 2022.The decline in IIP was driven by the manufacturing sector. Export-oriented sectors were hit by slowing global growth. Domestic-oriented sectors like consumer non-durables and infrastructure and construction goods also witnessed falling activity. IIP exhibited recovery in September. All sectors have contributed to the increase in IIP data during September.

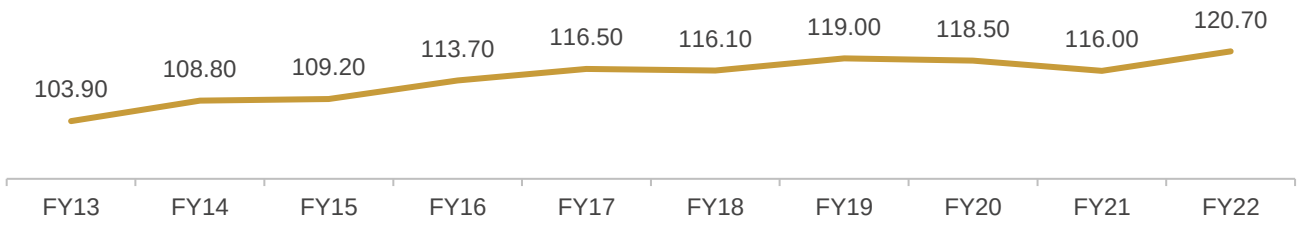
Figure 8: Value of IIP



Source: Ministry of Statistics and Programme Implementation

Note: Figures for September 2022 are quick estimates

Figure 9: IIP (manufacture of chemicals and chemical products)

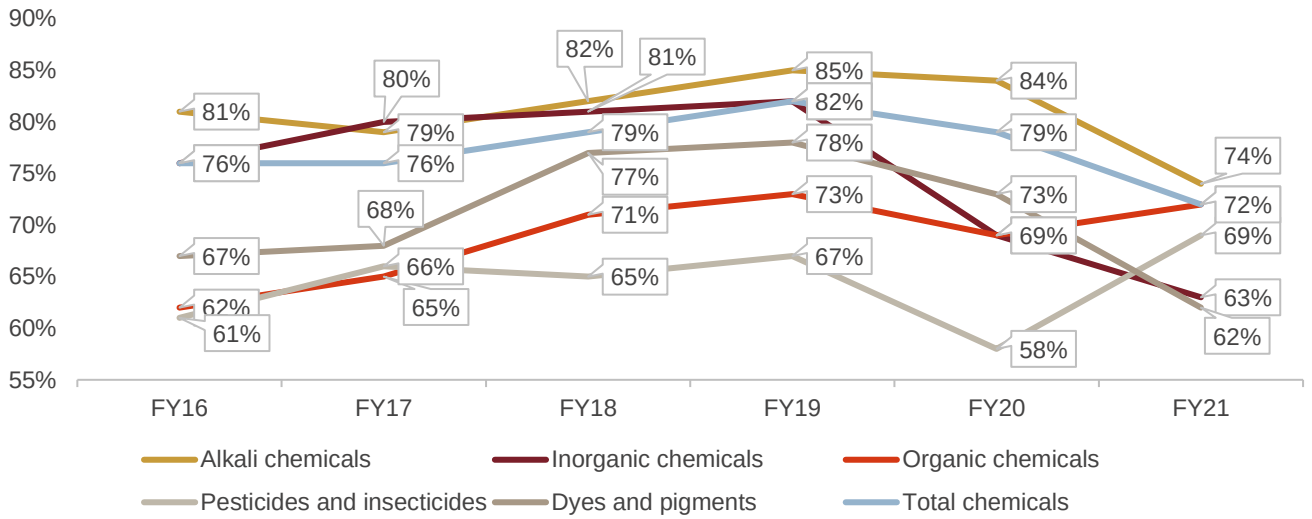


Source: Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers

2.7 Indian chemical sector expected to grow 1.5x by 2025

India is the world's sixth-largest chemical manufacturer, and accounts for 3.4% of worldwide chemical production. The Indian chemical industry was valued at $178 billion in 2019 and is expected to grow to $304 billion by 2025. The country's chemical sector is extremely diverse, with over 80,000 products, over 2 million people employed and a strong foundation for innovation because of a network of 200 national laboratories and 1,300 research and development (R&D) centres.

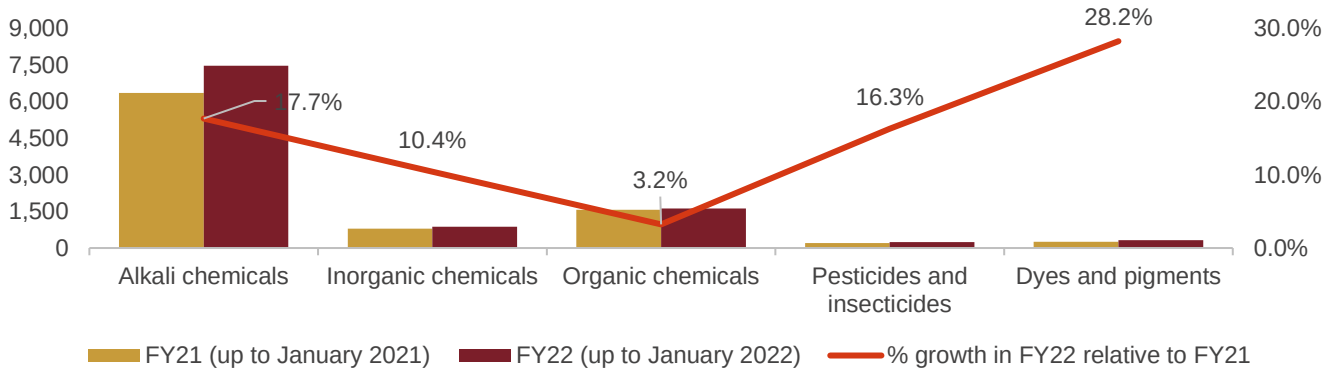
Figure 10: Capacity utilisation for major chemicals



Note: Based on master production records (MPRs) received by the department of Chemicals and Petrochemicals from manufacturers under large- and medium-scale units only

Source: Department of Chemicals and Petrochemicals

Figure 11: Production of major chemicals ('000 MT)



Note: Based on MPRs received by the department from manufacturers under large- and medium-scale units only

Source: Department of Chemicals and Petrochemicals

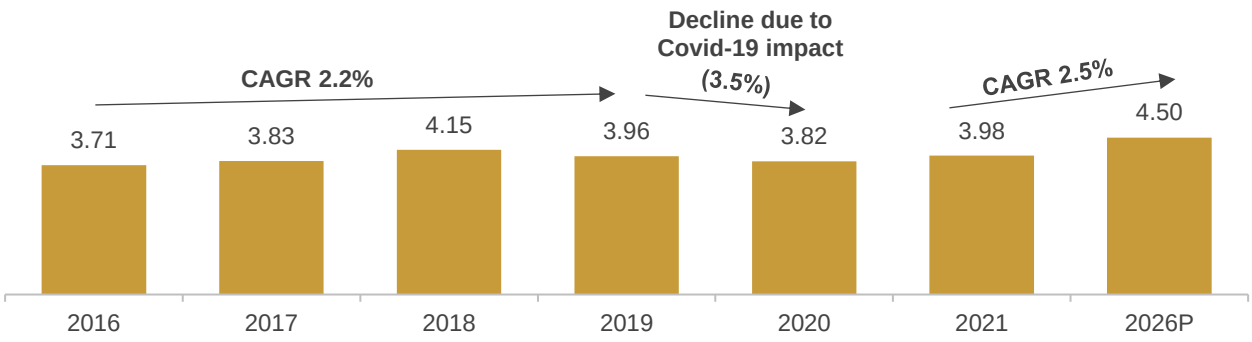
Production of all major chemicals viz. alkali chemicals, inorganic chemicals, organic chemicals, pesticides & insecticides, and dyes & pigments has increased during the period compared to the last year.

2.8 PLI scheme for chemicals

The Department of Chemicals and Petrochemicals (DCPC) has identified around 100 chemicals / intermediates imported in large value, and these chemicals are used in manufacturing products that have substantial export potential. These 100 chemicals are proposed to be supported under the production linked incentive (PLI) scheme for the chemical sector. The proposed PLI scheme aims at incentivising domestic production of intermediates and raw materials for agrochemicals, dyestuffs, and pharmaceuticals with emphasis on domestic value-addition. While the PLI scheme for basic chemicals has not been introduced yet, the government has introduced PLI schemes cumulatively worth ~Rs. 21,940 crores as incentives for manufacturing of Key Starting Materials (KSMs) / Drug Intermediates (DIs), Active Pharmaceutical Ingredients (APIs) and other products in India. In February 2022, the Minister of Chemicals and Fertilizers said the government is planning to announce a PLI scheme for the chemical sector to promote domestic production and exports and solve the trade deficit problem.

3 Global chemical and speciality chemical industries

Figure 12: Global chemical industry size ($ trillion)

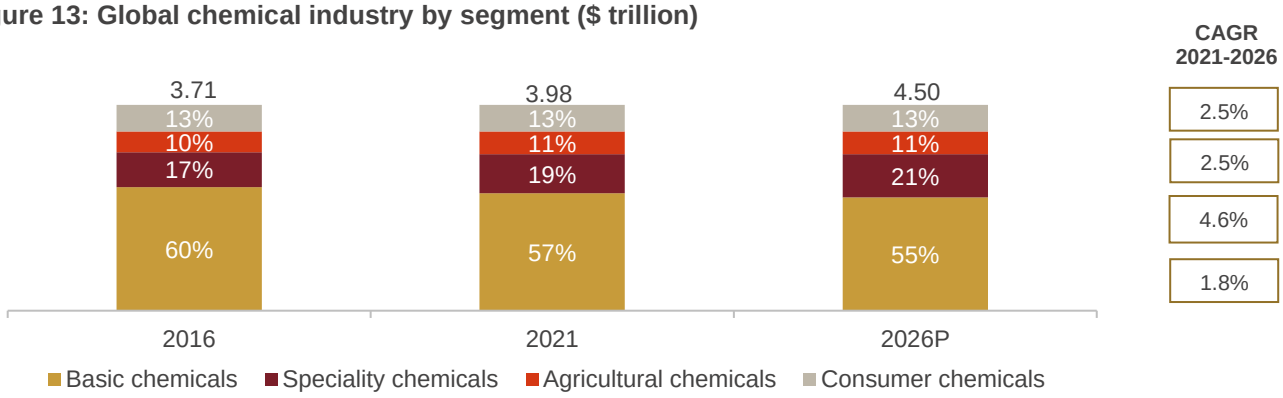


P: projected | Data for each calendar year

Note: Industry size excluding pharmaceuticals

Source: CRISIL Research

Figure 13: Global chemical industry by segment ($ trillion)



P: projected | Data for each calendar year

Source: CRISIL Research

3.1 India's positioning in the global chemical industry

As of 2020, the Indian chemical industry had a share of ~3% in the global chemical industry. It is ranked sixth at the global level and fourth in Asia. The country ranks eighth in global export of chemicals (excluding pharmaceutical products) and seventh in global import of chemicals (excluding pharmaceutical products).

Table 7: Chemical exports

Exporters	Exports ($ bn)	Share in world exports (%)		
Regions/ countries	**2020**	**2005**	**2010**	**2020**
EU	1,036	50.0%	46.0%	47.4%
US	212	10.9%	11.2%	9.7%
China	169	3.2%	5.2%	7.7%
Switzerland	125	4.0%	4.3%	5.7%
Japan	79	4.8%	4.6%	3.6%

Exporters	Exports ($ bn)	Share in world exports (%)		
Regions/ countries	**2020**	**2005**	**2010**	**2020**
South Korea	74	2.5%	2.9%	3.4%
UK	66	5.2%	4.3%	3.0%
India	**53**	**1.0%**	**1.4%**	**2.4%**
Singapore	51	2.4%	2.3%	2.3%
Canada	36	2.4%	2.0%	1.7%
Above 10	**1,901**	**86.4%**	**84.1%**	**87.0%**

Source: World Trade Organization (WTO Statistical Review, 2021)

Table 8: Chemical imports

Exporters	Imports ($ bn)	Share in world imports (%)		
Regions/ countries	**2020**	**2005**	**2010**	**2020**
EU	834	41.4%	37.9%	36.2%
US	283	11.4%	10.1%	12.3%
China	212	6.7%	8.5%	9.2%
Japan	73	3.3%	3.5%	3.1%
UK	68	4.7%	4.0%	2.9%
Switzerland	57	2.3%	2.1%	2.5%
India	**53**	**1.2%**	**2.0%**	**2.3%**
South Korea	51	2.1%	2.3%	2.2%
Canada	50	2.8%	2.4%	2.2%
Mexico	43	2.1%	1.9%	1.8%
Above 10	**1,723**	**78.0%**	**74.7%**	**74.7%**

Source: World Trade Organization (WTO Statistical Review, 2021)

The size of the Indian chemical industry, excluding fertilisers and pharmaceuticals, was $115-120 billion in fiscal 2021. Including fertilisers and pharmaceuticals, it was $160-180 billion.

3.2 Global speciality chemical market to log 4-5% CAGR by 2026

Speciality chemicals are low-volume, high-value chemicals with specific applications classified based on end-user industries. They can be single-chemical formulations or entities whose composition affects how the end-product performs and is processed. The major distinction between speciality chemicals and commodity chemicals is that speciality chemicals are produced through extensive R&D and typically are synthesized using multiple step reactions as compared to one or two steps in the case of commodity chemicals. A speciality chemical has only one or two primary applications, whereas a commodity chemical may have hundreds of varied applications. These high-value compounds are created via speciality chemistry and are employed in a variety of essential goods for consumers and business, including medications, agricultural chemicals and performance chemicals. In the speciality chemical industry, custom synthesis is a common service provided to customers.

Table 9: Comparison between commodity and speciality chemicals

Parameters	Commodity chemicals	Speciality chemicals
Type	Single basic chemicals; starting materials for the chemical industry	Formulations of chemicals containing one or more fine chemicals as active ingredients

Parameters	Commodity chemicals	Speciality chemicals
Sub-categories	Petrochemicals, basic chemicals, heavy organic and inorganic chemicals, (large volume) monomers, commodity fibres, and plastics	Adhesives, agrochemicals, biocides, catalysts, dyestuffs and pigments, enzymes, electronic chemicals, flavours and fragrances, food, and feed additives
Pricing indications	Rs 30-200/kg	Rs 500-800/kg for usual speciality chemicals, with potential for significantly higher per kg pricing for niche products
Production	High volume production (in thousand ton/ year); mass produced in continuous-process plants, using standardised reactions	Produced in limited quantities (10-500 ton/ year); blended in customised batches
Manufacturing steps	Limited steps (1 or 2)	Multiple steps (2 or more); for synthesis of intermediates and APIs, steps can range between 5 and 20
Usage	Based on their versatility as raw materials	Based on specific functionality

Source: CRISIL Research

Barriers to entry in the speciality chemical industry are typically high. The specialised nature of products leads to significant differentiation. Substantial R&D requirements, technical know-how, capital intensity service capabilities, customer relationships, and engineered or regulated specifications also create important barriers to entry. Although these barriers are not homogeneous across the industry, most speciality chemical companies enjoy the benefits of one or more of them.

The speciality chemicals industry was valued at $750-770 billion at the global level in 2021. The segment clocked 3-4% Compound annual growth rate (CAGR) over 2016-21. Agrochemicals and performance chemicals contribute the highest to the global speciality chemical revenue pie, accounting for 8-10% share each in 2021. The use of agrochemicals is rising because of increasing demand for agro products, led by population growth and improving propensity to buy owing to rapid industrialisation globally.

Global speciality chemical industry classification (2021)

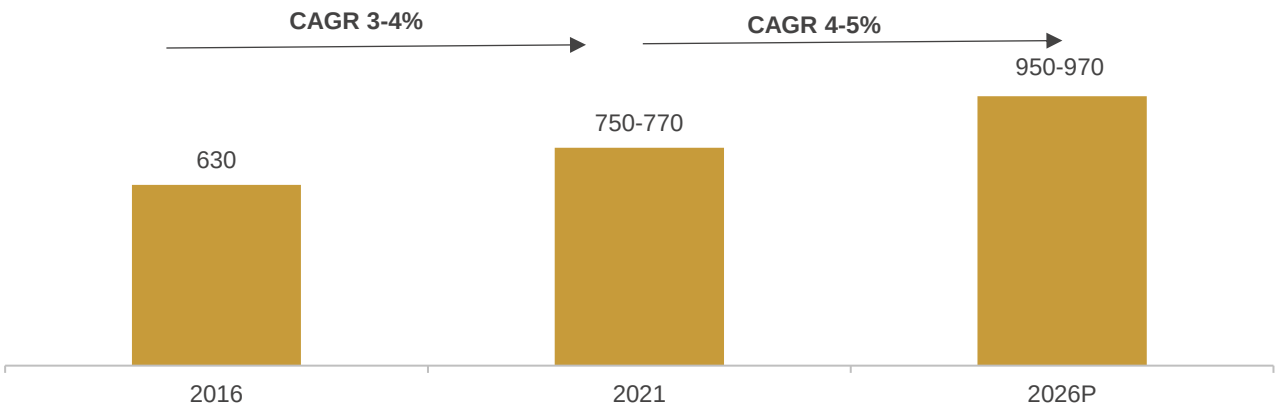
Speciality chemical classification	(% share in global market)
Agrochemicals	8-10%
Performance chemicals (includes multiple sub-segments)	8-10%
Construction chemicals	7-8%
Home and personal care chemicals	6-7%
Electronic chemicals	6-7%
Dyes and pigments	6-7%
Flavours and fragrances	5-6%
Polymer and plastic additives	4-5%
Food additives	4-5%
Pharma intermediates	4-5%
Textile chemicals	3-4%
Speciality coatings	3-4%
Oilfield chemicals	3-4%
Others	18-33%

Note: The performance chemical segment includes various sub-segments, such as antioxidants, anti-wear additives, flotation agents, solvents, surfactants, emulsifier, solvents, and chemical intermediates

Source: CRISIL Research

In 2020, the global specialty chemicals space declined 3-4% on-year because of the fallout of Covid-19. However, the segment is estimated to have recovered in 2021. Between 2021 and 2026, the market is expected to grow at 4-5% CAGR to $950-970 billion.

