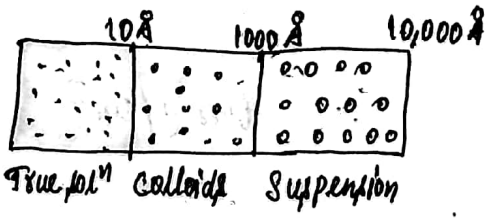
* Colloids :-



· Types of colloidal solution :-

(i) Lyophilic :- eg:- starch, glue, gelatin in water
(solvent loving)

(ii) Lyophobic :- Gold sol, Silver sol, arsenic sulphide.
(Solvent hating)

* Preparation :-

(a) Condensation Method :-

Eg:- Prussian blue color sol is obtained by precipitating it in presence of starch.

$$3K_4[Fe(CN)_6] + 4FeCl_3 \longrightarrow Fe_4[Fe(CN)_6]_3 + 12KCl$$

Prussian blue

(b) Chemical Method :-

colloidal sol of arsenic sulphide is obtained by passing slowly H_2S gas through a cold dilute sol^n of As_2O_3 in water.

$$As_2O_3 + H_2S \longrightarrow As_2S_3 + 3H_2O$$

(c) Bredig's arc method :-

* Purification of colloidal sol^n :-

(a) Dialysis

(b) Ultrafiltration

Gold number :- The least quantity of protective colloid in mg which is just sufficient to prevent the coagulation of 1 ml standard gold sol by a rapid addition of 1 ml of 10% NaCl sol^n. The coagulation of gold sol is indicated by a change in color from red to violet. Thus, smaller the gold number, higher is the protective power of lyophilic colloid.

Protective colloid	Gold number
Gelatin	0.005 – 0.015
Haemoglobin	0.003 – 0.07
Starch	10 – 15
Albumin	0.1 – 0.2

Q.1. Jutify the use of gelatin as a protective colloid.

Ans:- Lyophilic, stable and very low gold no.

Q.2 What substances have gold number?

Ans Lyophilic salt.

Q.3. What is observed when electric current is passed through a colloidal sol^n?

Ans → Electric charge disperse the charges of colloid.
→ movement of charged particles towards oppsite charged electrode and on reaching the electrode, they loss charge and gets coagulate

Q.4. Why are brownian motion and tyndall effect shown by colloidal sol^n only?

Ans due to size, not settle down; completely dispersed in dispersion medium.

Q.5. Which one of these is more efficient for the precipitation of As$_2$S$_3$ and why?
(i) NaCl, (ii) $BaCl_2$, (iii) $AlCl_3$

Ans $AlCl_3$, high charge of Al^{3+}

Q) Which one of the following is more efficient to precipitate $Fe(OH)_3$ sol
i) KCl, ii) $FeCl_3$, iii) $K_4[Fe(CN)_6]$, iv) $K_3[Fe(CN)_6]$

Ans) $K_4[Fe(CN)_6]$, More number of ions.

Q) Colloidal particle ~~execute~~ exhibit zig-zag movement. Give reason.

Ans) due to straight line motion of particle in dispersive medium and when it is disturbed by another particle, it exhibits a zig-zag movement.

Q) When slight ~~excess~~ excess of $AgNO_3$ is added to NaCl soln, a +ve charged sol of AgCl is obtained. On the other hand, when slight excess of NaCl is added to $AgNO_3$, a -ve charged sol of AgCl is obtained. Give reason.

Ans)

$$NaCl + AgNO_3 \longrightarrow AgCl\downarrow + NaNO_3$$

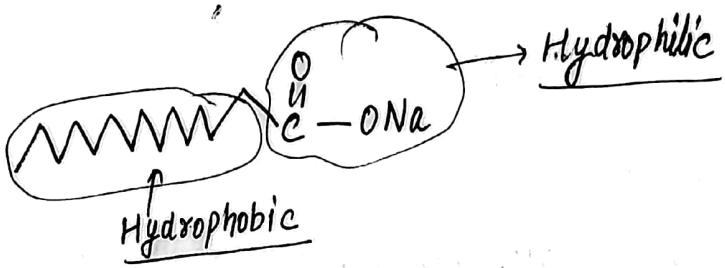
$$AgCl + AgNO_3 \longrightarrow \underset{\text{+ve sol.}}{[AgCl]Ag^+} + NO_3^-$$

In presence of slight excess of NaCl, Cl^- ions of slight excess NaCl are adsorbed preferentially on AgCl precipitate to form a negatively charged sol of AgCl.

