# Physical Chemistry
## Past paper 2021

## What is thixotropy phenomenon?

Thixotropy is a phenomenon where the viscosity of some fluids depend on the time of shave rate. It is time dependent phenomenon.

Certain gels or fluids that are viscous under static condition will flow over time when shaken, or shear stressed.
PH, temperature or polymer concentration may ase the factor of Thixotropy.

## What do you meant by CMC?

CMC stand for critical micelle concentration
The concentration of surfactants in solution above which micelles forms.

or

The concentration above which micelle formation occurs.

Temperature and electrolytes addition may affect the CMC.
It is essential for absorption of fatsoluble vitamins.

## How tyndall effect observed. What is emulsification.

The scattering of light as light beam passes Through colloid.
It is observed when light enters a dark room where the dust particles get scattered. It can be seen through the fog when torch is switched on.



The mixture of two or more liquids that are usually immiscible but under specific transforming processes will adopt a microscopic homogeneous aspect and microscopic heterogeneous one.



## Define Zeta potential?

It is physical property which is exhibited by any particles in suspension macromolecul or material surface.

**Example:** Lipases: It helps in gut to digest fats.

Amylase: In the saliva, It help to change starches into sugar.

| Physical adsorption | Chemical adsorption |
| --- | --- |
| • The force operating in this case are weak vander wall's force. | The force operating are chemical bonds (strong). |
| • The heat of adsorption is low about 20-40 kjmol$^{-1}$ | The heat of adsorption are high about 40-400 kjmol$^{-1}$ |
| • The process is reversible. | The process is irreversible. |
| • Monolayer or multilayer. | Monolayer only. |
| • It known as physisorption. | It known as chemisorption |
| • Non-activated | Activated. |

The potential difference between fixed charge layer and diffused layer having opposite charge.

Its unit is volts (V) or millivolts (mV).

## Difference between electrosomsis and electrophorsis

| | |
|---|---|
| • Electrophoresis is technique that is used to describe the motion of particles in fluid within a relatively uniform electric field. | Electroosmosis is phenomenon in which fluid moves through porous medium or charge surface under influence of applied electric field. |
| • The movement of charged particles can be fast. | The movement of liquid is generally slow. |
| • Solids and liquid both are separated. | Only liquid are separated. |

## Define enzyme catalysis with ex?

The increase in the rate of a process by biological molecule an enzyme.

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## Two postulates of Langmuir Adsorption isotherm:-

(i) Each adsorbent has specific equivalent sites for adsorption

(ii) Rate of adsorption is relatively high as compared to rate of desorption at initial stages

(iii) One molecule of adsorbate can adsorb on one site of adsabed.

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## Effect of Surface area on adsorption:

Surface area of the adsorbent has pronounced effect on the rate of adsorption.
Adsorbent with greater surface to Volume ratio possess greater extent of adsorption and vice versa. If substance is divided & Subdivided we get small Particles.

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# Homogeneous Catalysis - ?

"In Homogeneous catalysis reactants and Catalyst both are in the same phase"

Examples are as follows.

- Auto Catalysis
- Enzyme Catalysis
- Acid or base Catalysis

→ **Autocatalysis:**

In which one of the product formed act as a catalyst is auto catalysis.

- The chemical reaction between acidified potassium permagnate ($KMnO_4$) & Oxalic acid is example of auto Catalyst.

→ **Hydrogenation Reaction:**

The addition of Hydrogen ($H_2$) to Unsaturated organic compounds like alkenes to form alkanes in the presence of Homogeneous Catalyst e.g Wilkinson's Catalyst.

In this Catalyst dissolved in same Phas as reactants proceeding Hydrogenation reaction.

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# Enzymes as Catalyst are Specific in nature.

- Enzymes are bio organic catalyst which catalyze the chemical reaction occuring in human body
- Enzymes are highly specific catalyst due to their unique structural features, which arise from their complex protein nature

As,

Enzymes are macromolecules & protein in nature they are also called bipolymers. (enzyme as catalyst)

Due to following reasons they all imp in nature

→ Enzyme as a Catalyst act in all types of reaction (Redox, acid base and decomposition

→ Stereo specificity is basic character of enzymes.

→ Enzyme work on optimum PH or temperature

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# Enzyme Inhibition:

The decrease in rate of enzyme catalyzed reaction as a result of complex formation of a foreign substance with enzyme is called enzyme inhibition.

- This is crucial in regulating metabolic pathways, drug action & toxin effects

→ Reversible E·I

→ Irreversible E·I

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# Difference:

| Colloids | Sols |
|---|---|
| Colloids are mixture where one substance is evenly distributed (the dispersed phase) in another (the dispersion medium) | A sol is a type of colloid where solid particles are dispersed in a liquid |

e.g
aerosols (fog, mist) (solid dispersed in liquid)
gels (jelly, agar) e.g paint, blood



# Colloidal Dispersion:

A colloidal dispersion or Colloidal System is a mixture in which one substance (dispersed phase) is evenly distributed in another (dispersion medium) in the form of very small particles or droplets.

e.g milk (liquid in Liquid)
Fog (liquid in gas)
Butter (Solid in Liquid)