Figure 14: Global speciality chemical market size ($ billion)



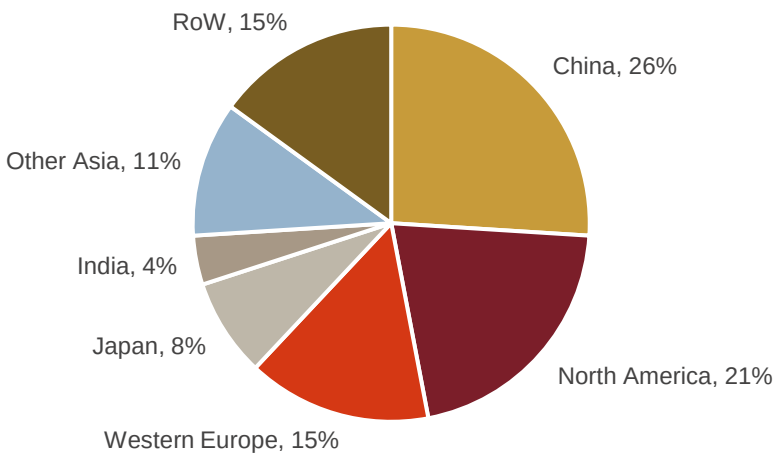
P: projected | Data for each calendar year

Source: CRISIL Research

3.3 APAC – key contributor to global speciality chemical market in 2021

Developed countries (particularly the US) and emerging countries in Asia-Pacific (APAC) have seen a significant shift in the speciality chemical industry in the past two decades. This has mainly been due to stricter environmental norms in western countries, coupled with cost advantages enjoyed by companies in emerging markets in terms of logistics and labour. The shift is also because companies are relocating closer to demand centres and optimising their supply chains. In 2021, APAC accounted for majority of the global speciality chemical market, with a share of 48-50%, followed by North America and Western Europe.

Figure 15: Market share of key countries in speciality chemicals in 2021

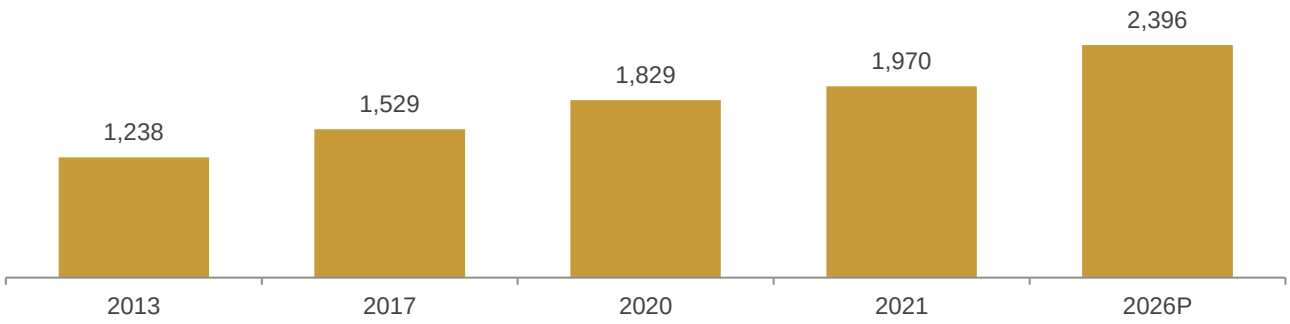


Source: CRISIL Research

3.4 China's chemical industry performance

Figure 16: Growth of China's chemical industry ($ billion)

CAGR: 2013-2021: 6.0%
CAGR: 2021-2026P: 4.0%



P: projected | Data for each calendar year

Source: CRISIL Research, Cefic (European Chemical Industry Council)

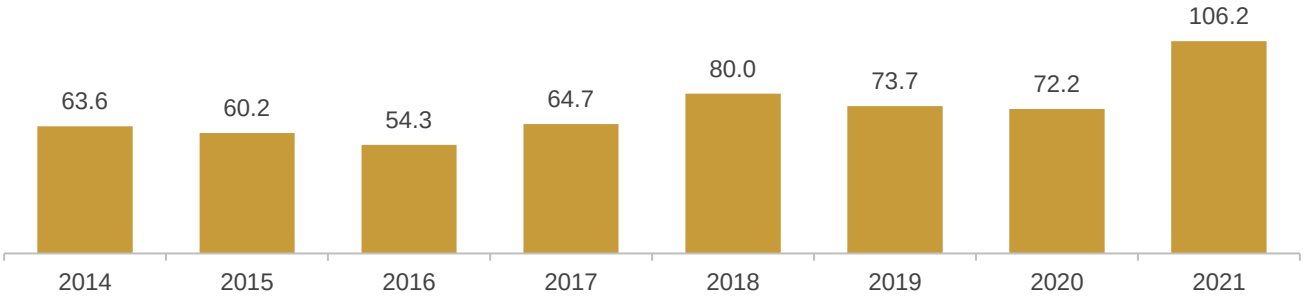
The Chinese chemical industry logged 6% CAGR over 2013-21. The industry is expected to clock a relatively slower CAGR of ~4% over 2021-26. Chemical demand growth is expected to taper in the consumer goods and electronics industries. Meanwhile, the automotive sector is expected to drive demand.

3.5 China's speciality chemical market is eroding

China's speciality chemical market has been on a downtrend in recent years, primarily because of environmental norms introduced by the government which led to the closure of several chemical plants as well as recent global geo-political tensions with the US and most corporates either planning or in the process of implementing supply chain diversification strategies.

The Chinese government started implementing stricter environmental protection norms from January 2015 to control pollution and has imposed strict penalties on polluting industries, including chemicals. As a result, capital and operating expenditures of chemical companies are rising, making the output less competitive in the export market. China's chemical exports have been on a downtrend since 2015. In 2017, ~40% of the chemical manufacturing capacity in China was temporarily shut down for safety inspections, with over 80,000 manufacturing units charged and fined for breaching emission limits. While exports rose in 2017 and 2018, as most plants restarted production, the trend has again turned south over the past two years. Domestic demand is also declining because of slowing economic growth. China's economy is expected to grow at a relatively slow pace in the coming years, resulting in reduced domestic demand.

Figure 17: Trend in China's chemical exports ($ billion)



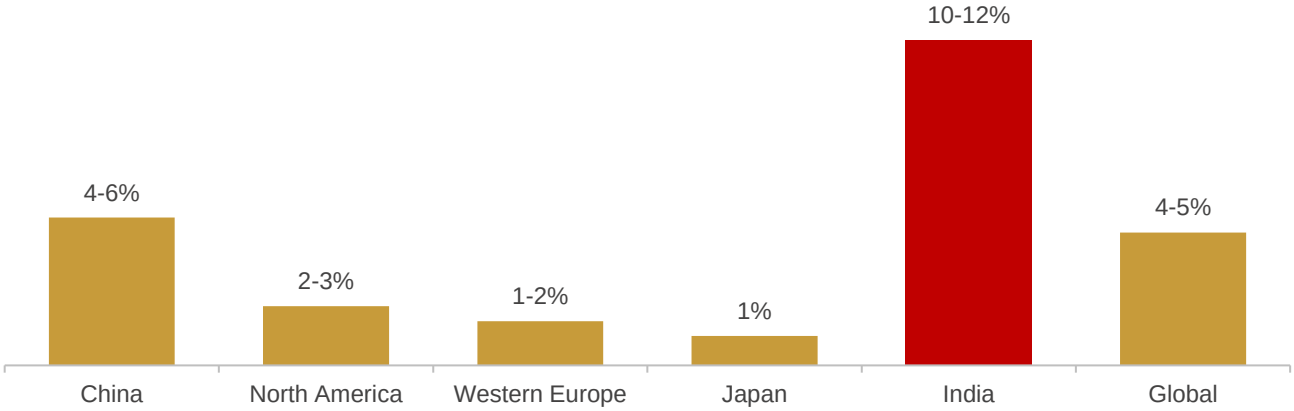
Note: Data for each calendar year

Source: UN Comtrade. Export of goods under HS codes 28 and 29 considered

3.6 Indian market expected to grow sharply as compared to other regions

By region-wise demand, India's speciality chemical industry is expected to post 10-12% CAGR over 2021-26 owing to rising demand from end-user industries, along with tight global supply on account of stringent environmental norms in China. In contrast, markets such as the Americas, Europe and Japan are expected to clock less than 3% CAGR over the next five years because of industry saturation in these regions. China's speciality chemical industry saw historic growth rates of ~20% and above until 2013, driven by a low-base effect. It exhibited a moderate CAGR of 9-10% over 2013-21 and is expected to witness a relatively slow CAGR of 4-6% over 2021-26.

Figure 18: Region-wise growth in speciality chemicals (2021-26, CAGR)

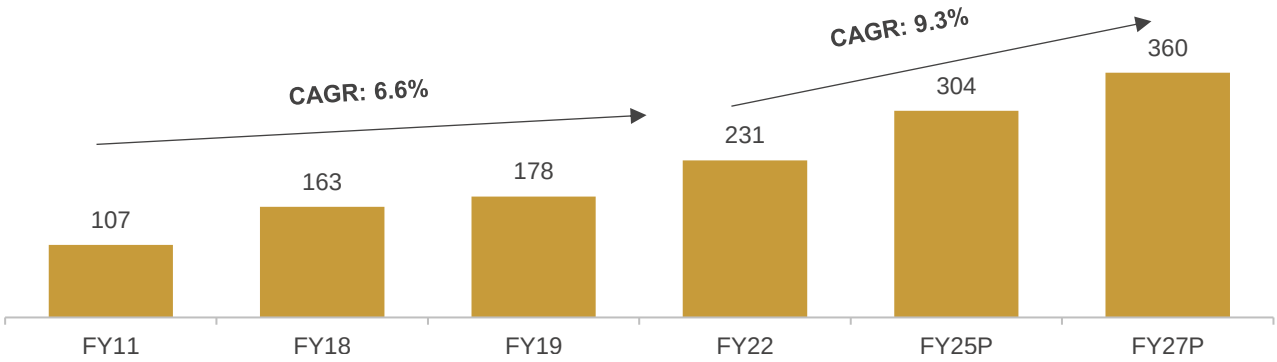


Source: CRISIL Research

4 Indian chemical and specialty chemical industries

4.1 Indian chemical industry

Figure 19: Indian chemical industry development ($ billion)



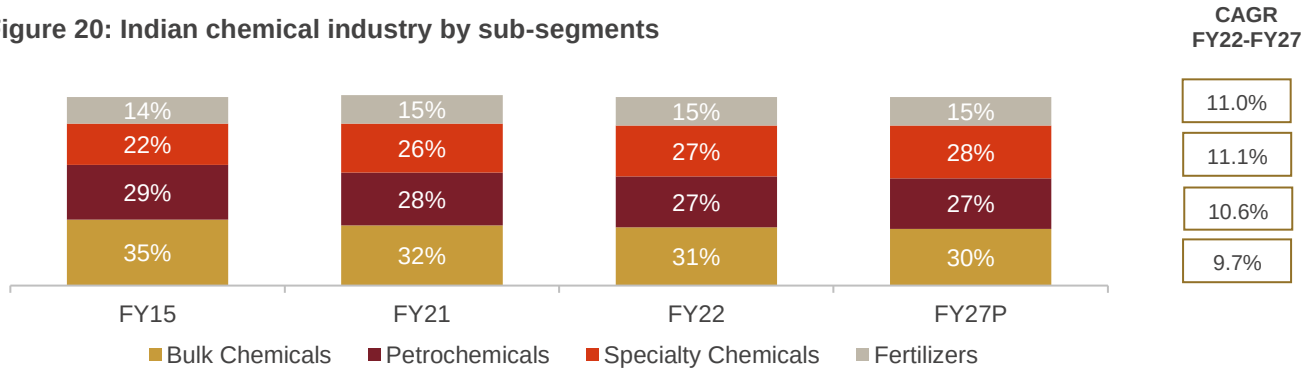
Note: Market size including (Biotech, Pharmaceuticals), Market size is based on consumption

P: Projected

Source: Department of chemicals and petrochemicals

The Indian chemical industry is a key constituent of the country's economy, accounting for 2.28% of the GVA (including pharmaceuticals) for all economic activities in fiscal 2020 compared with 2.23% in fiscal 2015. In 2020, it ranked sixth in the world in terms of revenue (excluding pharmaceuticals) and accounted for 2.7% of the global chemical industry compared with 2.5% in fiscal 2010. The Indian chemical industry is expected to double at 9.3% CAGR over fiscals 2019-25.

Figure 20: Indian chemical industry by sub-segments



Note: Segments excluding Pharmaceuticals

P: Projected

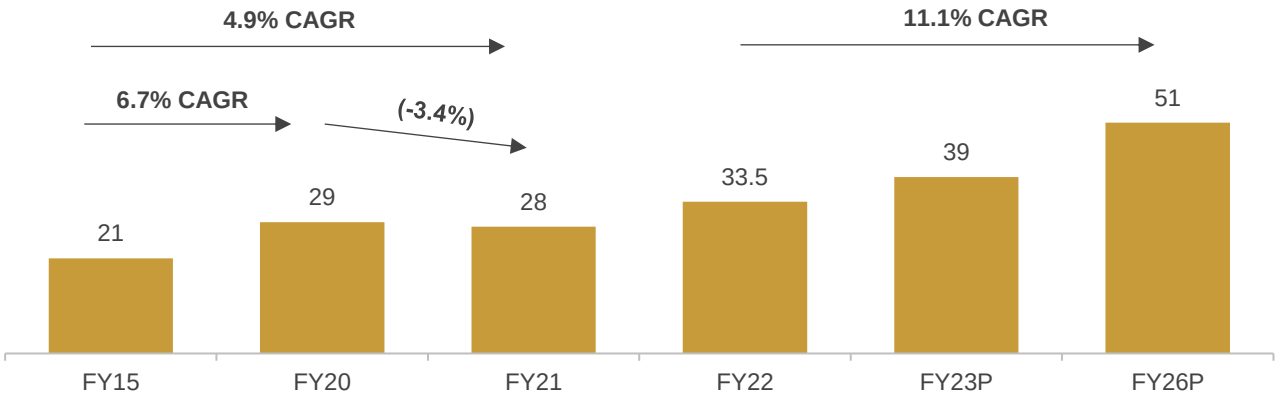
Source: CRISIL Research

4.2 Indian specialty chemical industry

The Indian specialty chemicals industry, accounting for ~26% of the overall chemicals industry (excluding pharmaceuticals), was worth $29 billion in fiscal 2020. The industry expanded at 6.7% CAGR over fiscals 2015-20, driven by an increase in domestic offtake from various end-user industries and rising exports. However, in fiscal 2021, the industry declined 3.4% on-year because of a slowdown in economic activity and the consequent decline in demand from end-user industries. The industry exhibited recovery in fiscal 2022 with an estimated worth of $33.5

billion. The Indian specialty chemical industry is expected to reach $51 billion by fiscal 2026, growing at 11.1% CAGR over 2022-26.

Figure 21: Indian specialty chemicals industry's trajectory ($ billion)



P: Projected

Note: Market size is based on consumption

Source: CRISIL Research

Table 10: Major sub-segments within the specialty chemicals market (value terms) in fiscal 2022

Segments	Market value ($ billion)	Market share %
Dyes and pigments	5.36	16.0%
Paints and coatings	4.52	13.5%
Agrochemicals	4.86	14.5%
Specialty polymers	2.85	8.5%
Plastic additives	1.34	4.0%
Home care surfactants	1.34	4.0%
Construction chemicals	1.01	3.0%
Textile chemicals	1.01	3.0%
Flavours and fragrance	0.67	2.0%
Water chemicals	0.67	2.0%
Cosmetic chemicals	0.67	2.0%
Paper chemicals	0.67	2.0%
Others	8.38	25.0%

Source: CRISIL Research

Note: CRISIL Research considers personal care ingredients, polymer additives, water chemicals, textile chemicals, construction chemicals, surfactants, and flavours and fragrances as specialty chemical categories.

The specialty chemicals industry presents significant entry barriers, including customer validation and approvals, expectation from customers for process innovation and cost reduction, high quality standards and stringent specifications, as well as various client and regulatory approvals that are required to be obtained.

4.3 Favourable global factors

China, a major player in commodity chemicals, has seen reduced focus on specialty chemicals. China's specialty chemicals market has seen a downturn in recent years due to various factors. Most prominent being the

introduction of stringent environmental norms, which has led to the shutdown of several chemical plants. Also, the Chinese government has mandated the construction of compulsory effluent treatment plants and imposed green tax on the chemicals industry to combat pollution. This coupled with increasing wage costs are pushing the capex and opex costs upwards, making Chinese chemical companies less competitive in the export market. Going forward, these factors are expected to play out in favor of India's specialty chemicals industry, since exports will trend up over the next few years.

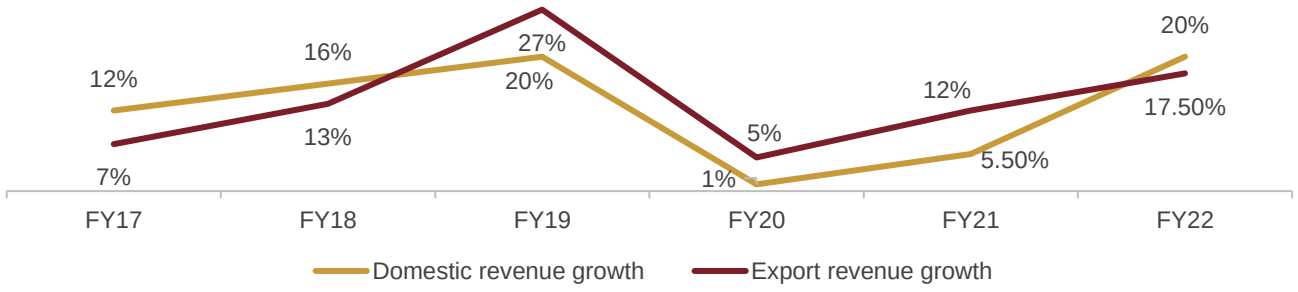
India is well-positioned to drive growth in the specialty chemicals industry, given its abundant supply of labour, land, feedstock, and established legal and regulatory framework. Indian companies with strong safety, health and environment measures, robust R&D and project management, and integration are well-poised to leverage opportunities in this space.

4.4 Capex in specialty chemicals to increase 50% on-year in FY23

A revival in domestic demand and continuing robust exports will spur a 50% on-year increase in the capex of specialty chemicals manufacturers in FY23 to Rs 6,000-6,200 crore. That would also be well above the Rs 5,000 crore spent before the pandemic in fiscal 2020, a CRISIL Ratings study of 106 rated specialty chemicals manufacturers, which account for a fourth of the sector's annual revenue of ~Rs 3 lakh crore, shows.

Export growth is expected to accelerate to 17-18% from 12-13% in fiscal 2021, owing to the competitive positioning of players, recovery in global demand, and the China-plus-one strategy of customers. In addition, owing to the impact of the pandemic on the global supply chain and geopolitical tensions, suppliers are looking to diversify and expand sourcing of products from different manufacturers across economies, including India, to minimise disruption on their operations. Domestic growth is likely to surge to ~20%, riding on strong demand from agrochemicals, fast-moving consumer goods (FMCGs), pharmaceutical and textile sectors, as well as a rise in discretionary spend.

