

CHEMISTRY STUDY MATERIALS FOR CLASS 12

GANESH KUMAR

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Surface Chemistry (Key Points)

Factors Affecting adsorption

Nature of adsorbent: Transition metals act as good adsorbents for gases due to vacant or half filled d- orbitals and high charge-size ratio.

Surface area of adsorbent: surface area adsorption.

Nature of adsorbate: Easily liquefiable gases like ammonia, HCl, carbon dioxide etc. are adsorbed to a much greater extent than permanent gases like nitrogen, Hydrogen ,etc.

Adsorption from solutions: In case of adsorption from *solution* phase. Extent of adsorption $(x/m) \propto 1/T$.

Extent of adsorption $(x/m) \propto$ surface area of the adsorption.

Extent of adsorption $(x/m) \propto$ concentration of the solute.

The extent of adsorption depends on the nature of adsorbent and the adsorbate.

APPLICATIONS OF ADSORPTION:

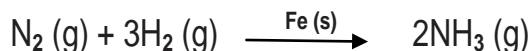
- (i) Gas masks (ii) Production of high vacuum (iii) Humidity control
- (iv) Removal of colouring matter from solutions (v) Heterogeneous catalysis
- (vi) Separation of inert gases (vii) Softening of hard water (viii) De-ionization of water

CATALYSIS: Substances which alter the rate of reaction, themselves remaining chemically and quantitatively unchanged after the reaction and the phenomenon is called catalysis.

HOMOGENEOUS CATALYSIS: When the reactants and the catalysts are in the same phase



HETEROGENEOUS CATALYSIS: The catalytic process in which the reactants and the catalysts are in different phases.



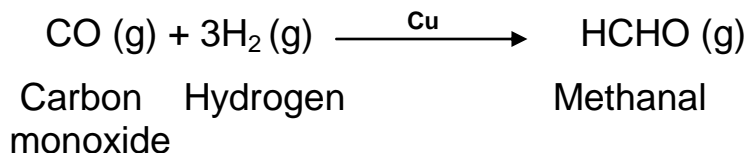
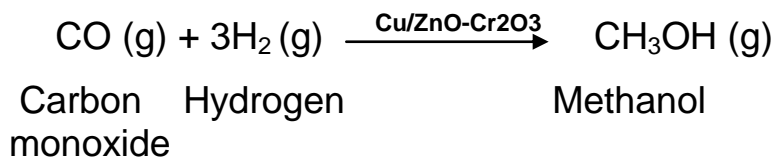
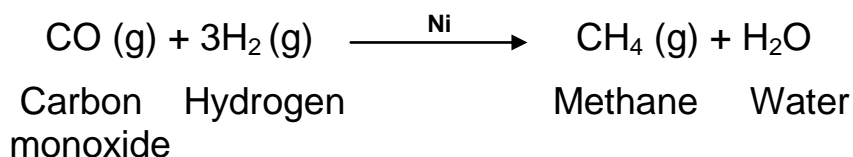
AUTO CATALYSIS— when one of the products increases the rate of reaction by acting as a catalysts.

FEATURES OF SOLID CATALYSTS-

1. **ACTIVITY** –The activity of a catalyst depends upon the strength of chemisorption to a large extent. The reactants must get adsorbed reasonably strongly on to the catalyst active.



2. **SELECTIVITY**- The selectivity of a catalyst is its ability to direct a reaction to yield a particular product.



ZEOLITES : are shape selective catalysts because of their honey comb like structures. Chemically **micro porous aluminosilicates**.

The reaction taking place in zeolites depend upon :The size and shape of reactant and product molecules and pores and cavities of the zeolites.

Zeolites widely used as catalysts in petrochemical industries for cracking of zeolites catalysts used in petroleum industries. **ZSM-5**, converts alcohols directly lin to gasoline (petrol)

COLLOIDAL STATE

The substances whose solutions could pass through filter paper and animal membrane, having higher rate of diffusion are called **CRYSTALLOIDS**.

Substances whose solution can pass through filter paper and not animal membrane, having higherrate of diffusion are called **COLLOIDS**. Particle size 1nm to 1000nm
