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CHEMICAL SECTOR

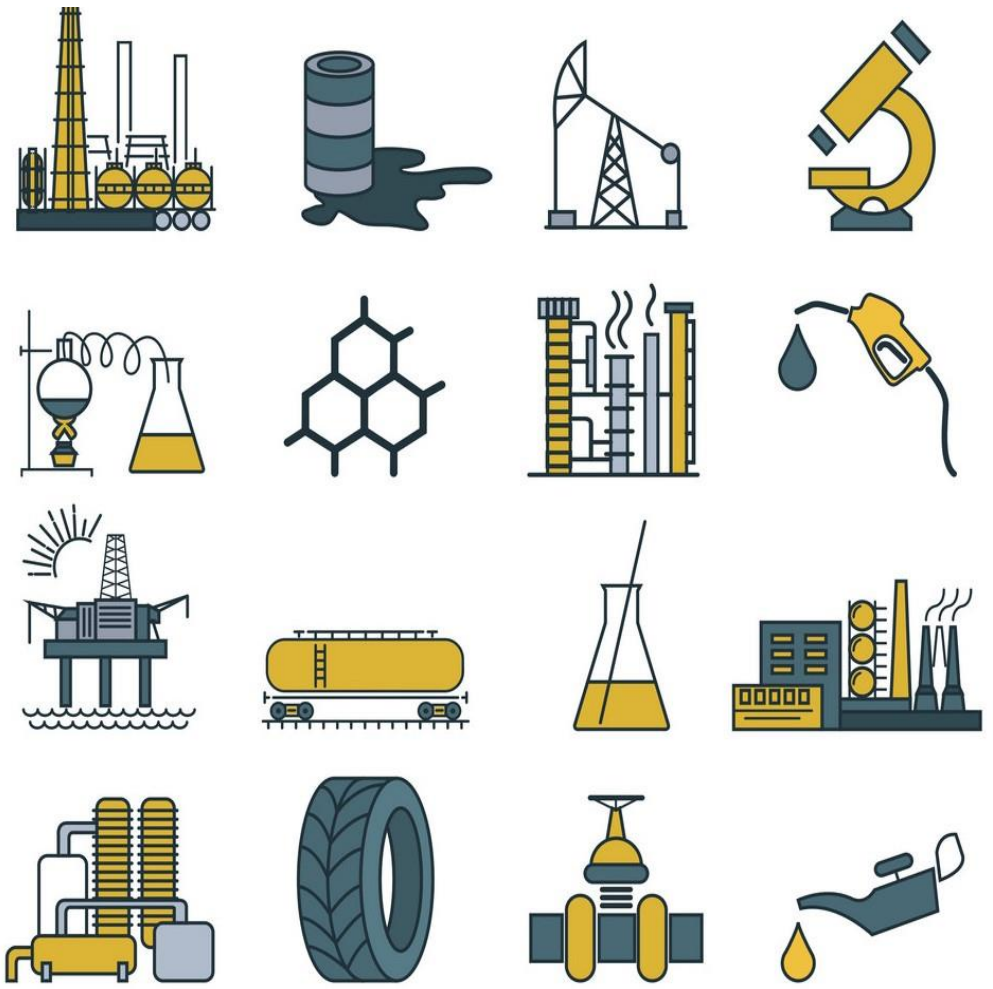
July, 2020

Chemical Industry

'Chemical Industry refers to the industry which is involved in the business of making different products from raw materials through chemical reactions'.

Importance of Chemical Industries

- Chemical industry is one of the major industry and contribute to multiple sectors of the economy.
- There are multiple types of chemicals and its products are used in multiple industries.
- Chemical industry produces fibers which are used in textile industries.
- Chemical industry helps pharmaceutical and healthcare industries by providing essential chemical components.
- It provides plastic to the packaging industry and artificial rubber to the automobile industry.
- Chemical industry also contribute to agriculture and food sector.