Figure 22: Domestic and export revenue growth development of Indian specialty chemical companies



Notes: Based on 106 CRISIL-rated players (25% of sector's annual revenue)

Source: CRISIL Research

4.5 Key growth drivers for the Indian chemicals industry

- Per capita consumption of chemicals in India is lower compared with western countries. Hence, there is considerable scope for new investment
- A large population, huge dependence of the domestic market on agriculture, and strong export demand are the industry's key growth drivers
- The shift in the geopolitical landscape and global supply chain preference from China can provide India with a platform for converting challenges into opportunities
- The domestic market has significant growth potential with rising GDP and purchasing power
- World-class engineering and strong R&D capabilities

5 Overview of heterocyclic and fluoro organic product groups

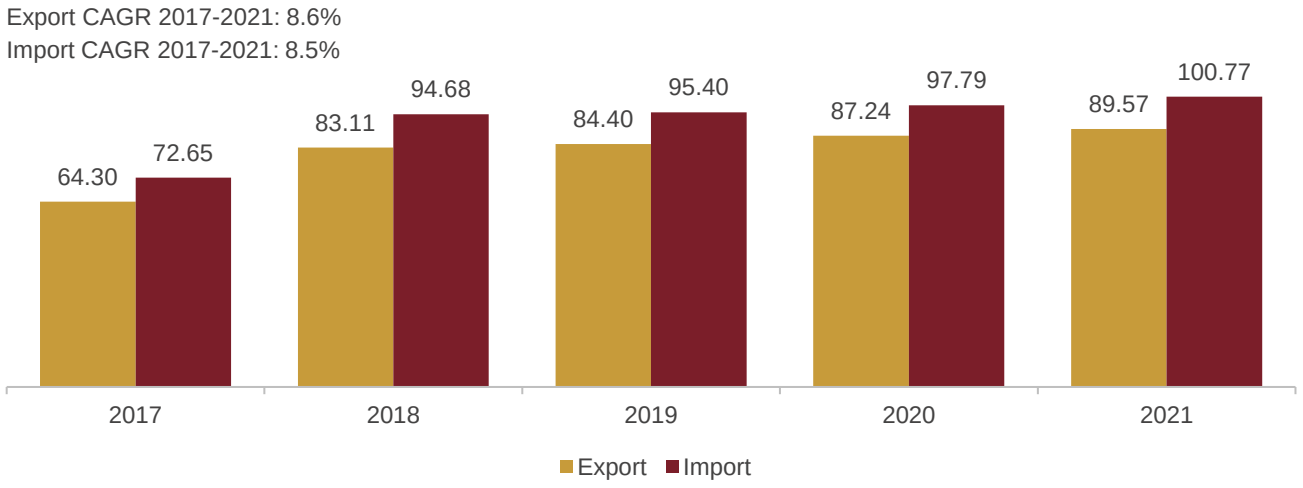
5.1 Heterocyclic product group

Heterocyclic compounds are cyclic compounds containing one/more atoms of other elements along with carbon atoms. Hetero atoms contain an atom other than carbon, such as nitrogen, sulphur phosphorus, etc. Heterocyclic compounds are normally classified according to the size of the heterocyclic ring and the nature and number of the heteroatoms. Among different kinds of heterocyclic ring systems, nitrogen heterocyclic compounds are more abundant in nature as a part structural unit of important bioactive compounds such as antibiotics, vitamins, hormones, and so on. Heterocyclic compounds constitute nearly 50% of known organic compounds and nearly 90% of active pharmaceuticals. Several heterocyclic compounds have applications in agriculture as insecticides, fungicides, herbicides, pesticides, etc. They also find applications as sensitisers, developers, antioxidants, copolymers, etc. They are key structural components of many of the anti-cancer drugs available in the market today. They are used as vehicles in the synthesis of other organic compounds. They are also useful as flavouring agents and dyes, as well as intermediates in organic synthesis.

A significant portion of current research on organic semiconductors involves heterocyclic building blocks. Custom fine chemical producers are in a good position to facilitate scale-up of the technology with exceptionally high purity profiles given their historical expertise in manufacturing high purity chemicals using heterocyclic synthesis for the agriculture and pharmaceutical industries.

The global export and import of heterocyclic compounds were valued at $89.57 billion and $100.77 billion in 2021, and have grown at 8.6% and 8.5% CAGR, respectively, from 2017 to 2021.

Figure 23: Global heterocyclic compound export and import ($ billion)

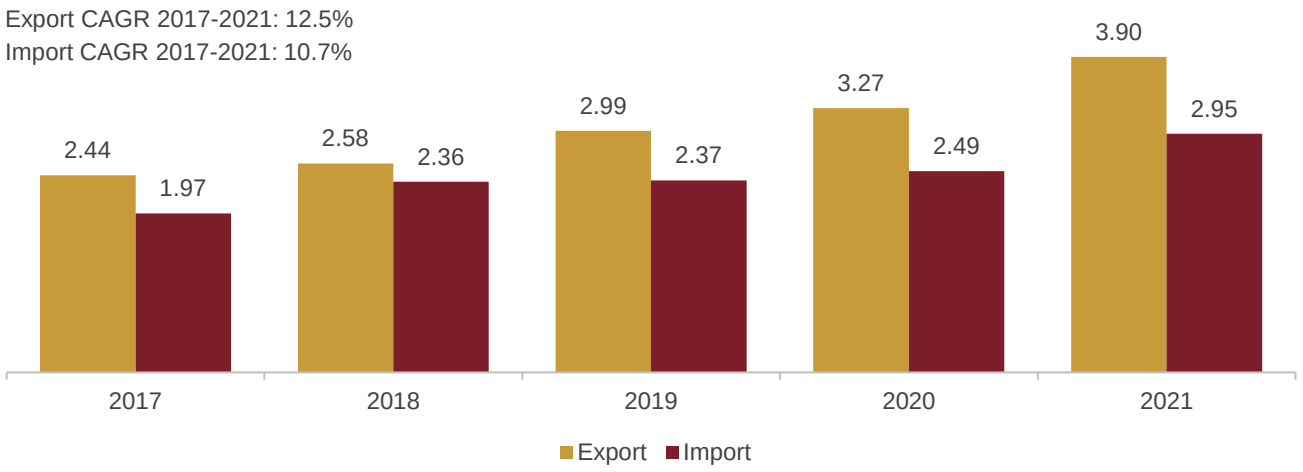


Source: CRISIL Research

Note: Data for each calendar year

HS Code: 2932 (Heterocyclic compounds with oxygen hetero-atom only) and 2933 (Heterocyclic compounds with nitrogen hetero-atom only)

Figure 24: India heterocyclic compound export and import ($ billion)



Source: CRISIL Research

Note: Data for each calendar year

HS Code: 2932 (Heterocyclic compounds with oxygen hetero-atom only) and 2933 (Heterocyclic compounds with nitrogen hetero-atom only)

India's exports and imports of heterocyclic compounds were valued at $3.90 billion and $2.95 billion in 2021, growing at 12.5% and 10.7% CAGR, respectively, from 2017 to 2021.

5.2 Fluoro organic product group

Organic fluoro compounds refer to organic compounds that have a carbon-fluorine bond. They are alternatively referred to as organofluoro or organofluorine compounds. Fluoro organic substances are extremely rare in nature; therefore, progress in this field mainly depends on the synthetic chemistry. Fluorinated compounds hold several properties that are highly attractive for industrial purposes, where they may act as reagents, solvents, building blocks, polymers, among others. The pharmaceutical and agrochemical industries are the two important sectors where these compounds are used, with a wide range of commercial drugs and pesticides belonging to this class of compounds. As pharmaceuticals, they find applications in antibiotics, as sedatives, and for cancer treatment; subsequently several of the top pharmaceutical drugs contain fluorine.

In the pharmaceuticals industry, fluoro pharmaceuticals are small organic drugs with at least one fluorine atom or a fluorinated functional group. Fluoro pharmaceuticals and fluoro agrochemicals find utilisation in drugs and pesticides — nearly 20% of pharma compounds and 35% of agrochemicals contain the fluorine atom. The field of pharmaceuticals and agrochemicals are interested by the application of fluorination. Fluorine compounds have proven to influence metabolic stability, lipophilicity, and the binding affinity of many drugs.

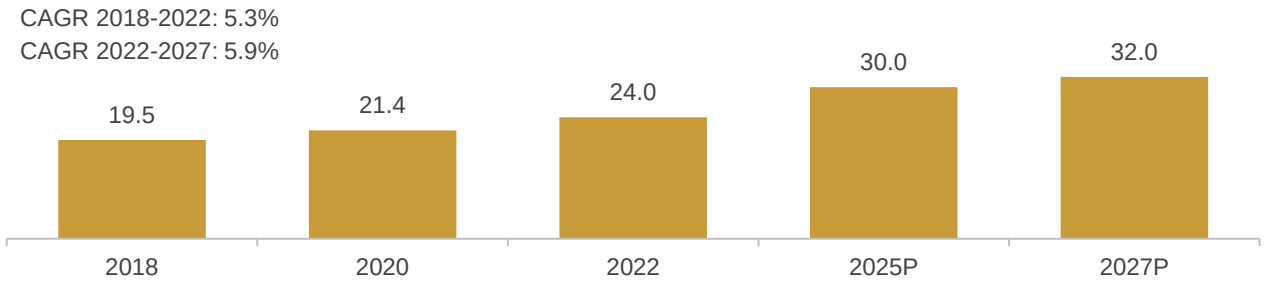
The expanding need for HVAC (heating, ventilation, and air-conditioning) technology from the construction industry is also one of the market drivers for the global fluorochemicals market. The demand for ventilation systems across buildings has increased because of rising commercial and residential construction activities in developing nations, which has also raised the need for fluorochemicals for use in refrigeration applications.

Global fluoro organic compound market

The global fluoro organic compound market is valued at $24 billion in 2022, and expected to reach $32 billion by 2027, expanding at 5.9% CAGR from 2022-27. The rise in refrigeration demand across a variety of end-user

industries is a key reason driving the fluorochemicals market's expansion. Market expansion is supported by an increase in the number of organic fluorochemical applications in the healthcare, pharmaceutical, and automotive industries.

Figure 25: Global fluoro organic compound market growth trajectory ($billion)



P: Projected
Note – Data for each calendar year
Source: CRISIL Research

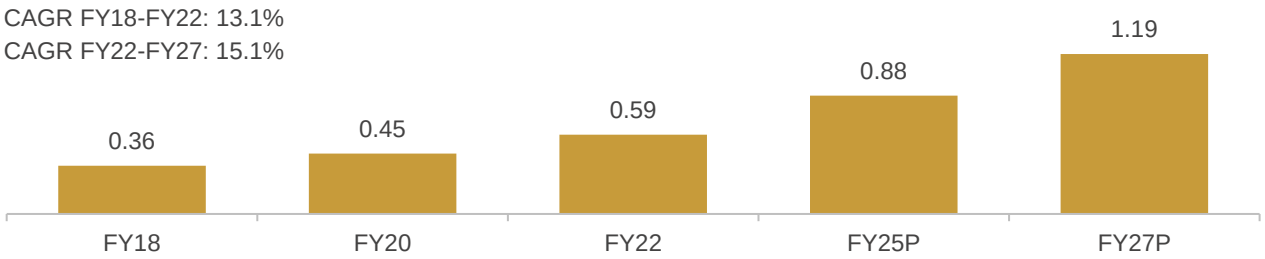
The Asia-Pacific accounts for the largest market share overall, approximately 40% in 2022, and is expected to maintain this position throughout the forecast period. This is explained by the expansion of the consumer base in the region, which has a huge electronics manufacturing base. Additionally, the Asia-Pacific commercial refrigeration market is experiencing lucrative growth possibilities due to the rise in disposable income, which is driving up demand for fluorochemicals. China, Japan, and India are the three largest market contributors in the Asia-Pacific. In terms of application, Europe holds the second-highest market share. This is linked to the presence of major automotive manufacturing market in the region.

India fluoro organic compound market

The India fluoro organic market was valued at $0.59 billion in fiscal 2022, and is expected to reach $1.19 billion by fiscal 2027, registering 15.1% CAGR.

The robust demand for air-conditioning systems and refrigeration equipment, rising aluminium production, expanding pharmaceutical applications, strong demand for blowing agents for plastic foaming applications in the construction sector, and expanding use of high-performance fluoropolymers in the automobile industry will all contribute to increased demand in the Indian fluoro organic market. Domestic consumer refrigerant demand is predicted to rise dramatically due to the high need for refrigeration and cooling solutions from residential and vehicle applications.

Figure 26: India fluoro organic compound market growth trajectory ($ billion)



P: Projected
Note – Data for each fiscal year, Market size is based on consumption
Source: CRISIL Research

6 Overview of key applications of Survival Technologies' products

6.1.1 Pharmaceuticals

Global pharma industry

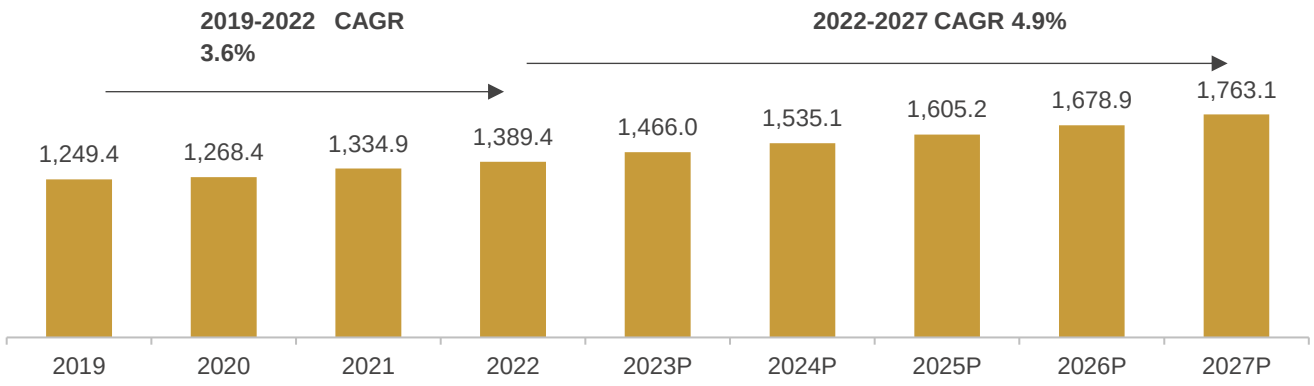
Posted healthy growth in 2021, as Covid-19 infection rates eased

Pricing pressure slowed growth of the pharmaceutical (pharma) market in calendar years 2018 and 2019. While it was flat in 2022, growth is estimated to have been higher in 2021 because of reopening of economies with the subsiding of Covid-19 infection rates, which increased the number of patient treatments in clinics and healthcare centres. Rising R&D in drug manufacturing, prevalence of chronic diseases, availability of generics, and uptake of biopharmaceuticals (biopharma) are the key drivers of the global pharma industry. In the near term, strategic initiatives such as new drug launches and biological products, acquisitions, collaborations, and regional expansion, are also expected to fuel market growth. However, unfavourable drug price control policies in several markets and high manufacturing costs are the main limiting factors.

To clock steady ~5% CAGR between 2020 and 2027

The global pharma industry, which grew 4.5-5.0% between 2016 and 2020 to ~$1,270 billion, is expected to sustain the growth momentum over the next five years, to reach $1,650-1,800 billion in 2027. New product launches, an ageing population, sedentary lifestyles, increasing prevalence of chronic diseases, technological advances, new methods for drug discovery, and increase in pharma drug usage are key industry drivers. Also, pharma companies are offering customised individual drug treatment for better treatment of diseases, and precision medicine that aims to provide medical care according to individual patient characteristics, needs, preferences, and genetic make-up.

Figure 27: Global pharma drugs market size ($ billion)



P: Projected

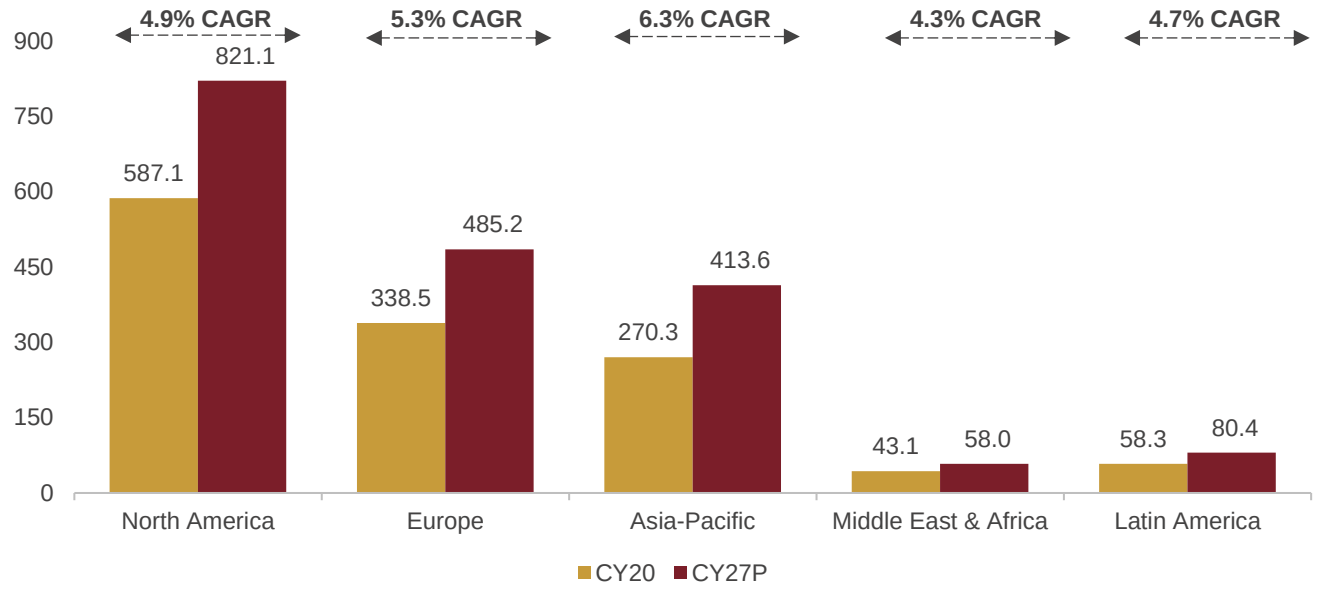
Note: Data for each calendar year

Source: CRISIL Research

North America to continue to dominate the global pharma market, Asia-Pacific to post fastest growth rate

North America is the largest pharma market in the world in terms of consumption (~$587 billion as of 2020), followed by Europe (~$338 billion), and the Asia Pacific (~$270 billion).

