SURFACE CHEMISTRY

DEFINATION AND PROPERTY:

The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid.

→ Surface phenomena.
→ Spontaneous, exothermic and leads to lowering of entropy.

TERMINOLOGY:

Adsorbate = substance absorbed.
Adsorbent = substance on the surface of which adsorbate is adsorbed.
Desorption = Reverse of adsorption.
Occlusion = adsorption of gasses on the surface of metals.
Sorption = Adsorption and absorption takes place simultaneously.

TYPES:

Physisorption;

molecules are held by weak van der waals forces.
→ low heat of adsorption and non-specific.
→ NO compounds is formed.
→ Decrease with increase in temp.
→ Forms multimolecular layer and is reversible.

Chemisorption:-

→ molecules are held by strong chemical bonds.
→ High heat of adsorption and specific.
→ Surface compounds are formed.
→ forms unimolecular layer and is irreversible.

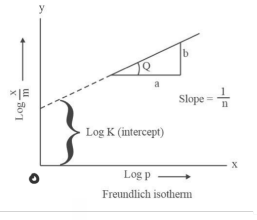
Positive adsorption:-

Conc° of adsorbate is more on the surface of the adsorbent than in the bulk.

Negative adsorption:-

Conc° of adsorbate increases in the bulk after adsorption.

ADSORPTION ISOTHERM



Freundlich isotherm

Adsorption isotherm

CATALYST:-

The phenomenal of enhancing the rate of a chemical reaction by using a catalysts.

Promotes:- substance that enhances the activity of a catalyst.

Poisions:- substances which decrease the activity of a catalysts.

Activity:- Capacity to increase the speed of the chemical rxn.

Selectivity:- Ability of a catalyst to direct the reaction to yield a particular products.

Homogenous Catalyst:- Reactants and catalyst are same phase.
Eg:- Oxidation of SO_2 to SO_3 in presence of NO as a catalyst. (lead chamber process).

Heterogenous:- when the reactants and catalyst are in diff° phase.
Eg- manufacture of NH_3 by using Fe as a catalyst.

Autocatalyst:- One of the products formed itself acts as a catalyst.
Eg:- titration of oxalic acid with $KMnO_4$.

Positive Catalyst:- Catalyst increases the speed of a reaction.

Negative Catalyst:- Catalyst decreases the speed of a reaction.

SHAPE SELECTIVE

Depends upon the pore structure of catalyst and size of the reactants and products molecules.

→ Zeolites, are good shape-selective Catalysts due to honey comb like stri

ENZYMES:

Biocatalysts
highly efficients and specific nature.
work under optimum pH and temp.
Activity increases in presence of activators and co-enzymes.
Activity inhibited by inhibitors and poisons.

COLLOIDS:-

A heterogenous system in which particle size is between 1 and 1000 nm.

Dispersed → Substance which is dispersed, it is a discontinuous phase.

Dispersion → Medium in which the substance is dispersed, it is a continuous.

CLASSIFICATION:-

Based on physical state of dispersed phase and dispersion medium.

Sols:- solids in liquids. Eg - Paints
Gels:- liquid in solids. Eg - cheese
Emulsion:- Liquid in liquids

→ oil in water is a type of emulsion Eg- milk.

*Based on the nature of interaction between dispersed phase and dispersion medium:-

(a) **Lyophilic solids:-** liquid loving directly formed, reversible in nature, quite stable, cannot be easily coagulated.

(b) **Lyophobic solids:-** liquid-hating prepared by special methods, readily coagulated, irreversible not stable and need stabilising agents for their preservation.

*Based on type of particles of the dispersed phase:-

→ **Multimolecular colloids;** Formed by aggregation of a large no° of atoms or molecules (diameter <1nm) held by weak vander waal's forces.

→ **Macromolecular colloids:-** formed by molecules of large size.

→ **Associated colloids:-**
→ formed by substance which at low concentration behave as normal strong electrolytes, but at higher conc exhibit colloidal behaviour due to the formation of aggregates called micelles.

IMP PROCESSES AND PROP

Tyndal effect:- scattering of light by the colloidal particles.

Brownian movement:- continuous zig-zag movement

Peptization:- convert precipitate into the colloidal.

Dialysis:- seperation of colloidal particles from the crystalloids by diffusion through a parchment or an animal membrane.

Zeta potential:
→ Potential difference between the fixed layer and the diffused layer of opposite charges, also called electro-kinetic potential.