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Different Types of Chemical Industries

- Inorganic and Organic Chemical Industries
- Fertilizer Industries
- Refineries and Petroleum Industry
- Pesticide Industries
- Electroplating and Heat Treatment Industries
- Hydro-Generated Oil and Soap Industries

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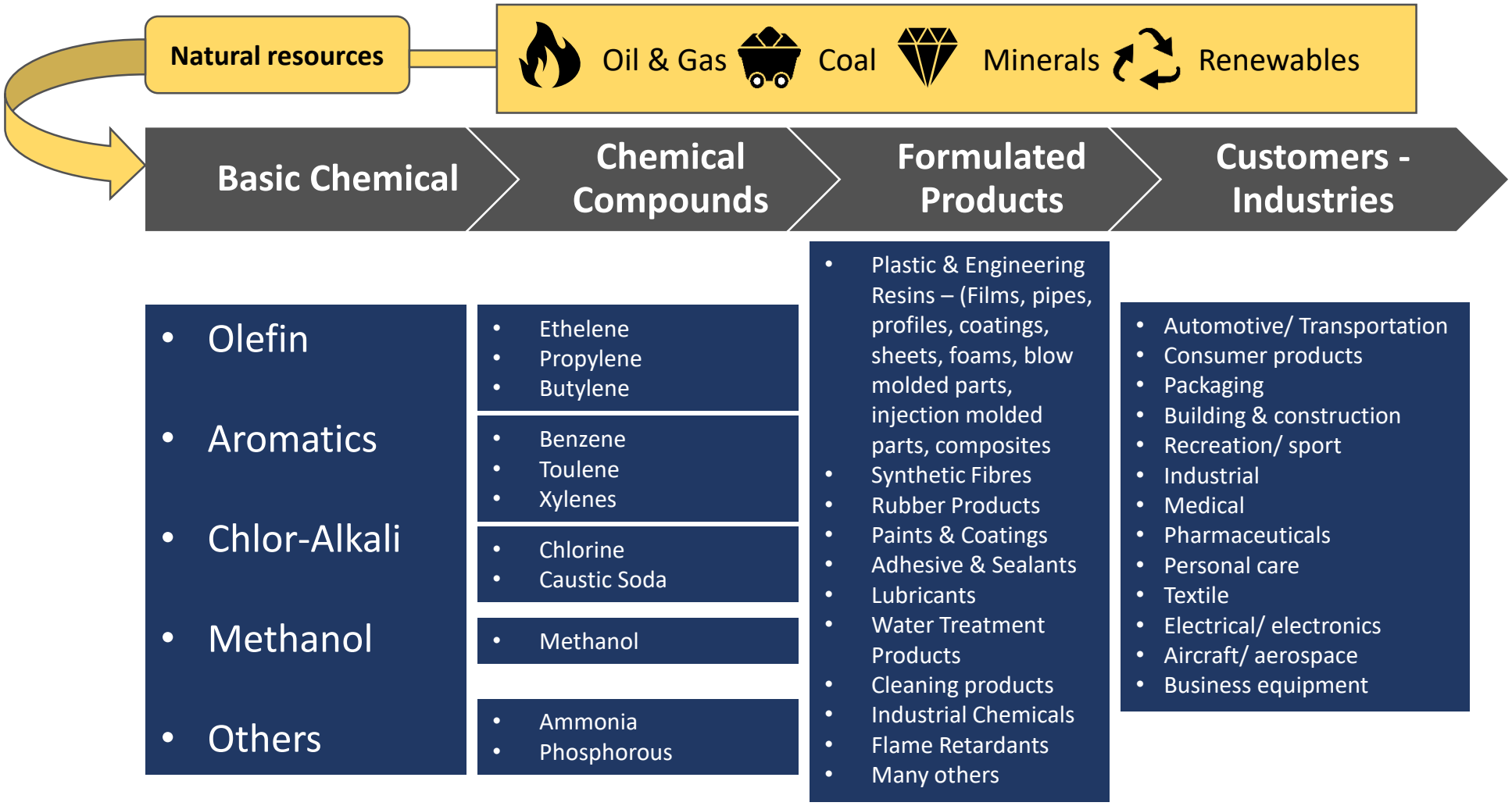
Different Types of Chemical Industries