Figure 28: Region-wise global pharma market outlook ($ billion)



Source: Mordor Intelligence, CRISIL Research

Key growth drivers

Rise in ageing population

According to the United Nations' World Population Prospects: The 2019 Revision, the number of 65-year-olds or above is expected to more than double from 703 million in 2019 to 1.5 billion 2050 globally. This population group is registering a faster growth rate than all the younger age groups, which will support the healthcare segment, as the incidence of chronic diseases is high in this age group.

Incidence of chronic diseases

Rising incidence of cancer, cardiovascular diseases, obesity, and diabetes has a significant impact on the economy of a country, which is, therefore, likely to drive the demand for pharma.

Better access to medicine in emerging markets

As the world's population topped 7.7 billion in 2020, per capita usage of medicine per person per day is also estimated to have increased. Much of the increase in usage is from emerging pharma markets such as China, India, Brazil and Indonesia, where substantial increases have been made in average medicine volume usage. The rise of government safety nets and private insurance are key factors that will increase volume usage across emerging markets.

Strong development of generics market

In the US, healthcare reforms are driving higher insurance coverage and greater usage of generic medicines. Driven by greater dependence on generic medicines and enactment of the Patient Protection and Affordable Care Act, the market is expected to continue to grow. The consequent decline in the uninsured population in the US will continue to drive demand for generic drugs, thereby aiding growth of the Indian pharma manufacturers.

India pharma industry

Global positioning

The Indian pharma industry, currently valued at ~$50 billion, ranks 3rd in terms of pharmaceutical production by volume and 14th in value globally, plays a significant role in the global pharma supply chain. Behind India's pharma success story is world-class manufacturing facilities, robust infrastructure, cost-competitiveness, trained human capital, and innovation. With over 80 pharma clusters, 10,500 manufacturing facilities, and 500 API manufacturers comprising ~8% share of the global API industry, India is the largest supplier of generic medicines, with 20% volume share of global supply. The country manufactures 60,000 different generic brands across 60 therapeutic categories, and exports to over 200 countries. The country also has the highest number of US Food and Drug Administration (USFDA)-compliant pharma facilities outside the US. 65-70% of the WHO's vaccine requirements are sourced from India.

Industry structure

It is a non-cyclical industry, comprising formulations, bulk drugs, and chemicals/intermediates.

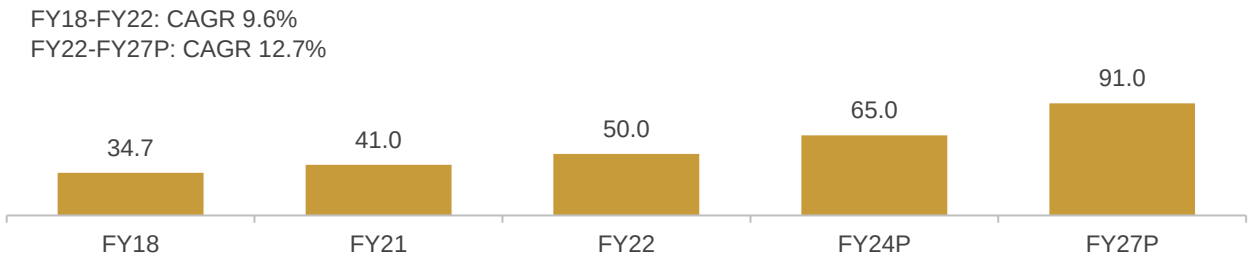
The value chain

Source: CRISIL Research

- **Pharma intermediates:** An API/ bulk drug is generally synthesised through complex stepwise chemical reactions. Intermediates are chemical compounds that are used to develop stable APIs and are key building blocks for APIs. As per the Pharmaceutical Export Promotion Council of India, intermediates are used as raw materials to produce bulk drugs, which are either sold directly or retained by companies to produce formulations. Intermediates are generally organic compounds, often manufactured from specialty chemicals through specific chemical processes, and then used in the synthesis of different API classes, such as antibiotics, vitamins, steroids, analgesics, etc
- **Bulk drugs or APIs**: These are the main constituents or raw materials of formulations that have the desired pharma property. API manufacturers supply to formulation players, who, in turn, sell the final dosage forms that can contain one or more API. The API industry can be segregated based on their application as anti-infective, cardiovascular, central nervous system, or respiratory system drugs
- **Formulations**: Final medicines are sold in the form of capsules, tablets, injectables, etc. These formulations are manufactured by combining one or more API, together with excipients, which serve as inert masking, binding or carrier substance. The dosage forms are chosen as per requirements

Over fiscals 2021 to 2027, the domestic pharma market is expected to grow at a steady pace on the back of vaccine manufacturing, growing opportunities in API manufacturing, US markets turning favourable with a focus on specialty drugs, complex molecules, and rising demand in the Indian market owing to an ageing population, increasing incidence of non-communicable diseases (NCDs), improving insurance penetration, booming medical tourism, and rising per capita income.

Figure 29: India pharma industry growth ($ billion)



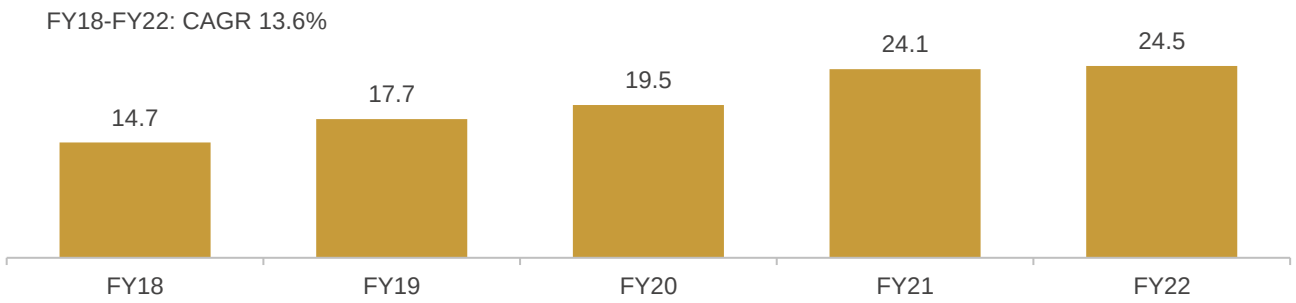
P: Projected | Note – Data for each fiscal year

Source: Department of Pharmaceuticals, RBI, CRISIL Research

India pharmaceutical exports

Building on the buoyant performance in fiscal 2021, Indian pharma exports once again registered a healthy trajectory in fiscal 2022, despite global trade disruptions and fall in demand for Covid-19-related medicines with the abating of infections rates. In fact, fiscal 2022 showed the pharma sector's best export performance. Between fiscals 2018 and 2022, Indian pharma exports rose from $14.7 billion to $24.5 billion, at a CAGR of 13.6%.

Figure 30: India pharma export growth ($ billion)



Source: Department of Pharmaceuticals, CRISIL Research

Overview of government initiatives in the Indian pharma sector

On March 21, 2020, the Union Cabinet approved two schemes to support the Indian pharma sector.

Name of the scheme	Details
Production-linked Incentive	• Tenure: FY21-FY30 • Financial outlay: Rs 69.4 billion • Scheme applicable for greenfield projects • Financial incentive to be provided for 41 identified key products that cover all 53 identified APIs • The net worth of the applicant (including that of group companies) as on date of the application should be >=30% of total proposed investment • Maximum number of selected applicants: 136 • The incentive under the scheme shall be applicable only on sales of eligible products to domestic manufacturers

Name of the scheme	Details
Creation of bulk drug parks	• Tenure: FY21-FY25 • Financial outlay: Rs 30 billion • Three bulk drug parks to get the support • Maximum grand-in-aid for one bulk drug park will be limited to Rs 10 billion • Minimum 50% of land area for bulk drug manufacturing units • Three states to be selected through challenge method

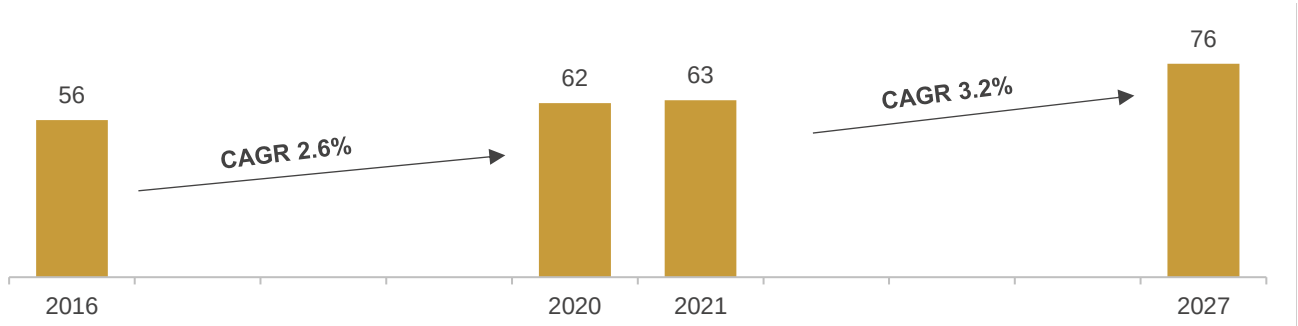
Source: PIB, CRISIL Research

6.1.2 Agrochemicals

Global agrochemical industry

CRISIL Research estimated the global agrochemical industry at $63 billion as of 2021. The industry grew at 2-3% CAGR over 2016-20. We expect 3-4%CAGR growth over 2021-27. The industry is witnessing consolidation and tight regulation. The importance of sustainability is also growing. Increasingly stringent regulation is impacting the growth of established products and increasing the cost of innovation. Generic products have grown consistently over the past 10 years and accounted for 40-41% of the agrochemical market in 2021. The Asia-Pacific accounts for 30-31% of the global agrochemical market. Asia and Latin America are the largest regional markets for crop protection chemicals and account for approximately 30% and 25% of global sales, respectively. Europe and North America together account for ~40%.

Figure 31: Global agrochemical industry market size ($ billion)



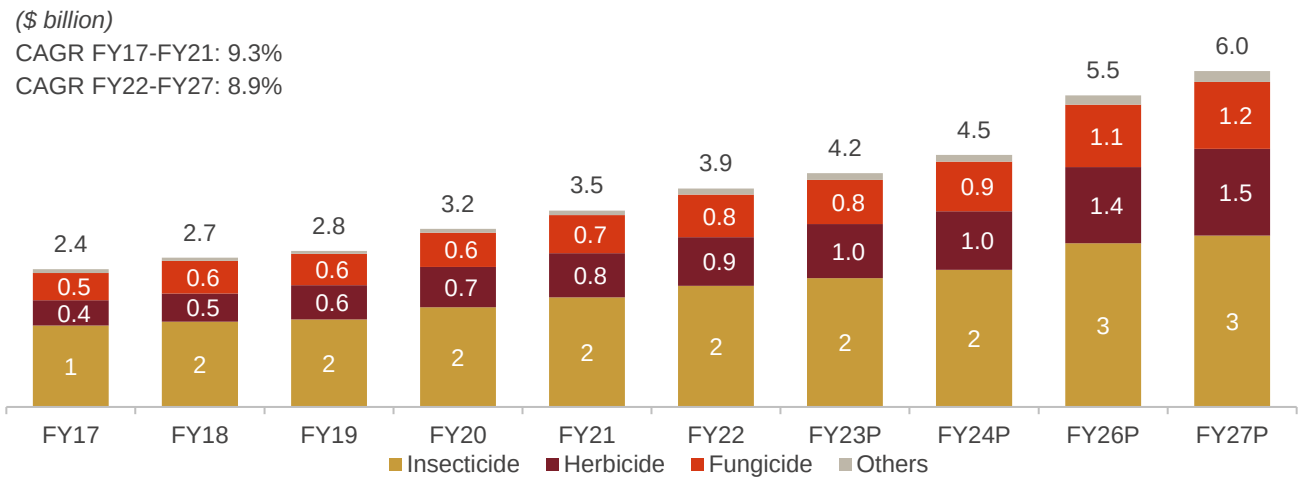
P: Projected | Note – Data for each calendar year

Source: CRISIL Research

India agrochemical industry

Generics dominate the Indian agrochemicals market. Over the next three years, assuming normal monsoons, CRISIL Research expects domestic consumption of agrochemicals to log 8-10% CAGR, to cross $6 billion by fiscal 2027. The growth will be driven by an increase in penetration and rise in per-hectare expenditure on pesticides. Further, usage is expected to increase because of rising farmer awareness. India has one of the lowest per-hectare consumption of agrochemicals. Therefore, farmers are likely to increase the intensity of application to achieve better crop yields and pare losses.

Figure 32: Indian agrochemical industry development



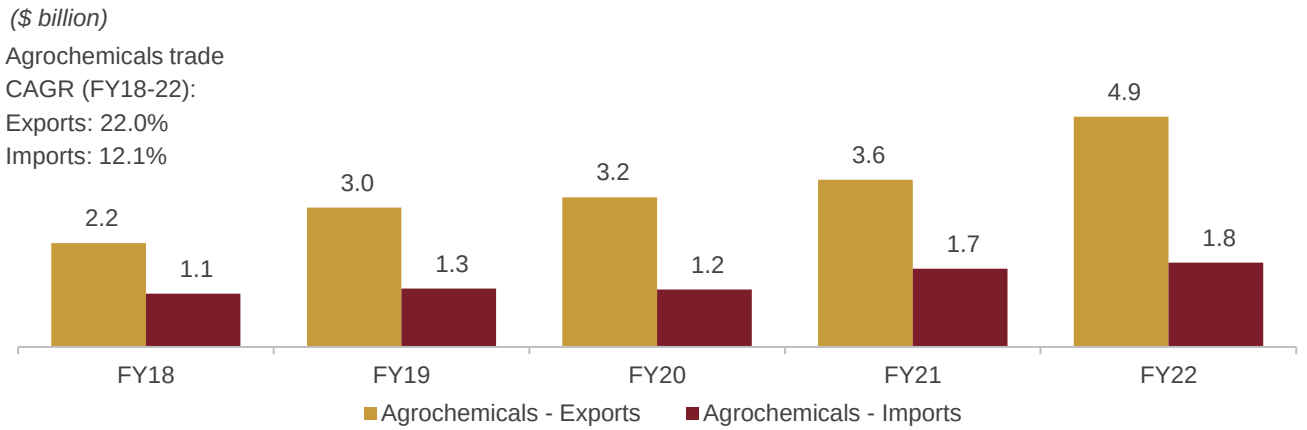
P: Projected | Data for each fiscal year

Source: CRISIL Research

India's agrochemicals exports logged 22% CAGR in past five years

In the past fiscal, the country's total agrochemical exports stood at $4.9 billion and imports at $1.8 billion. Agrochemicals accounted for 1.16% of the total merchandise exports and 0.29% of the total merchandise imports in the year. Between fiscals 2018 and 2022, exports of these products logged a robust 22% CAGR and imports 12.1% CAGR.

Figure 33: India's agrochemicals trade over fiscals 2018-22



Share (%) of agrochemicals in total merchandise trade of India	FY17	FY18	FY19	FY20	FY21	FY22
Exports	0.78%	0.84%	0.96%	1.07%	1.23%	1.16%
Imports	0.27%	0.28%	0.26%	0.27%	0.43%	0.29%

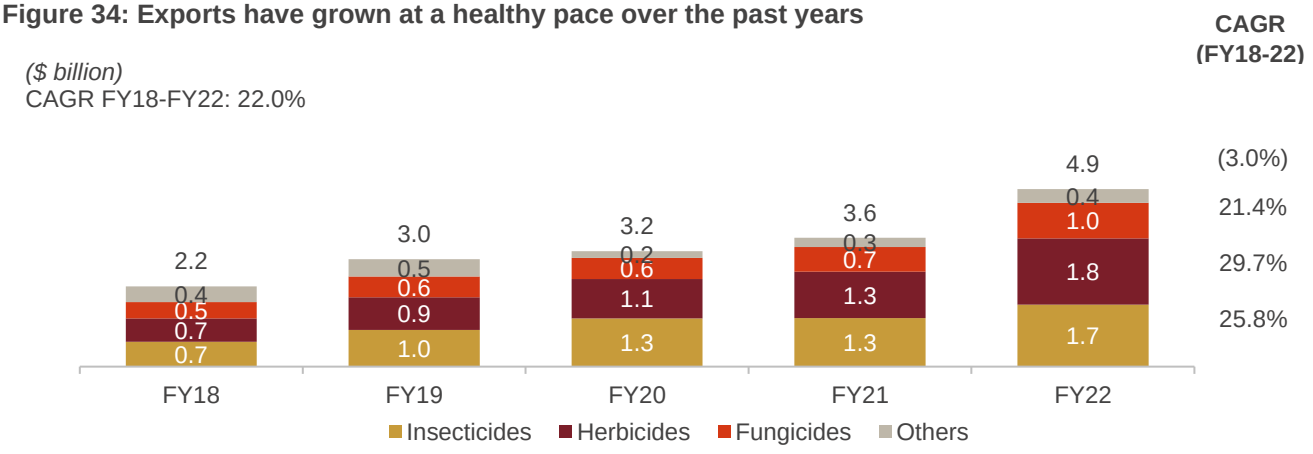
Conversion rate:1 USD= 73.93 INR

Source: DGCIS, CRISIL Research

~70% of agrochemicals produced in India exported in fiscal 2022

Brazil, the US and France are major export markets for Indian agrochemicals. The top five countries accounted for 57% of India's agrochemicals exports in fiscal 2022.

Figure 34: Exports have grown at a healthy pace over the past years



Note: HS codes: insecticides - 380891; fungicides - 380892; herbicides - 380893; others - 380894, 380899, 380869, 380862, 380861, 380859, and 380852

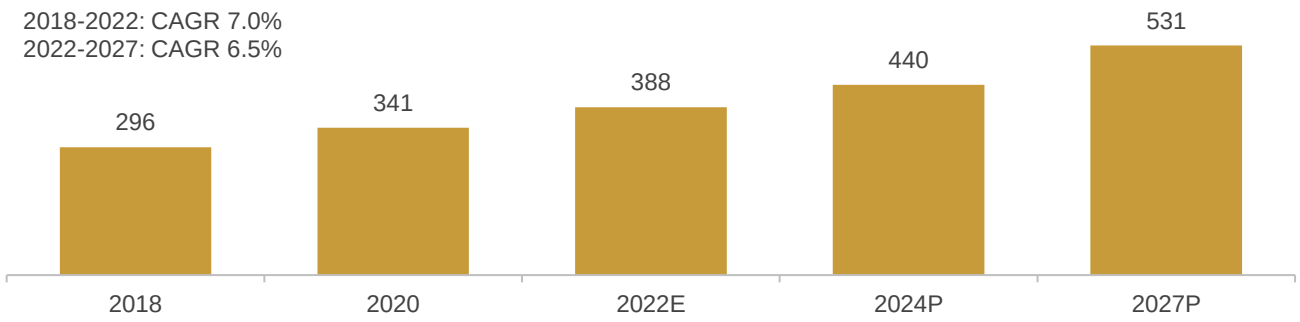
Source: Ministry of Trade and Commerce, CRISIL Research

6.1.3 Biopharma

Global biopharma industry

The biopharma industry is estimated to be valued at $388 billion as of 2022 and is anticipated to grow at a CAGR of 6.49% from 2022 to 2027 to $531 billion. Biopharmaceuticals are compounds with a high therapeutic value that are created utilising live creatures such as bacteria and animal cells. These bulky, intricate molecular medications are also referred to as biologics and biotech medications. The rise in the aged population, surge in the prevalence of chronic diseases such as cancer and diabetes, and the increased use of biopharma internationally are some of the reasons driving market growth. Additionally, it is projected that an increase in strategic alliances between biopharma companies will support the industry's expansion.

