

TDC Part II
Paper I, Group B
Inorganic Chemistry



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TOPIC:- Catalytic Activity

Catalytic Activity:

The catalytic activity of d-block elements and their compounds is associated with their variable oxidation states and their capability of forming interstitial compounds. A number of d-block metals and their compounds are known to catalyse various reactions of industrial importance, e.g., vanadium (V) oxide in the manufacture of sulphuric acid by contact process, etc. An important view of the mechanism of catalysis is that at solid surface of the catalyst, bonds would be formed between the molecules of the reactants and atoms of the catalysts thereby increasing the concentration of the reactants at the surface. This weakens the bonds of the reactant molecules due to lowering of the activation energy.

Formation of Interstitial and Non-stoichiometric Compounds:

The d-block elements form interstitial compounds with small non-metal atoms such as H, C, N, B, Si, etc. due to the ability of metal lattice to accommodate these non-metal atoms between the metal atoms without distortion of structure.

One of the striking properties of these metals is the formation of non-stoichiometric compounds which often exhibit semiconductivity, fluorescence and behave as heterogeneous catalysts. This non-stoichiometry is due to the defects in the solid structures.

Metallic Character and Alloy Formation:

All the d-block elements are metals, good conductors of heat and electricity, are malleable and ductile. All are solids except Hg (mercury) which exists as liquid at ordinary temperature.

These metals form alloys with each other due to

almost similar sizes of the atoms. Thus the atoms of one metal can easily take up positions in the crystal lattice of the other. The alloys are usually harder and have higher melting points than the parent metals, are more resistant to corrosion than their constituents.