Inorganic and Organic Chemical Industries	Fertilizer Industries	Refineries and Petroleum Industry	Pesticide Industries	Electroplating and Heat Treatment Industries	Hydro-Generated Oil and Soap Industries
•Manufacturing of acids, alkalis, allied chemicals and salts are clubbed in to this industry. •Oraganic Industries: These industries are classified into three broad groups: (a) Natural Drugs (b) Synthetic Drugs (c) Antibiotics	•Fertilizers are used in the agriculture industry to improve the yield (the amount of crop) farmers receive from an acreage of land. The three main types of nutrients or fertilizers are nitrogen, phosphate, and potash—with nitrogenous fertilizer industry being the largest fertilizer type, followed by phosphate and potash.	•An oil refinery or petroleum refinery is an industrial process plant where crude oil is transformed and refined into more useful products such as petroleum naphtha, gasoline, diesel fuel, asphalt base, heating oil, kerosene, liquefied petroleum gas, jet fuel, and fuel oils.	•Pesticide is an all-inclusive term of pesticide, herbicides, weedicides etc. The pesticide includes a variety of organic and inorganic compound but the modem trend is towards the synthetic organic pesticide.	•Electroplating is a process that uses an electric current to reduce dissolved metal cations so that they form a thin coherent metal coating on an electrode. In industries, electroplating is primarily used to change the surface properties of an object such as abrasion and wear resistance, corrosion protection, lubricity, aesthetic qualities, but may also be used to build up thickness on undersized parts or to form objects by electro refining.	•Traditionally, soap has been manufactured from alkali (lye) and animal fats (tallow), although vegetable products such as palm oil and coconut oil can be substituted for tallow. Laundry soaps & Toilet soaps are the two types of soaps produced by industries.

Chemical Industry



Olefin

Olefin, also called **alkene**, compound made up of hydrogen and carbon that contains one or more pairs of carbon atoms linked by a double bond. Olefins are examples of unsaturated hydrocarbons (compounds that contain only hydrogen and carbon and at least one double or triple bond).

Examples of Olefin

Methane: a greenhouse gas that can be used as fuel and is often included in rocket fuel.

Ethylene: used to make plastics and films, as well as detergents, synthetic lubricants, and styrenes (used to make protective packaging).

Propylene: A colorless, odorless gas used for fuel and to make polypropylene, a versatile plastic polymer used to make products ranging from carpets to structural foam.

Chemical Industry

Olefin

Polyvinyl Chloride (PVC or Vinyl)

Polyvinyl Chloride (PVC or Vinyl) is derived from ethylene which is a chemical compound of 'Olefin'.

Polyvinyl Chloride (PVC or Vinyl) is an economical and versatile thermoplastic polymer widely used in building and construction industry to produce door and window profiles, pipes (drinking and wastewater), wire and cable insulation, medical devices, etc. It is the world's third largest thermoplastic material by volume after polyethylene and polypropylene.

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Demand and Supply | Olefins - PVC

- In the domestic market of PVC, resin is mainly used to manufacture PVC pipes. Other sectors include artificial leather, shoes, rigid and soft sheets, garden hose, windows and doors etc. PVC domestic sales volume has steadily been increasing at the rate of 5% per annum.
- Total market size of PVC related products is estimated at 282 kilo tons.
- Domestic industry currently comprises one player, Engro Polymer and Chemicals Limited (EPCL), with an annual capacity of 203,000 tons per annum. The rest of the demand is catered through imports. EPCL sells its product under the brand name of “SABZ”. Engro Polymer is also going for capacity enhancement of 100,000 tons

