Catalysts are substances that facilitate a chemical reaction without being consumed in the process themselves. They work by lowering the activation energy required for the reaction to occur, thereby speeding up the reaction rate. Catalysts are essential in various industries and scientific processes because they allow reactions to occur more efficiently, saving time and resources.

There are different types of catalysts, including:

Homogeneous Catalysts: These catalysts are in the same phase as the reactants. For example, a catalyst dissolved in a solvent where the reaction takes place.

Heterogeneous Catalysts: These catalysts are in a different phase from the reactants. For example, a solid catalyst used in a gas-phase reaction.

Enzymes: Biological catalysts that facilitate biochemical reactions in living organisms.

Organometallic Catalysts: Catalysts that contain both organic and metal components. They are widely used in organic synthesis.

Homogeneous Catalysis: Where the catalyst and reactants are in the same phase.

Heterogeneous Catalysis: Where the catalyst and reactants are in different phases.

Catalysts play a crucial role in industries such as petroleum refining, pharmaceuticals, chemicals, and environmental protection. They enable the production of various products, including fuels, plastics, and pharmaceuticals, and they are also used in pollution control devices such as catalytic converters in automobiles.