Figure 35: Global biopharma sales trend ($ billion)



E: Estimated P: Projected | Data for each calendar year

Source: CRISIL Research

Government initiatives

The market is receiving the support of the government because of the expansion of the biotechnology sector in developing countries such as China, Japan, and India. Government initiatives are intended to streamline the clinical study standards, improve reimbursement practises, and speed up the product approval procedure, all of which will offer the business a profitable growth potential.

Additionally, agricultural input companies are focusing on improving the already-existing technology such as the creation of novel crop stacking features, and fresh germplasm through breeding advancements and gene sequencing. In order to increase productivity through long-term fixes, the major market players are focusing their efforts on bringing agricultural technologies to the market.

Growing incidence of chronic disease will drive growth

Over time, the rate of chronic diseases has risen. The biopharma industry helps prevent chronic diseases. Biopharma companies are concentrating on developing personalised therapies. This will pave the way for the creation of individualised procedural healthcare requirements as well as help in the treatment of some inherited genetic diseases. Additionally, fresh ideas are being introduced such as cell therapy, which has the potential to treat some cancers efficiently. As a result, during the anticipated timeframe, the growing incidence of chronic diseases will drive growth of the global biotech market during the projected period.

North America dominated the global biotechnology industry in 2021

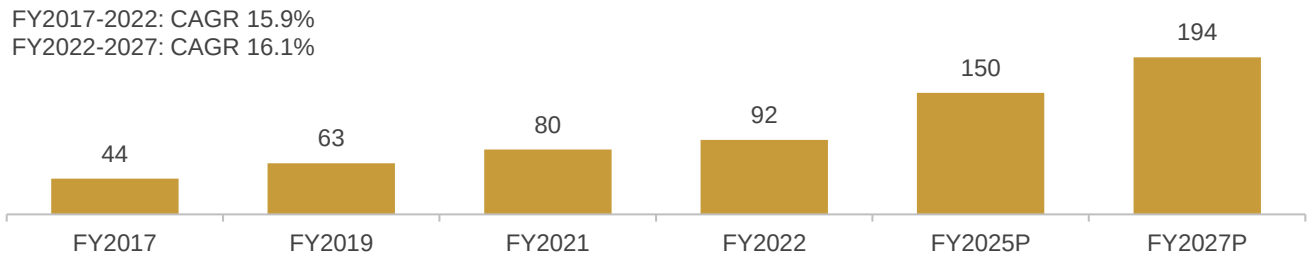
Due to several factors, including the existence of major competitors, strong R&D activities and high healthcare spending, the biotechnology (biotech) market in North America is expanding. Additionally, it is anticipated that the rising frequency of chronic diseases and the increasing use of personalised medicine apps for the treatment of serious illnesses will have a beneficial impact on market growth in North America.

From 2022 to 2030, the Asia Pacific is anticipated to experience the fastest growth. The development plans of major market participants, favourable government initiatives, and increased investments in healthcare infrastructure can all be linked to regional market growth.

India biotech industry

The Indian biotech industry was valued at $92 billion in fiscal 2022 and is expected to grow at a CAGR of 16.1% from fiscal 2022 to 2027, to reach $194 billion by fiscal 2027. The biotech industry can offer a variety of solutions for problems in several fields of health, agriculture, environment, energy, and industrial processes, mostly because of its multidisciplinary approach. India was one of the first countries to establish a department specifically for the biotech sector. Additionally, the government has established Biotechnology Industry Research Assistance Council (BIRAC), a non-profit organisation, to support and empower emerging biotech enterprises in the pursuit of strategic research and innovation by guiding them from the conception of their ideas to the commercialisation of their products and technologies.

Figure 36: Indian biotech industry growth trajectory ($ billion)

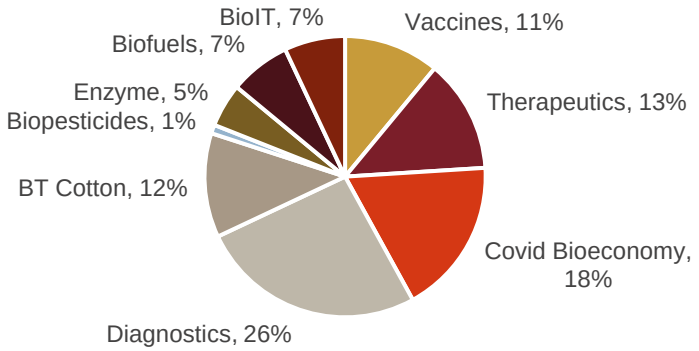


P: Projected | Data for each fiscal year

Market size is based on consumption

Source: CRISIL Research

Figure 37: Percentage share of biotech segments in fiscal 2021



Source: CRISIL Research

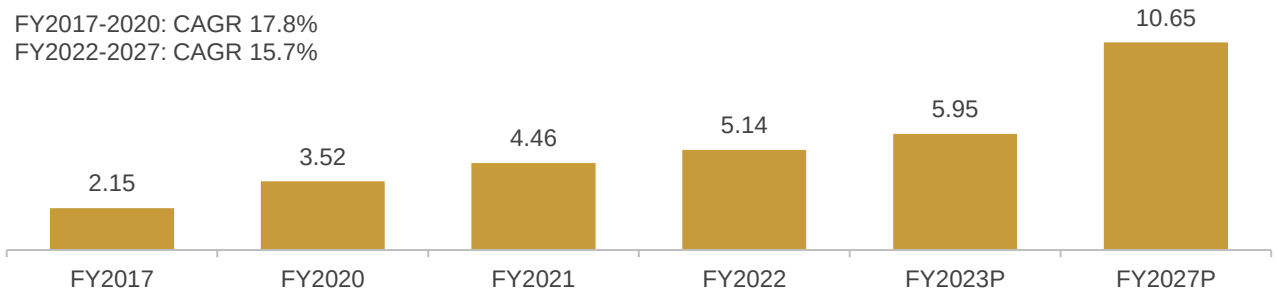
Rising government expenditure on public health and schemes such as PLI to aid market growth

The Government of India has launched Production-linked Incentive (PLI) scheme for 14 sectors, including pharma. This scheme is expected to attract investment in the areas of core competency and cutting-edge technology, ensure efficiencies, create economies of scale, enhance exports, and make India an integral part of the global supply chain. Government initiatives for infrastructure development and manufacturers' growing attention on extending their production capacity are projected to propel India's pharma market in the near future.

Covid-19 vaccine opportunity only in the near term, biosimilars to drive growth in the medium term

During fiscals 2017-2022, the Indian biopharma industry clocked a CAGR of 18-19%, because of increase in sale of vaccines in the domestic and global markets. On the other hand, in the therapeutic segment, growth has been lower than that in the vaccines segment due to inability of the Indian players to enter the regulated markets of the US and Europe. Further, though the Indian players have launched biosimilars in the semi-regulated markets, the high cost of biosimilars and poor healthcare infrastructure have restricted substantial growth. Major Indian pharma players were riding high on the success of the conventional generics segment in the regulated markets for almost a decade till fiscal 2015. Also, marketing exclusivity in many drugs enhanced their revenue, especially during fiscal 2012-2014. However, post fiscal 2014, competition sharpened for Indian generic companies due to the entry of many smaller players. On the other hand, lower patent expiry narrowed the opportunities for them. Therefore, Indian players have started looking at biosimilars and the specialty segment (conventional) as the next engines of growth.

Figure 38: Indian biopharma market ($billion)



P: Projected | Data for each fiscal year

Market size is based on consumption

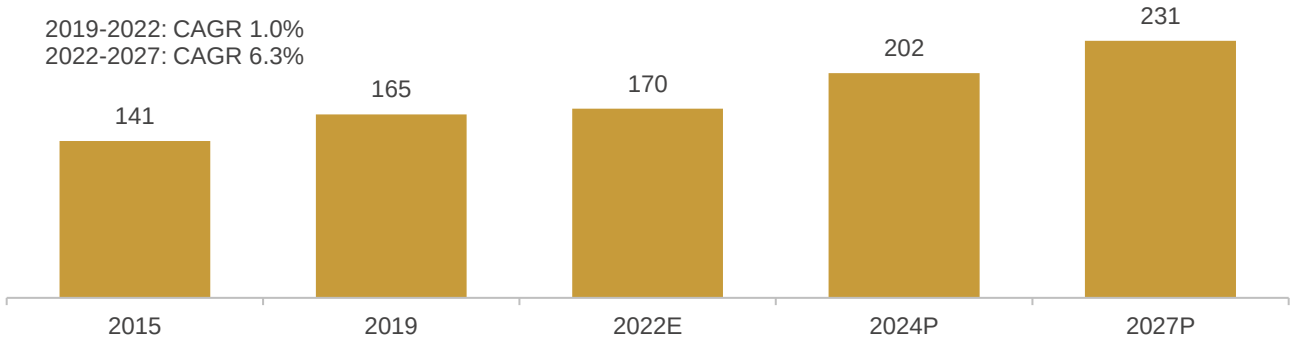
Source: CRISIL Research

6.1.4 Paints

Global paints industry

The global paints and coatings industry was valued at $170 billion in 2022. Industry exhibited slow growth of ~1% CAGR between CY2019-2022 due to impact by Covid-19 pandemic which led to slowdown in demand across end use. Industry is expected to grow at a CAGR of 6.3% between 2022 and 2027. It is anticipated to be driven by increasing product consumption in the construction, automotive, and general industries application sectors. Rapid urbanisation and industrialisation in emerging countries such as India, China and Southeast Asia are expected to drive product demand across a range of applications.

Figure 39: Global paint industry growth trajectory ($ billion)



E: Estimated, P: Projected | Data for each calendar year

Source: CRISIL Research

Paints are widely used in the wood, automobile, transportation, and construction industries. The main application is in the building and construction industry to protect structures from external damage. Additionally, the product is used to decorate infrastructure and buildings, both residential and non-residential, as well as industrial machinery, automobiles and boats, industrial wood, and others.

Key growth drivers

Sustainability development

The substrates that paints are applied to are preserved and protected, which helps conserve energy and material resources. Companies typically take sustainability into account when conducting commercial operations. The primary goal is to reduce volatile organic compounds (VOCs), which includes waste minimisation, process efficiency improvement, renewable resource use, and energy saving.

Rapid expansion of the construction industry

Paints are used to decorate and protect buildings and infrastructure. Architectural enhancements include primers, sealers, varnishes, stains, and interior and exterior house paints. The global paint industry is likely to be supported by an increase in construction activities and government spending in various public infrastructure projects. Additionally, advanced cutting-edge technologies such as cloud computing and collaborative building information modelling (BIM are becoming standard in the building business and driving growth.

Increase in demand from the construction and automotive industries will drive the segment

Marine, architectural, automotive refinish, automobile OEM, coil, general industries, industrial wood, and protective coatings are the application-based segments of the global paint market. During the projection period, the architectural segment is anticipated to maintain its dominance in terms of revenue and volume. The market for these materials is growing as their application expands in a variety of sectors, including the auto and construction industries. Rising product demand for commercial and industrial applications will accelerate market expansion.

Asia Pacific to dominate the global paint industry due to increasing construction activities

In terms of revenue and volume, the Asia Pacific held the largest market share in 2021, and is likely to retain it throughout the projected period. The reason is the expansion of the automobile and construction industries in China, Japan, and India. China is the main consumer because of its expanding population, which is driving the market expansion in the residential construction industry.

In Europe, demand for paints will be led by the automobile industry. Due to higher level of discretionary income and accessibility to raw materials, Europe ranks among the top global makers of automobiles. North America is anticipated to experience notable expansion as well. The US is one of the major consumers of paints for use in construction and automotive applications, which will also aid market expansion.

Indian paints industry

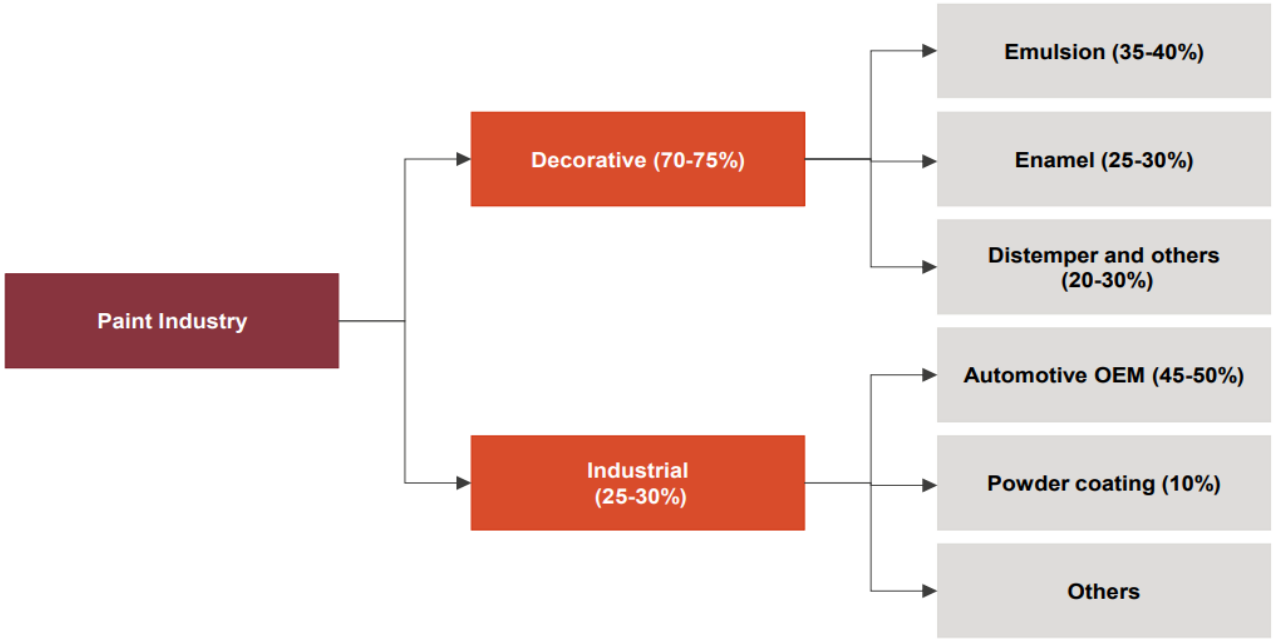
The domestic paints industry, with an estimated market size of $6.9 billion in fiscal 2020, is broadly segmented into: (1) decorative paints; and (2) industrial paints. Decorative paints find utility in the housing and construction sector and account for over 70% of the total paint market. Within this segment, repainting accounts for nearly 60-65%, while new constructions account for the rest. The decorative paints segment is subdivided into enamels, distempers, emulsions, putty, and exterior paints.

Industrial paints, conversely, find use in industries such as automobiles, auto ancillaries, consumer durables, marine vessels, and industrial plant & machinery. Of these, the automotive segment constitutes the largest share of the market. Owing to the technology-intensive nature of end-user segments in this category, manufacturers have entered into technical collaborations and joint ventures with leading international paint producers.

Large players account for 65-70% of the domestic paints industry (value wise), making the industry fairly organised. The remainder of the industry comprises 2,000 small players, who mainly compete in the regional markets.

The domestic paints industry has been recording a 6% CAGR between fiscals 2015 and 2020. Increasing penetration in the rural and non-metro cities, rising per capita consumption of paints and growth in the major end user industries such as real estate, automobiles and construction sector have been the key growth drivers for domestic paints industry. Amid slowdown in major end-user industries, the paints industry revenue contracted 5-10% y-o-y in fiscal 2021, as real estate completions were severely impacted during the first half post-lockdown, following the onset of Covid-19 that affected the decorative paints segment. Industry revenue is likely to witness a healthy growth on a lower base of fiscal 2021. The decorative segment will see a faster recovery following resumption of real estate construction and expected completions during the year.

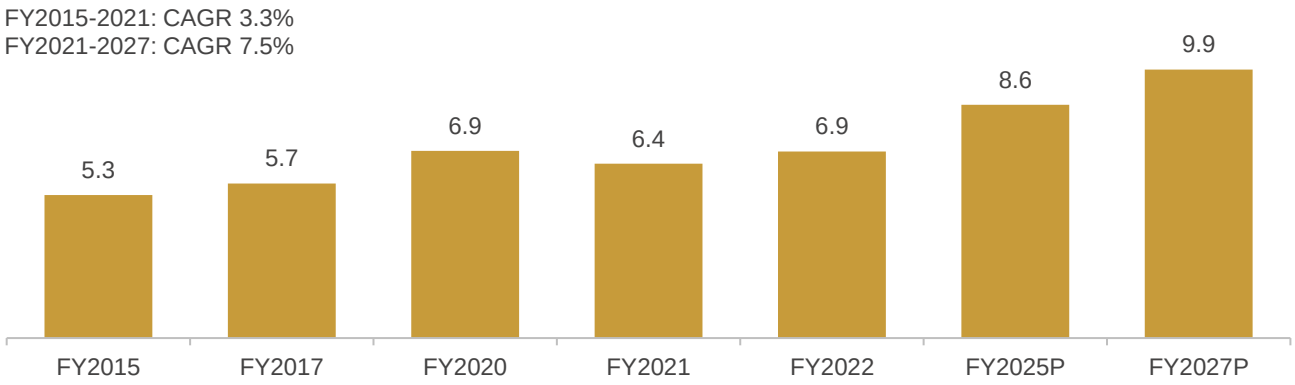
Paints industry by end-use



Source: CRISIL Research

Considering robust fundamentals and the current economic environment, the market is estimated to grow at 7.5% CAGR between fiscals 2021 and 2027, aided by better economic indicators.