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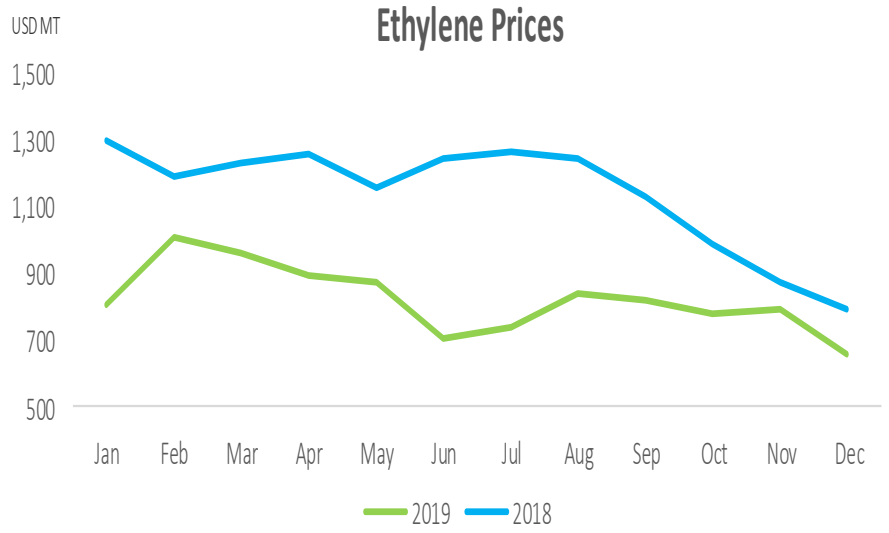
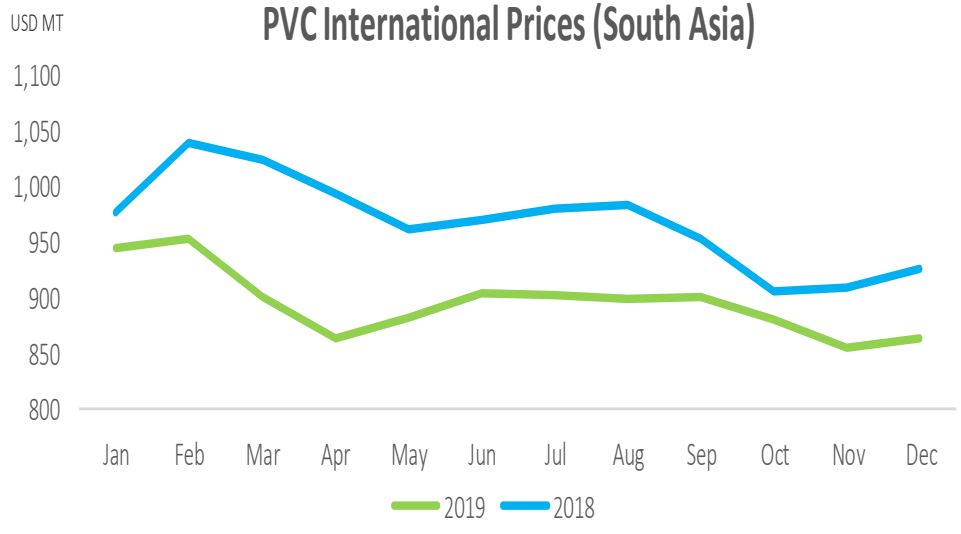
Chemical Industry

Demand and Supply | Olefins - PVC

- Local prices of PVC are directly linked with international prices.
- During June 2019, Polyvinyl Chloride (PVC) margins went up by 28.6% MoM to USD 513/ton.
- The industry indirectly benefits from the imposition of 12% import duty on PVC.
- Imposition of anti-dumping duty between 11 to 40% has impacted margins of local player





Aromatics

Aromatics, so called because of their distinctive perfumed smell, are substances derived from crude oil and, in small quantities, from coal. Aromatics are hydrocarbons, organic compounds that consist exclusively of the elements hydrogen and carbon – without which life would not be possible on Earth.

EXAMPLES

Benzene: Benzene is extracted from two primary sources: pyrolysis gasoline (pygas), which is a co-product of ethylene manufacture; or reformate, a refinery stream resulting from the catalytic reforming process used in gasoline production. Benzene can also be derived from toluene. Benzene is widely used across many industrial sectors, where it is combined and processed with other basic chemicals (such as ethylene or propylene) to produce countless consumer goods: clothing, packaging, paints, adhesives, plywood, computer casings, compact discs, dyes, agrochemicals, pharmaceuticals and many more.

Toluene: Toluene is extracted from gasoline manufacturing streams and so is produced in very large quantities to one of three grades of purity: TDI, nitration, and commercial.

TDI grade toluene is used to make isocyanates, which are combined with polyols in the manufacture of polyurethanes. In turn, polyurethanes are used in a wide variety of consumer goods, such as foams for furniture and bedding, coatings for floors and furniture, artificial sports tracks, ski suits and waterproof leisure wear.

Xylenes: Xylenes - para-xylene, ortho-xylene and meta-xylene - are extracted or distilled from gasoline refining. They can also be produced from toluene using the disproportionation process. Xylene is mainly supplied as a mixed stream, although various processes are used to separate the individual isomers for specific end-uses.

