

What is the industry ? ☐ The industry is a set of procedures, processes, and/or activities performed on raw materials with the objective of making finished products. ☐ The industry requires not only raw materials but also: ☐ Large amounts of energy. ☐ Specialized machinery ☐ A lot of human resources and skills. ☐ A lot of investment in capital and great markets with high purchasing capacity. ☐ On a global scale, highly developed industries are mainly concentrated in North America, Western Europe, Russia, and Japan.

What is the industry ? ☐ The industry is a fundamental activity in the economy of any country, and it's responsible for the the processing and transformation of natural products (raw materials) into other finished and semi-finished products. ☐ The modern industry started with the industrial revolution that took place in England in the mid of 18th century. ☐ Industrial Chemistry is the branch of chemistry which applies physical and chemical procedures towards the transformation of natural raw material and their derivatives to products that are of benefits to humanity. (On the basis of natural raw materials, we find it easier to study industrial inorganic and industrial organic chemistry separately.)

Raw Materials for the chemical industry ☐ Raw Materials from the Atmosphere Air ( $N_2$  ,  $O_2$  , Ne, Ar, Kr, Xe) ☐ Raw Materials from the Hydrosphere Good source of NaCl, Mg, and Br. ☐ Raw Materials from Lithosphere Mineral ores, Carbon and Hydrocarbons, coal, Natural Gas and Crude petroleum. ☐ Raw Materials from Biosphere Oils, Fats, Waxes, Reins, Sugar, Natural Fibers, and Leather

Industrial Inorganic Chemistry ☐ Chemical industries are very important for us because it has touched all our aspects of life like a agriculture, environment, food, hygiene, catalysis, construction, etc. ☐ Industrial inorganic chemistry includes subdivisions of the chemical industry that manufacture inorganic products on a large scale such as the heavy inorganic (chloro-alkalis, sulfuric acid, sulfates) and fertilizers (potassium, nitrogen, and phosphorous products) as well as segments of fine chemicals that are used to produce high purity inorganics on a much smaller scale such as reagents and raw materials used in high-tech industries, such as pharmaceuticals or electronics, catalysts, pigments, and propellants.

Chemicals ☐ Egypt's chemical industry exports surge by 35% in the first half (1H) of 2022. 2022 Chemical manufacturing creates products by transforming organic and inorganic raw materials with chemical processes. ☐ Chemicals generally are classified into three groups: ☐ Commodity Chemicals ☐ Specialty Chemicals ☐ Fine Chemicals ☐ Commodity chemicals are the foundation materials produced in large quantities and in general their applications can be traced back to their chemical structure; for this reason, two commodities produced by two different suppliers but with the same chemical structure and purity are almost identical and in general their cost is relatively low. ☐ BIC (Basic inorganic chemicals) ☐ Ammonia, Sodium hydroxide, Nitric acid, Sulfuric acid, Hydrochloric acid, Chlorine, Phosphoric acid. ☐ BOC (Basic Organic Chemicals) ☐ Ethylene and propylene

Chemicals ☐ Specialty chemicals : are constituted by a mixture of different chemical substances, that is designed and produced in order to be applied to a specific application. ☐ The formulation of specialties is the result of scientific researches carried out by the producer company, so each formulation and associated properties are unique and for this reason in the majority of the cases it is not possible to easily interchange two different specialties by two different suppliers. ☐ Examples of applications of specialty chemicals are pharmaceuticals industry and agriculture; they produced by batch plant and their cost is higher comparing to commodity chemicals. ☐ Specialty chemicals may be called effect chemicals or