Figure 40: India paint industry's growth trajectory ($billion)



P: Projected | Data for each fiscal year

Market size is based on consumption

Source: CRISIL Research

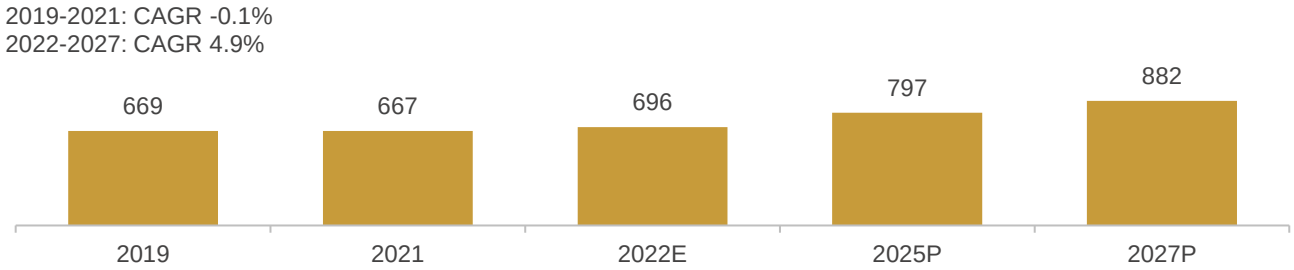
6.1.5 Polymers

Global polymers industry

In the automotive industry, heavy materials such as glass and metal are being replaced with lighter alternatives such as polycarbonate (PC), as there is an increasing focus on a higher fuel economy. As a result, a 4.9% CAGR is predicted between 2022 and 2027, increasing the size of the worldwide polymer market from $695.5 billion in 2022 to $881.9 billion in 2027. This is due to the excellent mechanical, electrical, insulating, optical, and chemical

characteristics of PC and other polymers, as well as their high strength-to-weight ratio, elasticity, and corrosion resistance.

Figure 41: Global polymer industry size ($billion)



E: Estimated, P: Projected | Data for each calendar year

Source: CRISIL Research

Growing food and beverage, automotive & healthcare business will drive growth

Due to the significant demand for polyethylene from the food and beverage packaging industry, the packaging category is anticipated to hold the largest market share for plastic over the projection period. The demand for products from the infrastructure and construction end-use industries is increasing due to the increasing usage of construction-related products in their production, such as flooring, window films, and fittings and pipes.

Similarly, the consumer goods/lifestyle and automotive and transportation end-use industries are anticipated to significantly contribute to the market's growth during the forecast period. The market is expanding as a result of the increasing use of polymers in the automotive sector to extend the lifespan of vehicle parts and improve vehicle efficiency. The increasing use of polymers in the healthcare sector can be credited to their property of guarding against contaminants by acting as a barrier. Several polymers are used in the production of healthcare-related items such gloves, syringes, bandage strips, blood bags, and prosthetics. Due to their insulating qualities, they are used in the electrical and electronics industries to create household appliances, switches, and light fixtures.

Rising demand of polyethylene due to its various end-use applications with drive the market

The expanding global trend for processed foods, platters, milk and fruit juice containers, cartons, barrels, and other water-based food packs is expected to increase demand for polyethylene. In order to fulfil the growing need for housing and public buildings that could be crucial in helping to provide a plentiful supply of plastic market opportunities, several provincial administrations of many different countries have been forced to increase their infrastructure footprint.

Asia Pacific to hold the largest market share during the forecast period

In 2021, the polymer market was dominated by Asia Pacific. The rapidly expanding industrial sector is anticipated to fuel demand for polymer in the electrical & electronics, automotive, construction, and packaging sectors. Due to technology transfer from western markets into the industry, both China and India have witnessed a rise in automotive production in recent years. Due to rising product demand from the electrical & electronics, healthcare & pharmaceuticals, and packaging industries, the U.S. held the biggest market share in North America.

The market for polymers is expected to grow in Europe because of the region's rising demand from the automobile industry. The expanding demand from the textile and packaging industries will be the main driver affecting growth in the Middle East and Africa. Latin America' is also anticipated to expand as a result of escalating urbanisation and the rise in businesses offering industrial packaging solutions.

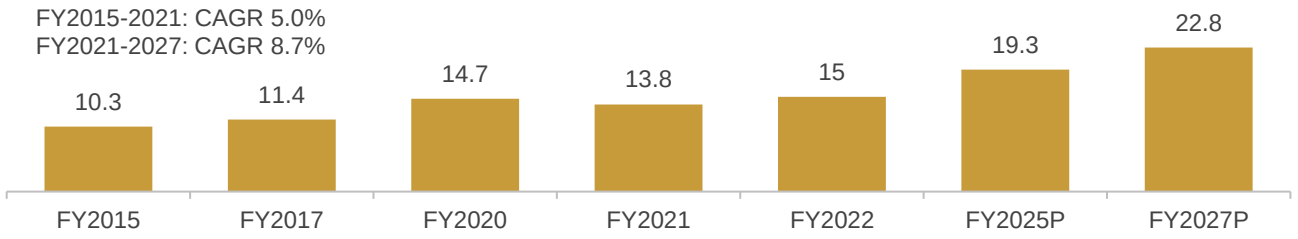
Indian polymers industry

The polymer industry is directly proportional to economic growth, due to its application in industries such as construction and automobiles, which follow a normal business cycle. The domestic polymer industry is driven by demand for plastics, which is further led by demand from major end-user industries, such as automotive, construction, electronics, healthcare, textiles and FMCG. Polymers comprise polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC) and polystyrene (PS). The total domestic polymer demand stood at ~14.7 mtpa (million tons per annum) as of fiscal 2020, with PE forming most of the demand.

Demand for polymers recorded a 7.5% CAGR between fiscals 2015 and 2020, because of higher economic growth, with PE contributing to most of the demand growth. PE demand is estimated to have recorded a 7% CAGR between fiscals 2015 to 2020, led by demand from blow-moulding, films, and general-purpose packaging applications. Demand from the films segment was propelled by improved demand from the processed-foods and retail-packaging segments. Domestic PP demand registered around 8.2% CAGR between fiscals 2015 and 2020, driven by the raffia and impact copolymer segments (together accounted for over 50% of offtake in fiscal 2020). These two segments expanded by a combined ~7-8% during fiscals 2015 to 2020. Offtakes of the fibre & filament and BOPP (Biaxially oriented polypropylene) segments were also healthy. Domestic polymer demand was estimated to decline 3-5% on-year in fiscal 2021, as against ~4% growth on-year in the previous fiscal. This was owing to severe slowdown in major industries such as electricals, automobiles, and construction. However, the decline was restricted due to support from the food-packaging sector, as well as from single-use plastic (currently being used in medical applications such as PPE kits, gloves, shoe covers, etc.).

CRISIL Research expects polymer demand to record an 8-9% CAGR between fiscals 2021 and 2027, driven by a revival in most of the end-use sectors such as automobiles, infra, industrials. Simultaneously, demand from major consumer segments, such as packaging, irrigation, and construction, is anticipated to lend support.

Figure 42: India polymer industry growth trajectory (million tons)



P: Projected | Data for each fiscal year

Market size is based on consumption

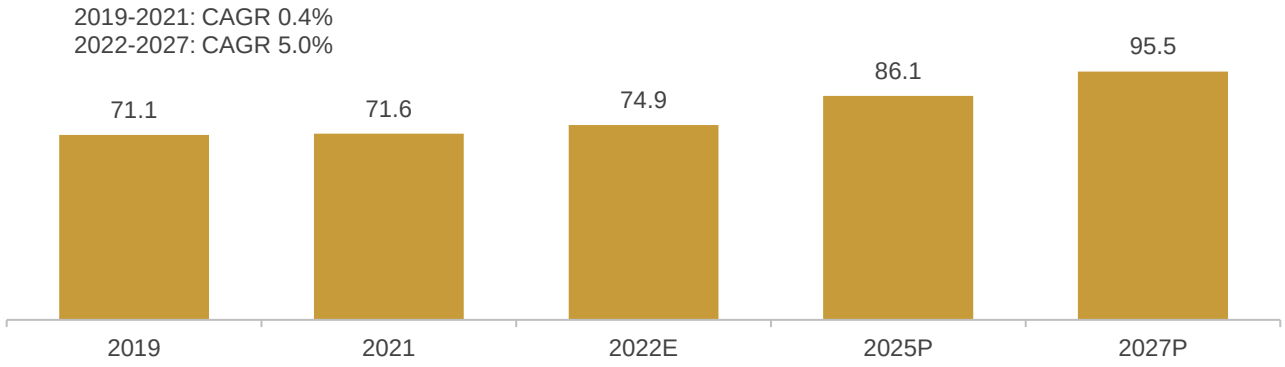
Source: CRISIL Research

6.1.6 Electronic materials and chemicals

Global electronic chemicals industry

The global market for electronic materials and chemicals is forecasted to grow from 2022 to 2027, at a CAGR of 5.0%. This market will grow from $74.6 billion in 2022 to reach $95.5 billion by 2027. The consumer electronics sector is anticipated to be primarily driven by falling equipment costs and growing living standards in various parts of the world, which will favourably affect the expansion of the electronic materials and chemicals market. The market is expected to grow because of the increased demand for semiconductors used in the production of integrated circuits, electronic chips, and mobile phones.

Figure 43: Global electronic materials and chemicals market growth trajectory ($billion)



E: Estimated, P: Projected | Data for each calendar year

Source: CRISIL Research

Semiconductor production to aid market growth

Electronic chemicals are mainly used in the production and servicing of integrated circuits and printed circuit boards in the semiconductor industry. The other uses of electronic chemicals include etching, polishing, cleaning, doping, and maintaining semiconductors, among other tasks. Technical improvements in the electronic industry have a significant impact on semiconductor production, which is expected to boost the market throughout the forecast period. Future technologies, such as artificial intelligence and the Internet of Things, will increase the use of semiconductors as well as other chemicals and materials.

Due to widespread use of nanotechnology, the electronic chemicals market future trends are changing toward NEMS and MEMS devices

Nano devices are popular all over the world due to their exceptional qualities, including reduced weight, smaller size, less power consumption, and lower fabrication costs. The market is turning toward nanoelectromechanical system (NEMS) and microelectromechanical system (MEMS) devices because of the widespread use of nanotechnology. The need for semiconductors has increased because of the expanding manufacturing of tablets, electronic appliances, laptops, and cell phones.

Throughout the predicted period, Asia Pacific is expected to maintain its dominant position

Due to advancements in several industries, including electronic gaming, telecommunications, consumer goods, and IT, there is a tremendous need for printed circuit boards, which is primarily be the reasons for the domination in Asia Pacific region with China, India, and Japan are the main contributors to the growth of this market in the area. Due to the constantly increasing demand for electronic gadgets, the market in North America is expanding at a tremendous rate. In North America, there has been a growth in the use of chemical mechanical polishing (CMP) slurries, low-dielectrics, and photoresist chemicals.

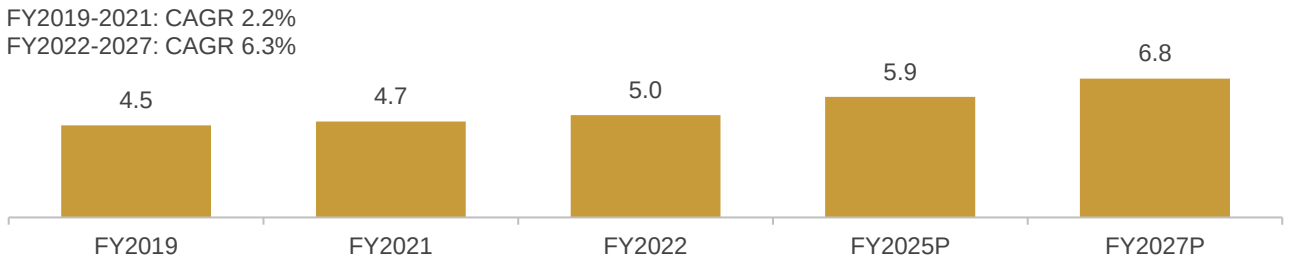
The expansion of the market in Europe is evidenced by an increase in the usage of electronic devices with cutting-edge functionality, such as smart homes and offices. The usage of electronic chemicals and materials is also supported by the region's big producers and suppliers of electronic equipment and supplies.

India electronic material and chemical industry

The market for electronic materials and chemicals is predicted to grow significantly from fiscal 2022 to fiscal 2027, at a CAGR of 6.3%. This market will grow from $5 billion in fiscal 2022 to $6.8 billion by fiscal 2027. The consumer electronics sector is expected to be primarily driven by dropping equipment costs and growing living standards of population living in different parts of India, both of which will have a positive effect on the expansion of the

electronic materials and chemicals market. The increasing need for semiconductors in the production of mobile phones, electronic chips, and integrated circuits is expected to fuel the market's growth.

Figure 44: India electronic materials and chemicals market growth trajectory ($billion)



P: Projected | Data for each fiscal year

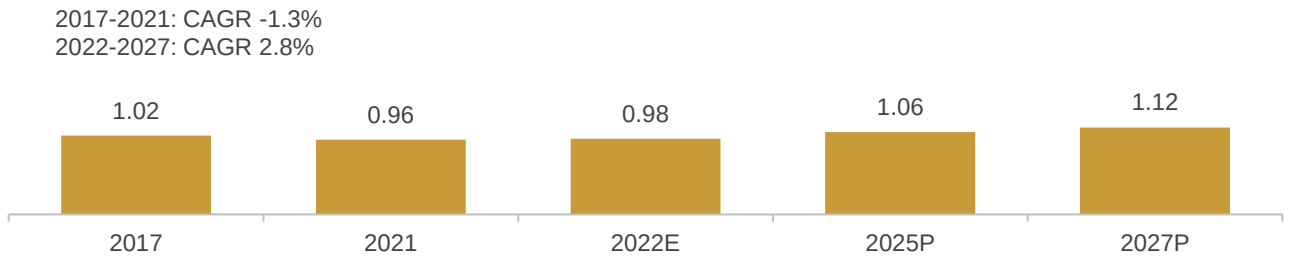
Source: CRISIL Research

6.1.7 X-ray films

Global X-ray films industry

The size of the global X-ray film market is estimated at $0.98 billion in 2022 and is anticipated to increase at a CAGR of 2.8% to reach $1.12 billion by 2027. The growing need for diagnostic imaging technology across a range of industries, including manufacturing, power plants, oil & gas, transportation, and more, is what is driving the global x-ray film market. Moreover, increasing number of radiography tests year by year across the world and lack of competition and alternatives owing to high cost of advanced imaging solutions for medical applications has compelled consumer to maintain X-ray as their primary imaging solutions.

Figure 45: Global X-ray films market growth trajectory ($billion)



E: Estimated, P: Projected | Data for each calendar year

Source: CRISIL Research

Diagnostic centres segment is anticipated to grow significantly

In developing nations, the demand for the diagnostic business is growing quickly. Test accuracy, quality, and cost remain several of the major problems that need to be resolved, which is driving the demand for studies in this segment. In developed economies, like Europe, major investment and critical technological advancements are generated in the public sector, while this is almost exclusive to the private sector in developing economies.

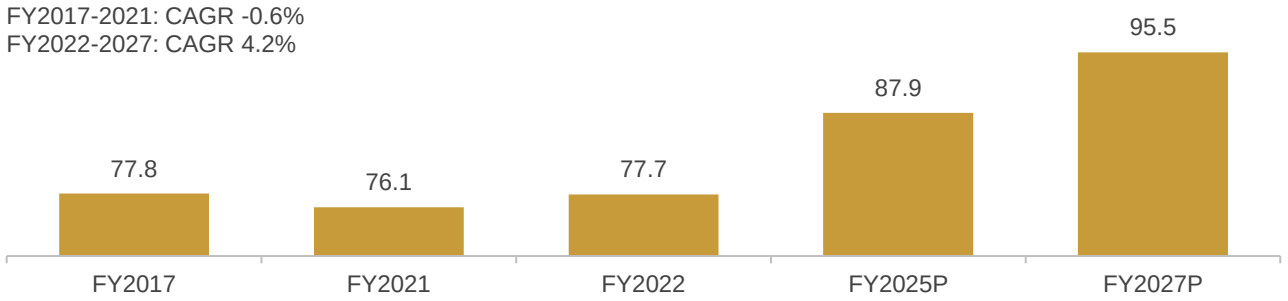
Asia-Pacific to witness a significant growth rate

Asia-Pacific continues to rely heavily on conventional x-ray technologies. The use of X-rays is increasing because of the region's growing population and the number of individuals with conditions that require the use of CT to diagnose or treat them. Medical imaging is in high demand because of this expanding patient base.

India X-ray films industry

India's market for X-ray imaging systems was estimated to be valued at $77.7 million in fiscal 2022, is anticipated to grow at a CAGR of 4.2% during the forecast period to reach $95.5 million by fiscal 2027. This can be attributed to the country's ageing population, which is more prone to illnesses that need an X-ray imaging equipment to diagnose. In India, there are nearly 104 million elderly people, constituting 8.6% of total population, according to Census 2011. This number is predicted to rise in the upcoming years which will increase the prevalence of illnesses or injuries that require an X-ray imaging equipment for an accurate diagnosis.

Figure 46: India X-ray films market growth trajectory ($ million)



P: Projected | Data for each fiscal year

Market size is based on consumption

Source: CRISIL Research

Increasing number of injuries and accidents on the roads to aid market growth

The number of injuries caused by accidents has dramatically increased in India because of the increasing frequency of road accidents. This has raised the need for X-ray imaging equipment, which are necessary for the identification of various ailments brought on by car accidents and other injuries. The World Bank estimates that 53 traffic accidents occur in India every hour, which kill 1 person in every 4 minutes.

Growing prevalence of osteoporosis

The frequency of various forms of fractures and injuries among the older population in India, particularly women, has increased due to the growing prevalence of osteoporosis, driving up the demand for an X-ray imaging equipment necessary for diagnosis. Wrist fractures, hip fractures, and spinal bone fractures are a few of the most frequent injuries in patients with osteoporosis.

Rising public health expenditure

There has been increased hospitals and diagnostic labs because to the country's expanding healthcare infrastructure. Additionally, the infrastructure of the current hospitals is being upgraded by the Indian government. Government expenditure on healthcare is up to 2.1% of GDP in fiscal 2021-2022 from 1.3% in fiscal 2016, with a target of 2.5% of the country's GDP by 2025.

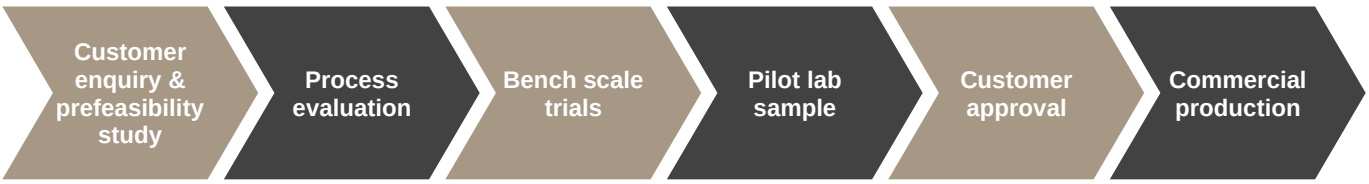
7 Global and India CRAMS market

Contract research and manufacturing services (CRAMS) refers to outsourcing of production activity to third-party vendors, i.e., it involves synthesis of agrochemical technical grades or active ingredients, intermediates, and specialty chemical products, as well as other fine chemicals.