Para-xylene is primarily used as a feedstock for terephthalic acid, a key component in polyethylene terephthalate (PET) resins. Ortho-xylene is used in plasticisers, medicines, and dyes.

Aromatics

Linear Alkylbenzene Sulfonic Acid (LABSA)

Linear Alkyl Benzene Sulphonic Acid, LABSA is a largest volume surfactant because of its low cost, good performance; environmental friendliness is a widely used industrial detergent. It is used in washing powder, detergent powder, oil soap, cleaning powder and detergent cake.

Linear Alkyl Benzene Sulphonic Acid (LABSA) is derived from Linear Alkyl Benzene which is a chemical compound of 'Aromatics'.

Chemical Industry

Market Dynamics | LABSA

- The demand of LABSA is increasing with time and the overall consumption of LABSA at present is about 200,000 tons per annum. The major consumption of LABSA is with local industries which consumes around 55% of the LABSA and the MNC's consume around 45% of LABSA.
- Since LAB is derived from crude oil, the price of LAB is derived are linked by the variables affecting crude oil price.
- LABSA raw material are primarily imported from China, Indonesia and South Korean in Pakistan.
- Currently major player in Pakistan is Tufail Group with a combined capacity of 110,000 tonnes. Tufail Group has also planned capacity enhancement of 50,000 tonnes. Engro Chemical and Sitara Chemical have both announced the plant capacity of around 20,000 and 30,000 tonnes, respectively.
- Anti dumping duties on LABSA range from 10.6%-21.6%

Aromatics

Terephthalate (PET) resins

Terephthalate (PET) resins are derived from xylene which is a chemical compound of Aromatics

- PET, which stands for polyethylene terephthalate, is a clear, strong and lightweight plastic belonging to the polyester family. It is typically called "polyester" when used for fibers or fabrics, and "PET" or "PET Resin" when used for bottles, jars, containers and packaging applications.
- Major products of PET in Pakistan are PET bottles, PET Preforms and r-PSF (recycled-Polyester Staple Fibre) used in textile.
- Major players in the PET packaging industry include Gatron Industries Limited, EcoPack Limited, Al Hafiz Crystoplast, Continental Plastic and Mehran Plastic.

Chemical Industry

Chlor-Alkali

The chlorine-alkali (chloralkali) industry is an important part of the chemical industry, and produces **chlorine** and **sodium hydroxide** through the electrolysis of table salt (NaCl). The main raw material is **brine** which is a saturated solution of sodium chloride (NaCl) that is obtained from natural salt deposits.

PRODUCTS

Chlorine: Chlorine is used in a vast range of chemical processes to create thousands of often indispensable products. While perhaps best known for its role in providing clean drinking water, chlorine chemistry also helps provide energy-efficient building materials, electronics, fiber optics, solar energy cells, 93% of life-saving pharmaceuticals, 86% of crop protection compounds, medical plastics, and much more. In most of these applications, there are no viable substitutes for chlorine.

Caustic Soda: Caustic soda (sodium hydroxide) is a versatile alkali. Its main uses are in the manufacture of pulp and paper, alumina, soap and detergents, petroleum products and chemical production. Other applications include water treatment, food, textiles, metal processing, mining, glass making and others.

Hydrogen : The chlor-alkali process applies 90% of the electric current in the process to a brine (water and salt) solution to produce chlorine, hydrogen gas, and sodium hydroxide, or caustic soda solution. The hydrogen derived from the process is used to produce products like the hydrochloric acid, ammonia and hydrogen peroxide.

Chemical Industry

Market Dynamics | Chlor Alkali – Caustic Soda

- Caustic soda is a key product of Pakistan's Chlor Alkali industry.
- Caustic Soda is largely used in the textile industry for processing, soap industry as a raw material, as well as several other industries for water treatment.
- The demand for caustic soda is highly dependent on the growth of the manufacturing sector as it is an essential raw material in variety of industries, ranging from textiles, soaps and detergents, paper and board, to vegetable oil refining, thermal power units, and food processing.
- The biggest consumer of caustic soda in Pakistan is the textile sector.
- The major players of the caustic soda and chlor alkali based products are Sitara Chemicals Industries Limited, ICL, Engro Polymers Chemicals Limited, Ittehad Chemical and Nimir Industrial Chemicals Limited. Since Engro Polymer's entry in this industry.
- Raw material for Caustic Soda is majorly imported from Iran, China and Japan in Pakistan.