performance chemicals as they are designed for action in the end user application. Chemicals Fine chemicals are the commodity chemicals, they are chemical substances characterized by their chemical structure, but , on the contrary of commodity chemicals, they are produced in a small quantity ; fine chemicals can be used as components in the formulation of specialty chemicals. For example active ingredients of pharmaceutical drugs are fine chemicals, but the pharmaceutical drug is a specialty chemical. Example of applications of fine chemicals are; pharmaceuticals industry, agriculture, photography chemicals, and electronic chemicals; they are produced by batch plant and in general their cost is relatively high. Fine chemicals are single, pure chemicals created in tailored batches. The manufacture of fine chemicals is an advanced, multi-stage procedure that must create batches with ultra-high levels of purity and meet strict specifications. . Chemicals generally are summarized to Commodity Chemicals Specialty Chemicals Fine Chemicals are produced in large quantities and are used to produce fine chemicals are combinations of two or more fine chemicals may be called effect chemicals as they are designed for action in the end –user application. are blended to make specialty chemicals with end–use specific properties. High valued and pure organic chemicals produced in relatively low volumes and sold on the basis of exact specifications of purity. Low valued products produced in large quantities mostly in continuous process High –valued products produced in small quantities for specific uses.. Enzymes, dyes medicinal chemicals, agrochemicals, flavor, personal care products, surfactants and adhesives Chemicals The chemical industries is considered one of the largest industrial sectors in Egypt; it includes 7 main subsectors, which are plastics, rubber, paper, detergents, paints, fertilizers, glass, and cement. The petrochemical sector represents about 12% of Egypt's total industrial production and is worth around US \$7 billion annually. While this figure is equivalent to just 3% of Egypt's total GDP (gross domestic product). Which is the main inorganic chemical industry? By far the biggest SO<sub>2</sub> – emitting Inorganic Chemical Industry plants are production sites of sulfuric acid. They are followed by production plants of NPK (nitrogen, phosphorous, and potassium) fertilizers (top 21), Titanium dioxide, black carbon, Ammonia, Ammonium sulfate, calcium carbide, Nitric acid. Which country is No 1 in chemical industry ? ● The largest chemical company in the world is China Petroleum Chemical Corporation: with a revenue of \$424.837 – 595.3 billion. ● USA : The united states of America is the world's leading country in the production of chemical products. It produces nearly 30 to 35% nitric acid, soda ash and caustic soda of the world and also ranks second in the production of sulphuric acid. Which is it important to study the industrial chemistry? Industrial chemistry has assisted in the discovery and development of new and improved synthetic fibers, paints, adhesives, drugs, cosmetics, electronic components, lubricants and thousands of other products, and improved processes for oil refining and petrochemical processing that saves energy and reduces pollution. What do we study in industrial chemistry ? Industrial chemistry is the branch of chemistry which applies physical and chemical processes towards the transformation of raw materials into products that are beneficial to humanity. Artificial Intelligence (AI) Chemical manufacturing can be optimized by Artificial Intelligence (AI). Benefits of AI in chemical manufacturing Asset optimization towards zero–waste strategy. Minimized energy consumption. Higher end product quality Improved regulatory compliance Streamlined production process and scheduling Zero–accident

culture with visual inspection and predictive maintenance. ☐ No 1 industrial chemical is sulfuric acid. ☐ In North America, they produced about 50 million tons a year, mostly by burning sulfur to sulfur dioxide which is then reacted with water. ☐ Sulfuric acid is very important to produce Fertilizers. ☐ What the rank of India in Chemical Industry? ☐ it ranks 14th in exports and 18th in imports of chemicals at global level (excluding pharmaceuticals) What is the number 1 industrial Chemical? ☐ Industry is a base role in the development of countries. “developed country” is the same as saying “industrialized country”. ☐ A agricultural growth is a parallel factor to industry development. ☐ The types of industries available: ☐ Depending on the degree of complexity of the production processes, the industries are heavy and light. ☐ The heavy industries is in charge of transforming raw materials into semi– finished products, and are characterized by requiring a greater concentration of capital and constant technological renewal. Usually, steel, metallurgy, and petrochemicals are considered. ☐ On the other hand, capital goods industries use the semi–finished products of basic industries to manufacture machinery and tools for other industries – like construction and mechanical industries. Importance of industry in economic development ☐ Light industries are responsible for producing goods that can be directly consumed by the population. This includes the food, textile, chemical, electronic, automotive, and marine industries. ☐ What are the benefits that industries bring to help the development of any country? • Better utilization of natural resources • A decrease in levels of underemployment • Improvement in capital accumulation. • Support of other economic sectors. • Greater economic independence