The business is increasingly becoming an attractive option for companies in the chemical, pharmaceutical, and biotechnology sectors, which require molecules to be exclusively made for them at a certain scale. It is also beneficial for companies looking to reduce costs and operate competitively in a business environment characterised by increasing regulation, declining product approvals, and rapidly advancing technology.

In the chemicals space, CRAMS helps companies increase manufacturing capacity and flexibility without undertaking large capital investments. Large companies that need access to synthetic and process expertise, which may not be available in-house and require safety management and regulatory issues, are choosing CRAMS. In the case of the pharmaceutical and biotechnology sectors, CRAMS lowers drug discovery risks for larger companies and provides flexibility and immediate access to highly trained technical expertise. It also provides cost efficiencies and reduced time to market.

Contract research and manufacturing services process flow



CRAMS process

Value chain in CRAMS	Overview of key activities
Discovery	Library synthesis • molecule design • lead optimisation • route synthesis • biological testing • environment impact testing • micro field
Development and scale-up	Process development • analytical development • kilo lab studies • pilot plant trials • basic engineering • process optimisation • detailed engineering • plan design • HAZOP • small scale manufacturing for trials • formulation development
Manufacturing	Large scale manufacturing • offering multiple chemical reaction (high pressure to low temperature) • formulations

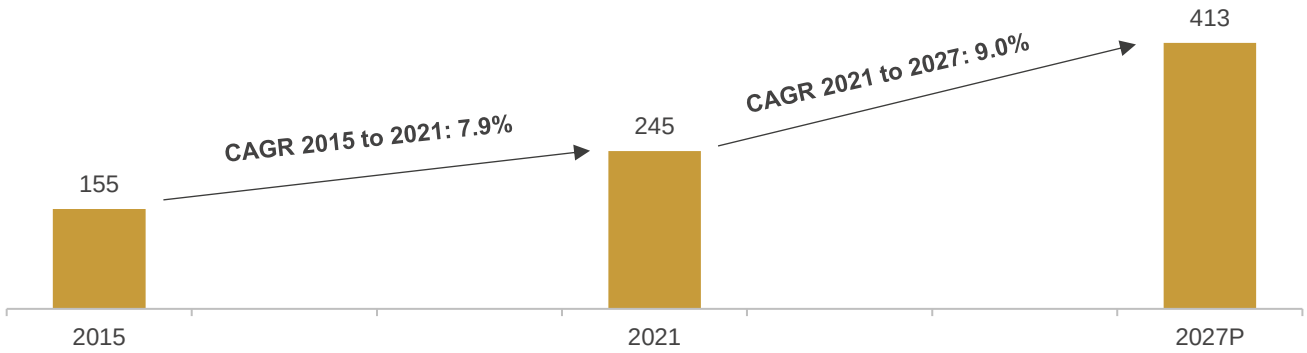
Source: CRISIL Research

7.1 Global CRAMS industry to accelerate between 2021 and 2027

CRISIL Research expects the global CRAMS industry for specialty chemicals to clock 9.0% CAGR between 2021 and 2027, supported by growth of the global specialty chemicals industry, increase in commodity prices, rise in demand for outsourcing of manufacturing to emerging markets, and increased focus on R&D over manufacturing by established players. This is a sharper rise vis-à-vis the previous corresponding period, i.e., 2015 and 2021, wherein the industry logged an estimated CAGR of 7.9%, reaching $245 billion.

Specialty chemicals include agrochemicals and fertilisers, personal care chemicals, textile chemicals, paint and coating additives, intermediates, and specialty chemical products, along with other fine chemicals, such as APIs.

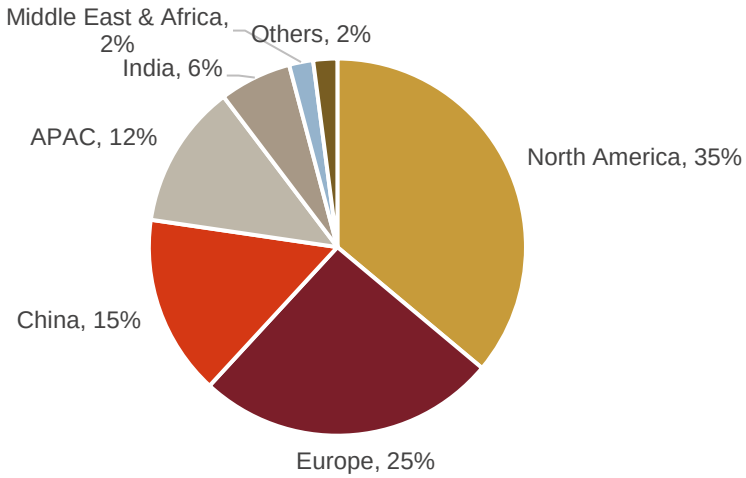
Figure 47: Global CRAMS market ($ billion)



P: Projected | Data for each calendar year

Source: CRISIL Research

Figure 48: Global CRAMS market by geography (2021)



Source: CRISIL Research

Innovator companies outsourcing complex manufacturing

Custom synthesis of a new molecule requires unique infrastructure that is technologically advanced and certified, as well as skilled workforce to carry out the manufacturing process. Most global innovator companies are increasing their focus on core competencies such as R&D and outsourcing custom synthesis to countries that have highly skilled labour and the required infrastructure to undertake the complex manufacturing of new molecules.

CRAMS provides greater flexibility and reduces costs

The specialty chemicals industry is driven by innovation. Though it is a low volume space vis-à-vis bulk commodities, it is critical in the value chain as it imparts a variety of properties to products with a high degree of value addition. In fact, development of specialty chemical requires deep research and expertise.

However, as new molecules become increasingly complex, major manufacturers of specialty chemicals in sectors such as pharmaceuticals, agrochemicals, etc globally are preferring to gain access to these competencies externally instead of building it in-house. CRAMS provides these companies an opportunity to manage costs, ensure flexible operations, and realise efficiencies in R&D and related functions.

Rising number of USFDA-approved manufacturing sites in developing countries

The number of USFDA-approved manufacturing plants in developing countries such as India, China, Mexico, and Brazil have increased, making these countries favoured destinations for CRAMS for global pharmaceutical companies. The healthcare infrastructure and technological innovations in drug development processes in these countries are also significantly improving, which is prompting several pharmaceutical companies in developed countries to outsource research and manufacturing operations to vendors in these countries.

7.2 Indian CRAMS industry to accelerate up to fiscal 2027

The Indian CRAMS industry is projected to grow a healthy 10.6% CAGR between fiscals 2022 and 2027, owing to new product launches and volume growth in the pharmaceutical and agrochemicals industries, and growth in end-use industries such as paints, automobile, textile, home care segments. Between fiscals 2016 to 2022, the industry grew at 7.8% CAGR to ~$15.7 billion, thereby accounting for 6.4% of the global CRAMS industry.

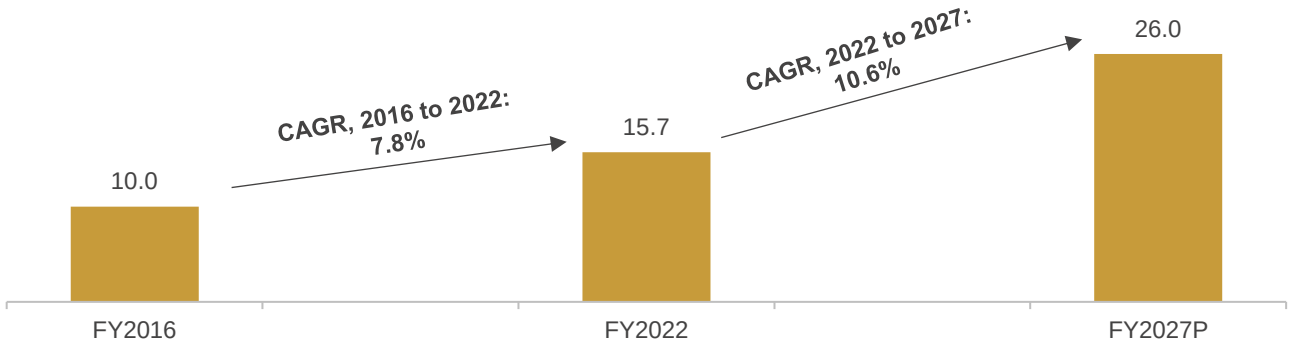
Global pharmaceutical and agrochemical companies prefer Indian CRAMS companies due to their low cost compared with those in developed economies. Contract manufacturing has picked up in India because of the huge availability of complex chemistries, R&D capabilities, strong intellectual property (IP) protection, skilled workforce, and large number of WHO Good Manufacturing Practices-certified plants. The product mix of companies in India ranges from high-end research and complex technology services and niche / custom manufacturing to more high-volume manufacturing services which are typically dependent on technology transfers from the customer. The range of services broadly can be categorized into basic commercial manufacturing, development services, and go-to-market support. At present there is less innovator manufacturing in India, but the focus is shifting towards providing value added services. However, a few companies, including Survival Technologies, have proven their capabilities and have been able to work with innovators on their needs. A contract manufacturing organization (CMO) that can handle the basics, as well as deftly provide other value-added services can potentially increase the commercial success of an agrochemical, pharma, or biotech company's product, while still delivering the financial incentives is often taken for granted. Value added services might include such capabilities as formulation improvements, alternate dose forms, improved yield, and cycle time. Cost reduction is still a real possibility, but these value-added service enhancements will likely be key differentiators for contract manufacturers in the future. The Government of India's 'Make in India' campaign is also expected to act as a stimulus to the emergence of India as a manufacturing hub for the chemicals industry.

Typically, demand for CRAMS is concentrated towards manufacturing bulk drugs (intermediates and APIs), formulations, biopharmaceuticals (especially vaccines), and agrochemicals. Some larger players are also involved in contract manufacturing of intermediaries for global innovator players. In addition, agrochemical custom manufacturing is likely to receive a boost with discovery chemistry gaining traction.

That said, custom synthesis and contract manufacturing is a highly fragmented industry, comprising several small and medium, and some large manufacturers. Companies, both domestic and multinational corporations, complete on the basis of pricing, relationships with customers, product quality, and process innovation. Most contract research manufacturing companies cater to the domestic industry as well as export to the semi-regulated markets. Regulated markets such as US and Europe account for a smaller portion because of stringent regulations.

Moreover, because of growth in the global specialty chemicals industry, CRAMS units in India are expected to see a strong upsurge in export demand to developed and emerging markets.

Figure 49: India CRAMS market ($ billion)



P: Projected | Data for each fiscal year

Source: CRISIL Research

India to be a focus for CRAMS for companies looking to diversify from China

Demand for CRAMS has grown sharply in India due to availability of a skilled workforce at lower cost compared with developed economies. Considering the surge in demand for food grains, demand from the agro industry for custom manufacturing is likely to continue to rise. However, the pharmaceutical industry is expected to continue to dominate the custom manufacturing space. But with stringent regulations likely to be implemented for chemical synthesis or discovery chemistry, larger Indian players are likely to see more demand for manufacturing services vis-à-vis smaller companies.

Meanwhile, R&D cost is rising, and complexity of new molecules is increasing, which is necessitating global innovators to seek outsourcing of manufacturing and research to strategic partners to provide bandwidth to focus on core competencies and development of new active ingredients.

India will continue to benefit owing to its:

- **Lower cost base:** India, with its low-cost manufacturing base, a track record in process chemistry, and cogent IP protection policies, has established itself as a destination of choice for global innovators looking to outsource manufacturing operations. The pharmaceuticals industry is one of the major beneficiaries in the Indian CRAMS space, followed by agrochemicals, personal care ingredients, and specialty chemicals. Lower capital expenditure and set-up costs in India is driving growth, as CRAMS is a niche segment, and custom synthesis requires unique manufacturing techniques that can be a vastly expensive process.
- **Large and abundant talent pool:** The availability of a large talent pool of professionals for drug development and research chemistry is strengthened by a sizeable number of pharmacists and post-graduate professionals, which is an added attraction for the global industry. One of the key indicators for rising penetration of pharma science education is the number of registered pharmacists – as per National Health Profile, India had 12,01,393 registered pharmacists as of March 2020, which was a rise from 5,59,408 in 2002.
- **Presence of USFDA-approved manufacturing sites**: India's established market position is backed by +300 USFDA-approved manufacturing sites. These sites support growth of the Indian CRAMS industry, where continuous R&D has helped contribute to revenue growth. Further, growth of the industry is driven by growth of the Indian specialty chemicals market, which is expected to outpace China, and double its share of the global market to ~6% by 2026 from 3-4% in fiscal 2021, according to CRISIL Research.
- **Indian government push for IP treaties:** Joint ventures and technology transfers are driving the Indian CRAMS industry. The Indian government is doing its part to help the industry develop, by signing IP treaties, such as in June 2019, wherein India accepted the three important classification treaties of the World Intellectual

Property Organization to ease the search of trademarks and industrial designs, thereby providing brand owners and designers with protection for their IP.

- **Global players preferring supply chain diversification strategy:** Players are adopting a China+1 business strategy to restrict investing only in China and diversify their business in other countries. This has been triggered by the rising costs of doing business in China, especially operating costs, the fragility of over-dependency of supply chains on Chinese goods exposed during the pandemic, and stricter environmental protection norms in China shutting down few chemical plants. Multinational companies are finding an alternative to China with their 'China plus one' strategy. Businesses are looking to take advantage of ASEAN countries and shift to cost effective markets with strong technological capabilities. India appears to be at the forefront of alternatives, especially when it comes to the pharma and specialty chemicals industries.
  - Due to recurring quality issues and supply disruptions in China following the Covid-19 pandemic, global customers are looking to widen their sourcing footprint to strengthen their supply chains and reduce country dependence. This has given an opportunity for markets like India to establish as a reliable sourcing option, thereby increasing its share in global CRAMS industry
- **Long-term partnership with customers:** In custom synthesis and manufacturing industry, customers typically enter into confidentiality agreements with manufacturers, and, hence, prefer working with a few select manufacturers, which translates into a long-term relationship with the manufacturers
  - Also, the acquisition of a CRAMS partner is a long process as the parent company is required to register the manufacturer with regulatory bodies as a supplier of intermediate products or active ingredients. Also, from the product testing stage to the batch procurement phase, to the eventual customer approval stage, innovator companies usually take 12-24 months, depending on the product's complexity. Also, customers typically avoid sharing product-related information with numerous manufacturers to restrict the spread of confidential information, and, as a result, customers select manufacturers after carefully reviewing them, and tend to develop long-term relationships.

8 Overview of select products

Select heterocyclic and fluoro organic compounds are produced by Survival Technologies which are employed as intermediates in the production of chemical products used in applications such pharmaceuticals, agrochemicals, biotech, polymers, X-ray films, and electronics. The descriptions of select products are as follows:

- 1-Ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC, EDAC or EDCI) is a water-soluble carbodiimide available as hydrochloride salt. It is used by pharmaceutical manufacturers in the development of drug products and for applications in health care and cosmetics products such as dermal fillers.
- Trimethylsilyl trifluoromethanesulfonate (TMSOTf) is an excellent catalyst for the acylation of alcohols with acid anhydrides. TMSOTf is an important medical and pesticide intermediate.
- Bromoacetonitrile is also an important reagent in the synthesis of several compounds, such as pharmaceuticals and agrochemicals.
- 5-bromovaleric acid and CYCLAM (1,4,8,11 tetraazacyclotetradecane) are used as drug synthesis intermediate.
- 4-Bromobenzenesulfonyl chloride is used as pesticide, pharmaceutical intermediates.
- Pyrimidine derivatives such as 5-bromo-2,4-dichloro pyrimidine is used as an intermediate for new anticancer agents.
- Alpha tetralol is a heterocyclic compound which is used as an intermediate of rodenticide coumatetralyl.
- TEMPO is chemically known as 2,2,6,6-Tetramethyl1-piperidinyloxy or 2,2,6,6-tetramethylpiperidine-1-Oxyl. As a stable radical, it has applications throughout chemistry and biochemistry. TEMPO has a wide range of applications including use as intermediate for applications such as pharma intermediate, perfumery, polymer. It is used as a catalyst for the oxidation of primary alcohols to aldehydes in organic synthesis.

Table 11: Market size of select products in India and Global (Tons per annum, TPA)

S.No	Product	Product type	Product category	Application	Market size India, TPA (FY22)	Market size Global, TPA (CY21)
1	Ethyl - 3 -(3-Dimethylaminoprophyl) carbodiimide	Peptide coupling reagent	Intermediate	Agro, Cosmetics, Paints, Biotech, Pharma	50.6	512.0
2	Trimethylsilyl trifluoromethanesulfonate (TMSOTf)	Triflic derivative	Intermediate	Agro, Pharma	56.7	120.0
3	2-PYRIDYL TRIBROMOMETHYL SULFONE (BSP)	Triflic derivative	Intermediate	Polymers, X Ray Films (MRI)	0.0	55.0
4	Trifluoromethanesulfonicanhydride	Triflic derivative	Intermediate	Agro, Electronics, Polymer, Biotech, Pharma	12.0	110.0
5	Bromoacetonitrile	Laboratory reagent	Intermediate	Biotech, Pharma, Agro	13.7	44.1
6	4 BROMOBENZENESULFONYLCHLORIDE	Heterocyclic compound	Intermediate	Pharma	0.0	20.0

S.No	Product	Product type	Product category	Application	Market size India, TPA (FY22)	Market size Global, TPA (CY21)
7	5-BROMO-2,4-DICHLORO PYRIMIDINE*	Heterocyclic compound	Intermediate	Pharma - Anti Cancer	0.0	25.0
8	5-BROMOVALERIC ACID	Laboratory reagent	Intermediate	Pharma	7.5	10.6
9	ALPHA TETRALOL	Heterocyclic compound	Intermediate	Rodenticide	0.0	17.2
10	CYCLAM (1,4,8,11 tetraazacyclotetradecane)	Heterocyclic compound	Intermediate	Pharma	0.1	2.5
11	2,2,6,6-tetramethylpiperidine N-oxyl (or known as TEMPO)s	Catalyst	Intermediate	Pharma, Perfumary, Agro	5.2	20.0

*Note: * India market for product 5-Bromo-2,4 Dichloro Pyrimidine in FY22 was nil but the market has started growing and expected to reach 1 to 1.2 Tons per annum (TPA) by FY23 as Survival Technologies have started limited domestic sales in FY23*

Source: CRISIL Research

9 Survival Technologies' market positioning

Survival Technologies Limited, incorporated in 2005 by Vijay R Agarwal, manufactures fine and specialty chemicals for the global and domestic pharmaceutical, agrochemical, petrochemical, personal care, and electronics manufacturing sectors. The company's strong R&D set-up facilitates CRAMS, custom synthesis, and bulk production. It is one of the prominent companies in the country for fine and rare specialty chemicals, with an inventory of 1,500+ products and 800+ global clients. Through the sale of high value products, it is evident that the company has a significantly higher realization per kg vis-à-vis its peers with focus on CRAMS.