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NIMIR INDUSTRIAL CHEMICALS LTD.

SITARA CHEMICAL INDUSTRIES LTD

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Market Dynamics | Chlor Alkali – Hydrogen peroxide

- Total domestic demand stands between ~60,000 – 70,000 Metric tons while production amounted to ~57,500 MT in FY20.
- ~99% of local production is consumed locally, with only a minor amount being exported to Afghanistan and Sri Lanka.
- Imports are mainly from South Korea, Thailand and Bangladesh.
- The major domestic consumer is the Textile Industry, followed by Mining and Food & Beverages.

	UoM	FY17	FY18	FY19	FY20
Production	MT	54,489	53,640	55,356	57,500
Demand	MT	64,886	69,500	71,210	75,936
International Prices	USD/MT	400	500	500	430-450

Chemical Industry

Market Dynamics | Chlor Alkali – Hydrogen peroxide

- The domestic industry currently comprises two players:
- i) Descon Oxychem Limited – Installed annual capacity 28,000 MT
- ii) Sitara Peroxide Limited – Installed annual capacity 30,000 MT
- Presently, both players are in the process of increasing their capacities. Following the expansions, Descon Oxychem's capacity will increase to ~35,000 MT while Sitara Peroxide's capacity will amount to ~44,800 MT.
- Engro Polymer & Chemicals is also planning to enter the market in FY20 with a capacity of ~20,000 MT.
- Once the new capacities come online, the Country's production of HPO is expected to exceed local demand by FY21.

Chemical Industry

Oleochemical

- At present, the total installed capacity of the sector in Pakistan for oleo chemical products is ~150,000MT per annum.
- Per capita consumption of toilet soaps is increasing with the increase in population and improvement in living styles of the general public and it is recorded at approximately ~700 grams per annum.
- This also elevates the demand for oleo chemicals.
- Nimir Industrial Chemical Ltd annual production capacity is ~85,000MT per annum contributing ~57% to the total Industry capacity.

Oils and fats are important raw materials for the production of oleochemicals, including free fatty acids, methyl esters, fatty alcohols and amines, and glycerol as a byproduct.

An oleochemical is any chemical that has been derived from fats and oils. Widely used in the Home and Personal Care industries, oleochemicals can also be used as a raw material or as an intermediary for the pharmaceutical, rubber, plastic, paint and lubricant industries.

NIMIR INDUSTRIAL CHEMICALS LTD.

Methanol

Methanol (CH_3OH), also called methyl alcohol, wood alcohol, or wood spirit, the simplest of a long series of organic compounds called alcohols. Methanol is an important material in chemical synthesis. Its derivatives are used in great quantities for building up a vast number of compounds, among them many important synthetic dyestuffs, resins, pharmaceuticals, and perfumes. It's an ingredient in commercial products like antifreeze, glass cleaner, and paint thinners, but many people regularly drink other, more innocuous products that contain methanol. Methanol is found naturally in fruit juice and distilled spirits such as whiskey, wine, and beer.

Chemical Industry

Ammonia:

Well over half of the ammonia produced worldwide is used in agriculture. It's used to produce liquid fertilizers that contain ammonia, ammonium nitrate, and urea. It's also used in the production of ammonium nitrate fertilizer. It's used in the production of cotton defoliants, stripping leaves to make the cotton easier to pick. It's used to make antifungal agents for certain fruits. Ammonia is also used in the production of other chemicals and products, including: Nitric acid, certain dyes, sulfa drugs, cosmetics, vitamins, certain synthetic textiles, such as rayon and nylon, household cleaners, such as glass cleaners. Additionally, ammonia is used by several industries:

- As a complexing agent in the mining and metal manufacturing industries
- As a refrigerant in industrial refrigeration
- As a curing and protective agent in the leather industry

Phosphorus:

Phosphorous is a multivalent nonmetal of the nitrogen group. It is found in nature in several allotropic forms, and is an essential element for the life of organisms. There are various allotropic forms of phosphorus but only two forms have commercial significance - white and red phosphorus - and white phosphorus is the most commercially important, accounting for 99% of demand worldwide.