9.1 Product portfolio

The company has a diversified portfolio, with over 400+ active products in fiscal 2022. It utilises processes, including those created via internal research, to manufacture fine and specialty chemicals. Many of the products it sells domestically are import substitutes that were earlier imported from countries like China.

It was one of the most profitable companies manufacturing speciality chemicals in India in fiscal 2022, based on the analysis of the margins of Indian companies operating in the space. It is also one of the leading CRAMS companies in India, in terms of the manufacturing of select chemical products as of fiscal 2022.

Survival Technologies focuses on select niche segments and products; for example, it is one of the few speciality chemical manufacturers in India manufacturing select products from the heterocyclic and fluoro organic product group for sale in India and globally. Niche product groups such as these have high entry barriers owing to the capital-intensive nature and technicalities involved in manufacturing the products.

It also has market-leading position across several of its products. It is –

- one of the 12 manufacturers globally and the largest domestic producer of ethyl–3– dimethylaminopropyl carbodiimide;
- the only manufacturer globally to manufacture alpha tetralol;
- the sole company in India making products such as 2-pyridyl tribromomethyl sulfone, 4-bromo benzene sulfonyl chloride, 5-bromo-2, 4-dichloro pyrimidine, cyclam, and tempo on a commercial scale.

Being the largest manufacturer for several niche chemical intermediates (as mentioned in table 11) in India, Survival Technologies is well-positioned to leverage the growing demand for its products globally, to grow its market share.

Table 12: Survival Technologies' market positioning for select chemical products

Products	Key Applications	Domestic sales, tpa (FY22)	Exports tpa, (FY22)	Total sales tpa, (FY22)	Market position	India market share (FY22)	Global market share (CY21)
Ethyl - 3 -(3-Dimethylaminopropyl) carbodiimide	Agro, cosmetics, paints, biotech, pharma	16.1	30.3	46.4	One of 12 producers globally; largest producer in India.	32%	9%
Trimethylsilyl trifluoromethanesulfonate (TMSOTf)	Agro, pharma	35.4	0.0	35.4	Only commercial scale producer in India	62%	29%
2-Pyridyl tribromomethyl sulfone (BSP)	Polymers, X-ray films	-	51.5	51.5		Not currently sold / consumed in India	94%
Trifluoromethanesulfonicanhydride	Agro, electronics, polymer, biotech, pharma	12.0	4.3	16.3		100%	15%
Bromoacetonitrile	Biotech, agro, pharma	4.4	6.4	10.7		32%	24%
4 Bromobenzenesulfonylchloride	Pharma	-	3.7	3.7		Not currently sold / consumed in India	19%
5-Bromo-2,4-dichloro pyrimidine	Pharma-anti cancer	-	8.2	8.2		Not currently sold / consumed in India	33%
5-Bromovaleric acid	Pharma	7.5	0.0	7.5		100%	71%
Alpha tetralol	Rodenticide	-	17.2	17.2		Not currently sold / consumed in India	100%
Cyclam (1,4,8,11 tetraazacyclotetradecane)	Pharma	0.1	0.0	0.1		100%	6%
2,2,6,6-Tetramethylpiperidine N-oxyl (or known as tempo)	Pharma, perfumery, agro	2.0	0.3	2.22		38%	11%

Note: commercial scale include ability to manufacture products in multi metric ton and excludes any experimental or pilot scale production which can range between grams to few kilograms

1) Market share in India has been calculated on the basis of sales volume of the relevant product in India in Fiscal 2022, including sales in such period of such products imported into India.
2) Global market share has been calculated on the basis of total sales volume of relevant product during Fiscal 2022 divided by the global market size calculated in terms of sales volume of such product in Calendar Year 2021

Source: CRISIL Research

9.2 Manufacturing competency

The company has four manufacturing plants — two in Ankhleshwar and one in Vapi in Gujarat, and one in Mahad, Maharashtra (under implementation). These manufacturing facilities are equipped with modern technologies and machinery to produce high quality pure intermediates and fine chemicals. It also has effluent treatment plants at its facilities. All its facilities are fungible across product categories, thereby compensating for any drop is demand of any one product, are regularly audited, and certified by clients, and are in proximity to ports, giving it logistical advantage; as exports comprise a high share, the facilities are strategically located at proximity to ports in Gujarat and Maharashtra.

Manufacturing process

The raw materials are charged continuously batch-wise with a catalyst in reactors of suitable capacity and design based on the type of reaction. Other technical parameters, such as temperature, pressure, and reaction time, are maintained based on the type of reaction to be carried out. When the reaction is complete, the product is analysed and subjected to further processing, which includes filtration, continuous/ batch distillation, and purification to get the required quality product. The product is ultimately tested to ensure it meets the applicable specifications before it is supplied to the customer. The company's ability manufacture end-stage products ensures that their customers are required to undertake limited additional steps to produce the final API / final active ingredient.

Strong customer relationships

The company has a strong customer base, which includes many leading domestic and global marquee names, such as Pfizer, Chori, BioSpectra, Sun Pharma, Dr Reddy's, BASF, and Evonik. By strategically matching the solutions with the customers' business objectives, company ensures long-term partnerships. It also adds value to customers by reducing transition time and providing innovative solutions for synthetic chemistry requirements.

Research and development

The company has two R&D labs manned by a highly qualified team of 32 employees. It focuses on undertaking continuous R&D dedicated to manufacturing new products through complex chemistries from initial conceptualization to commercialization of a product where, it believes, there is continuous growth potential. Its continued focus on R&D has been instrumental in the growth of its operations and has improved its ability to customize products for its customers as well as reduce its cost of goods while maintaining its margins.

Reaction capabilities

The company has been widely acknowledged for its expertise in handling a wide variety of complex chemical reactions, ranging from advanced synthesis, catalysts, high pressure, organo-metallic, esterification, to macro cycle ethers, etc. Its understanding of complex chemistry has even enabled it to establish an alternative synthetic route of the production of non-infringing patents. Its R&D capabilities and manufacturing facilities have enabled it to develop core competencies in several chemistries, including complex chemistries such as heterocyclic chemistry, hydrazide chemistry, macrocyclic ethers, trifluoromethyalation, and electrophilic and nucleophilic fluorination using various fluorination reagents.

Focus on sustainability

Survival has also been assessed and successfully completed the Together for Sustainability (TfS) audit which is an on-site examination of a company's business sites and practices. Together for Sustainability (TfS) is an international, non-profit association that supports and coordinates the measurement of sustainability performance of chemical companies and their suppliers. Results are shared with all TfS members, enhancing efficiency and cost-effectiveness while simultaneously encouraging industry-wide collaboration and continuous improvement. TfS

members are chemical companies representing a global annual turnover of over €600 billion as of November 2022 in the chemical industry.

Barriers to market entry

The nature of the business in which the Company operates (CRAMS focused speciality chemical manufacturing), and especially niche products groups such as heterocyclic and fluoro organic compounds, is characterised by high entry barriers owing to its knowledge-intensive nature, expertise required to handle complex chemistries, ability to develop products to cater to a variety of industries, high-quality standards and stringent impurity specifications for processes and products capabilities. Moreover, some of the raw materials and intermediates are corrosive, thereby requiring a high degree of technical skill, expertise, and training to manage. In fact, the handling of raw materials used for the manufacture of products requires considerable training of employees, which creates additional significant barriers to entry for a new player. This provides Survival Technologies with an advantage over new entrants that would need to make significant investments and endure a long gestation period with potential customers to effectively compete. In addition, given the nature and industry standards of the end-use products manufactured by customers, any change in the supplier may require significant time and expense for the customers, which acts an entry barrier for any such change, i.e., a customer may require considerable amount of time to approve suppliers to ensure that all their quality norms are adhered to. Hence, due to the resources involved in engaging with new suppliers, customers are less inclined to pursue alternate supply sources.

Core expertise

The company views expertise as a modern mantra for continual innovation. With their deep understanding of chemistry, they design and synthesise exotic and difficult-to-find intermediates, giving them a competitive advantage in terms of quality, cost, and regulatory requirements.

Custom synthesis

Capable of developing solutions in specific time frame for complex chemistry, it successfully undertakes custom synthesis right from lab scale to commercial production. Developing and synthesising hard to find intermediates, it has been recognised as the most preferred partner by leading MNCs from various sectors across the globe.

Quality control

It adheres to the highest quality standards at par with the latest international trends. From their stringent quality checks for raw materials, in-process, final product precisely in line with customers' specifications. It's list of valued patrons has been growing manifold over the last many years.

Complex chemistry and technology

All products and technology to develop the end-product is developed in-house in its own R&D labs and no technology has been borrowed or acquired to ensure best quality and lower costs. Company endeavours to be backward integrated wherever possible to the basic materials and to undertake at least 2-3 stages of reactions. It employs advanced chemistries and guards the technology. R&D efforts focus on determining optimal production process for the intermediates they manufacture and the reduction of energy consumption this has helped them in lowering manufacturing cost. It prefers to be in complex chemistry requiring specialised know-how.

10 Financial benchmarking

CRISIL Research has compiled profiles of key players in the Indian specialty chemicals industry that are similar to Survival Technologies and have a focus on CRAMS or have pharmaceuticals as their key end-use application. Information in this section is sourced from company websites, including annual reports and investor presentations, regulatory filings, rating rationales and/or product brochures. The competitive landscape is based on player operations in India, comparable operating revenue, and availability of financial data of the players.

Table 13: Revenue from operations

Metric/company	Revenue from operations (Rs million)				Revenue CAGR (FY20-FY22)
	FY23 (Q1)	FY22	FY21	FY20	%
Survival Technologies	1,002.2	3,117.8	2,747.9	1,991.5	25.1
Alkyl Amines Chemicals	4,734.8	15,428.0	12,424.4	9,928.8	24.7
Neogen Chemicals	1,479.0	4,872.5	3,364.2	3,061.2	26.2
Aether Industries	1,600.1	5,900.5	4,498.2	3,018.7	39.8
Navin Fluorine	3,975.2	14,533.6	11,793.9	10,615.5	17.0

Source: CRISIL Research

Table 14: Gross profit and gross margin

Metric/company	Gross profit (Rs million)				Gross margin (%)				Gross margin growth CAGR (FY20-FY22)
	FY23 (Q1)	FY22	FY21	FY20	FY23 (Q1)	FY22	FY21	FY20	%
Survival Technologies	547.8	1,615.0	1,188.9	831.3	54.8	51.8	43.3	41.7	39.4
Alkyl Amines Chemicals	2,411.7	7,072.4	7,193.0	5,083.8	50.9	45.8	57.9	51.2	17.9
Neogen Chemicals	662.0	2,122.8	1,387.9	1,220.2	44.8	43.6	41.3	39.9	31.9
Aether Industries	770.1	3,020.1	2,191.3	1,457.2	48.1	51.2	48.7	48.3	44.0
Navin Fluorine	2,152.4	7,877.3	6,420.2	5,777.3	54.1	54.2	54.4	54.4	16.8

Source: CRISIL Research

Table 15: EBITDA

Metric/company	EBITDA (Rs million)				EBITDA margin (%)				EBITDA growth CAGR (FY20-FY22)
	FY23 (Q1)	FY22	FY21	FY20	FY23 (Q1)	FY22	FY21	FY20	%
Survival Technologies	328.7	919.0	696.5	349.1	32.9	29.5	25.3	17.5	62.3
Alkyl Amines Chemicals	1,158.5	3,265.2	4,291.3	2,570.2	24.5	21.2	34.5	25.9	12.7

Neogen Chemicals	246.5	865.9	643.6	580.5	16.7	17.8	19.1	19.0	22.1
Aether Industries	424.5	1,681.1	1,121.6	696.5	26.5	28.5	24.9	23.1	55.4
Navin Fluorine	991.3	3,548.1	3,092.9	2,634.9	24.9	24.4	26.2	24.8	16.0

Source: CRISIL Research

Table 16: Profit after tax

Metric/Company	PAT (Rs million)				PAT margin (%)				PAT growth CAGR (FY20-FY22)
	FY23 (Q1)	FY22	FY21	FY20	FY23 (Q1)	FY22	FY21	FY20	%
Survival Technologies	248.8	734.6	563.2	190.5	24.9	23.6	20.5	9.6	96.4
Alkyl Amines Chemicals	818.8	2,249.0	2,953.4	2,152.8	17.3	14.6	23.8	21.7	2.2
Neogen Chemicals	111.0	446.3	313.3	286.6	7.5	9.2	9.3	9.4	24.8
Aether Industries	306.2	1,089.3	711.2	396.1	19.1	18.5	15.8	13.1	65.8
Navin Fluorine	744.5	2,630.8	2,470.5	4,013.7	18.7	18.1	20.9	37.8	(19)

Source: CRISIL Research

Table 17: Return on equity and capital employed

Metric/Company	RoE (%)			RoCE (%)			Working capital cycle (days)		
	FY22	FY21	FY20	FY22	FY21	FY20	FY22	FY21	FY20
Survival Technologies	32.6	37.0	19.8	38.2	42.8	31.1	114.9	70.8	95.6
Alkyl Amines Chemicals	22.7	37.3	40.1	28.0	46.3	36.6	37.5	27.2	70.1
Neogen Chemicals	10.2	17.1	18.3	12.9	18.3	25.8	209.1	173.8	276.1
Aether Industries	28.2	40.8	38.3	28.9	34.8	32.3	218.8	146.3	153.1
Navin Fluorine	14.3	15.1	28.4	15.5	15.4	15.6	150.7	137.5	120.2

Source: CRISIL Research

Table 18: Gross fixed asset turnover ratio

Metric/company	Gross fixed asset turnover ratio		
	FY22	FY21	FY20
Survival Technologies	8.7	10.1	8.2
Alkyl Amines Chemicals	2.1	2.4	2.1
Neogen Chemicals	1.6	2.5	2.7

Aether Industries	2.1	1.9	2.2
Navin Fluorine	2.7	2.4	2.4

Note: Consolidated financials for all companies have been considered.

Source: CRISIL Research

Formulas used

Operating EBITDA = PBT+ D&A + interest cost – other income

EBITDA margin (%) = EBITDA/ revenue from operations

PAT margin (%) = PAT/ revenue from operations

RoE = PAT/ shareholders' equity

RoCE = EBIT/ capital employed (total assets – current liabilities)

Working capital days = Inventory days + receivable days – payable days

Inventory days = Closing inventory*365/COGS

Receivable days = Closing receivable*365/revenue from operations

Payable days = Closing payables*365/COGS

Gross profit = Revenue from operation – COGS

Gross margin = Gross profit/revenue from operations

Gross fixed asset turnover ratio = Revenue from operations/ gross fixed asset

Survival Technologies' financial positioning

- Revenue from operations increased to Rs 3,118 million in fiscal 2022 from Rs 1,991 million in fiscal 2020, which was a CAGR of ~25.1%.
- Gross profit increased to Rs 1,615 million in fiscal 2022 from Rs 831 million in fiscal 2020, which was a CAGR of ~39%.
- Gross margin improved significantly between fiscals 2020 and 2022, from 41.7% to 51.8%, thereby recording the 2nd highest gross margin vis-à-vis all peers in fiscal 2022.
- EBITDA margin strengthened to 29.5% in fiscal 2022 from 17.5% in fiscal 2020, the highest among identified peers in fiscal 2022.
- PAT rose to Rs 734.6 million in fiscal 2022 from Rs 190.5 million in fiscal 2020, which was a CAGR of 96.4%, the highest among all peers.
- PAT margin improved significantly between fiscals 2020 and 2022, thereby recording the highest margin vis-à-vis all peers in fiscal 2022.
- The company's capital efficiency improved over fiscal 2020 to 2022, highlighted by improvement in RoCE (31.1% to 38.2%)
- The company posted the highest asset turnover among considered peers in fiscal 2022, which was largely the result of its focus on high-value products and high-capacity utilisation of its facilities
- STL was one of the most profitable companies manufacturing speciality chemicals in India in fiscal 2022, based on the above analysis of the margins of Indian companies operating in the space.
- The company also recorded the highest return ratios (ROE and ROCE) in fiscal 2022, amongst the above considered peers.

About CRISIL Limited

CRISIL is a leading, agile and innovative global analytics company driven by its mission of making markets function better.

It is India's foremost provider of ratings, data, research, analytics and solutions with a strong track record of growth, culture of innovation, and global footprint.

It has delivered independent opinions, actionable insights, and efficient solutions to over 100,000 customers through businesses that operate from India, the US, the UK, Argentina, Poland, China, Hong Kong and Singapore.

It is majority owned by S&P Global Inc, a leading provider of transparent and independent ratings, benchmarks, analytics and data to the capital and commodity markets worldwide.

About CRISIL Research

CRISIL Research is India's largest independent integrated research house. We provide insights, opinion and analysis on the Indian economy, industry, capital markets and companies. We also conduct training programs to financial sector professionals on a wide array of technical issues. We are India's most credible provider of economy and industry research. Our industry research covers 86 sectors and is known for its rich insights and perspectives. Our analysis is supported by inputs from our large network sources, including industry experts, industry associations and trade channels. We play a key role in India's fixed income markets. We are the largest provider of valuation of fixed income securities to the mutual fund, insurance and banking industries in the country. We are also the sole provider of debt and hybrid indices to India's mutual fund and life insurance industries. We pioneered independent equity research in India, and are today the country's largest independent equity research house. Our defining trait is the ability to convert information and data into expert judgments and forecasts with complete objectivity. We leverage our deep understanding of the macro-economy and our extensive sector coverage to provide unique insights on micro-macro and cross-sectoral linkages. Our talent pool comprises economists, sector experts, company analysts and information management specialists.

CRISIL Privacy Notice

CRISIL respects your privacy. We may use your contact information, such as your name, address, and email id to fulfil your request and service your account and to provide you with additional information from CRISIL. For further information on CRISIL's privacy policy please visit www.crisil.com/privacy.

Disclaimer

Argentina | China | Hong Kong | **India** | Poland | Singapore | UK | USA

CRISIL Limited: CRISIL House, Central Avenue, Hiranandani Business Park, Powai, Mumbai – 400076. India

Phone: + 91 22 3342 3000 | Fax: + 91 22 3342 3001 | www.crisil.com

/company/crisil @CRISILLimited /CRISILLimited /user/CRISILLimited /lifeatcrisil

CRISIL

An S&P Global Company