Most phosphorus is used to make phosphoric acid of high purity necessary for some food processing and for etching semi-conductors. It is known as thermal phosphoric acid and is made by burning phosphorus in moist air.

However most phosphoric acid needed to make fertilizers need not be very pure and is more cheaply made directly from rock phosphate ores and not via the element.

Elemental phosphorus is also used to manufacture other chemical intermediates (products used in the manufacturing processes for other chemical products).

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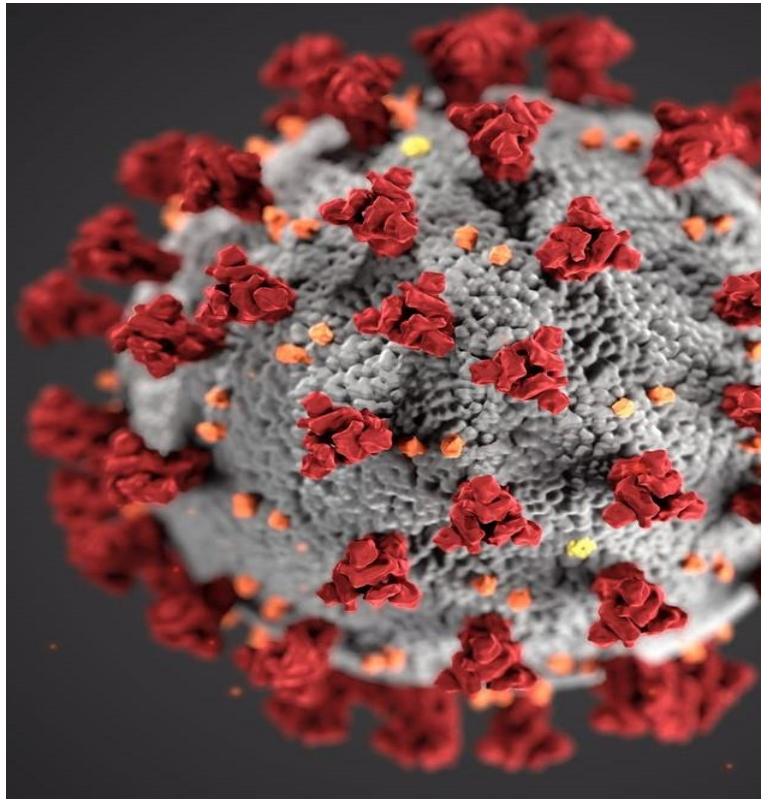
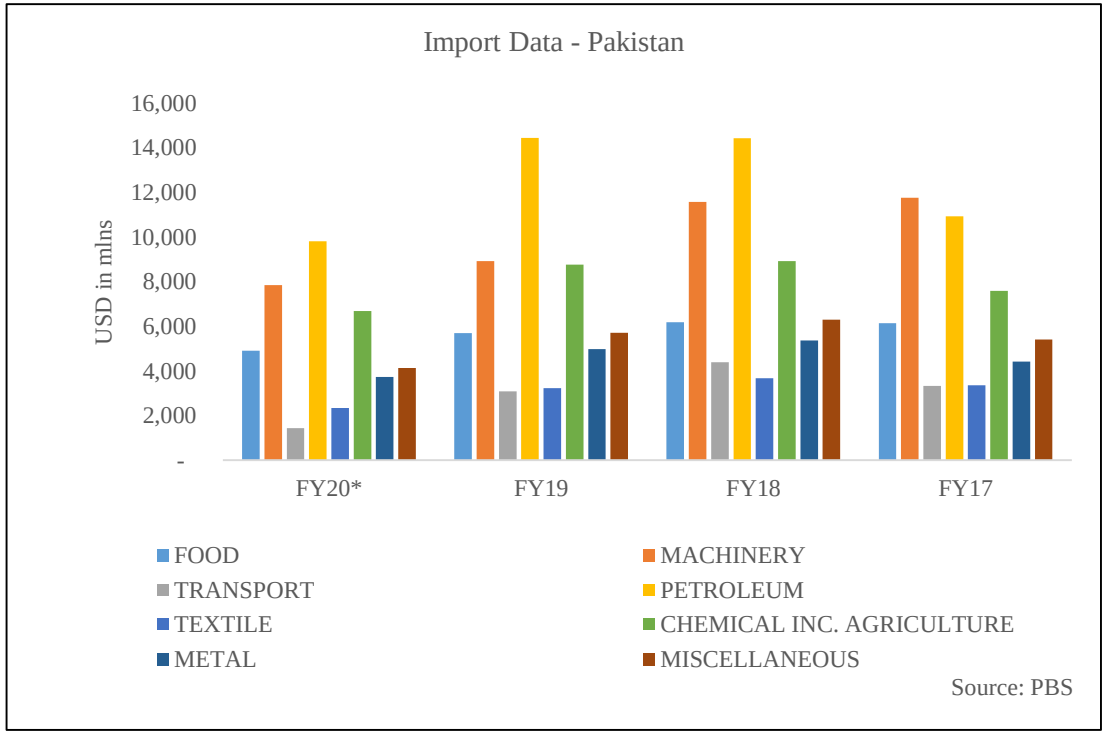
Impact of Covid-19 on Pakistan's chemical Industry

- Demand for chemical sector is expected to decrease on the back of overall contraction in economy and overall slowdown in industrial activity. Essential chemical industries such as Chlor Alkai, health related chemicals (Sanitizers, Industrial Gases, Pharma), chemicals used in food processing & packaging and hygiene related chemicals (Oleo chemicals, Surfactants) will witness lesser impact on demand and may witness increase in demand in short term. Construction related chemicals (PVC, Paints, Emissions & Coatings) will also witness lesser impact on demand due to government's incentives for construction industry. Non-essential Chemical industries such as Resins, Dyes & Miscellaneous Acids will see large drop in demand due to shutdown of textile and other non-essential manufacturing sectors.
- Sudden decrease in oil prices leading to decrease in petrochemicals prices may cause inventory losses but lower raw material cost to bode well for industry margins. The industry mainly imports its raw material from the Middle East in case of crude drive petrochemicals and from East Asia in case of other processed chemicals such as dyes. Supply chain is expected to remain intact after initial disruptions.
- Non-essential chemical industries will witness drop in margins due to lesser demand and closure of operations. Essential Chemical Industries including health and food related will not be much impacted. Construction related Chemicals may see improvement in margins but remain dependent upon duration of lockdown.



Pakistan – Imports & Share of Chemical

- Imports during FY20 totaled ~USD 52bln (estimated on the basis of 11 month) as against ~USD 55bln during the corresponding period of last year showing a decrease of ~5.12%.
- Main commodities of imports were Electrical machinery and apparatus, Iron and Steel, Palm Oil, Petroleum products, Power generating machinery, Iron and steel Scrap, and Raw cotton.
- Pakistan's Chemical sector is import driven. Chemical Sector (including agriculture) imports make up ~17% of total imports of the country
- Chemical Sector(including Agriculture) imports have decreased by ~17% in FY20
- Going Forward, the imports will be impacted due to COVID-19 due to decrease in number of flights and shipments and the vendors not taking orders due to risks associated with it.



Chemical Industry

Opportunities & Challenges

Opportunities	Challenges
Recent increase in demand in essential chemicals due to COVID - 19	Currency devaluation make imports expensive
Decrease in Policy rate will help to finance new projects	Oil price fluctuations lead to inventory losses/gains
SBP Relief measures after COVID-19 to provide breather to cashflows of struggling players	Reliance on some import markets & closure of those markets like in Covid-19 impact supply chain

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The Pakistan Credit Rating Agency Limited

The Pakistan Credit Rating Agency Limited (PACRA) was created on August 18, 1994. PACRA is Pakistan's first credit rating agency and has been responsible for introducing credit ratings at a time when even the concept of free capital market was not well-rooted in the country. PACRA has gained a recognition on the perceived value and integrity of its opinion. Today, PACRA is recognized as a national rating agency by apex regulators of the country, the Securities and Exchange Commission of Pakistan and an external credit assessment institution (ECAI) by the State Bank of Pakistan. PACRA is one of founding members of Association of Credit Rating Agencies in Asia (ACRAA). It has a vibrant presence in the region, providing technical collaboration to regional partners.

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