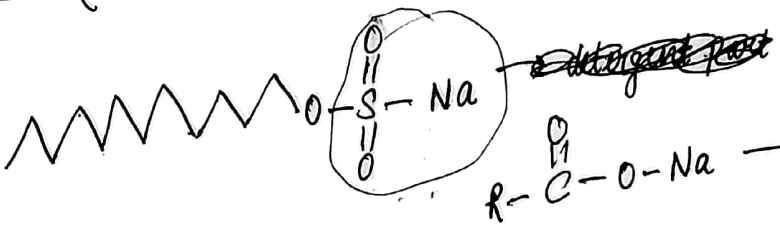
Micelles

1) Surfactants

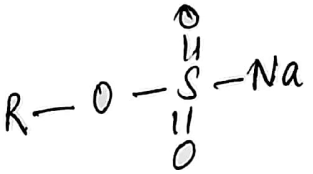
Classification → Cationic
→ Anionic
→ non-ionic
→ Zwitter-ionic



* SDS (Sodium Dodecyl Sulphate) → A detergent



$R-C(=O)-O-Na$ → Soap



→ Detergent.

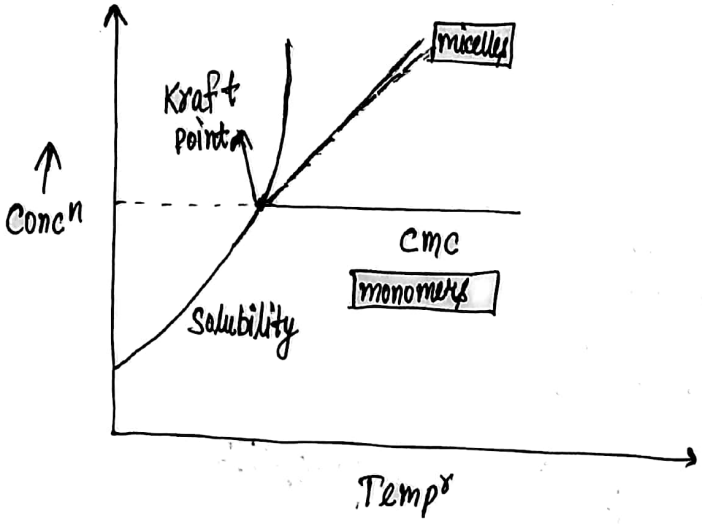
* ~~Adsorption of Surfactants~~

(i) Temperature effect :- (I) For ionic surfactants:-

→ (a) The solubility of surfactants exhibit a sharp rise in above a certain temp called Kraft temperature.

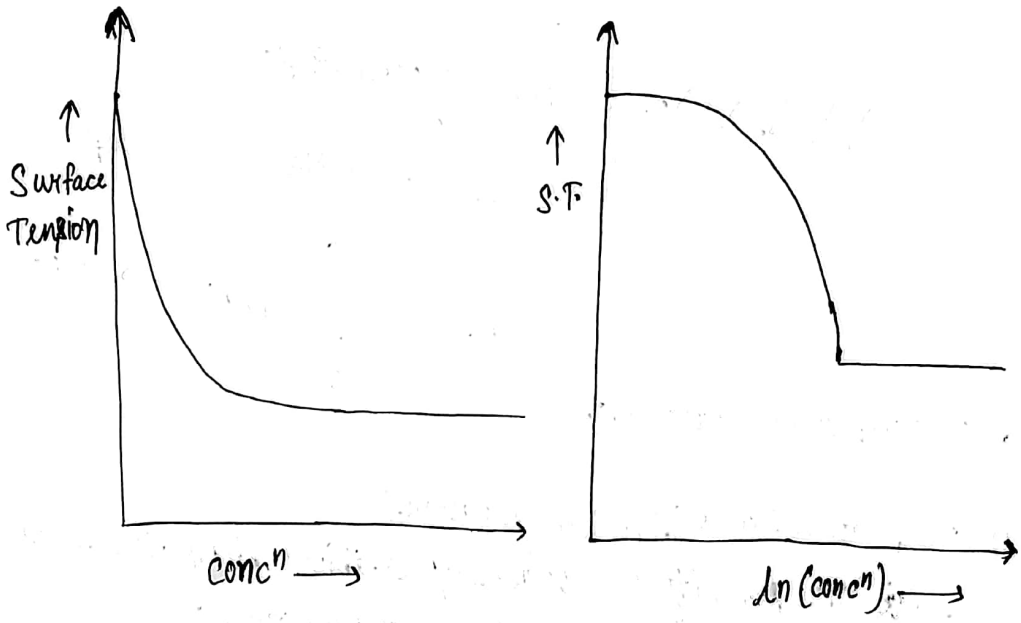
(b) Below Kraft temp, solubility is lower than CMC. otherwise, solubility does not depend significantly on temp, but depends on the ionic strength.

(II) For non-ionic surfactants,
rising temp appears to decrease solubility, so above cloud point, large aggregation of surfactant appear.



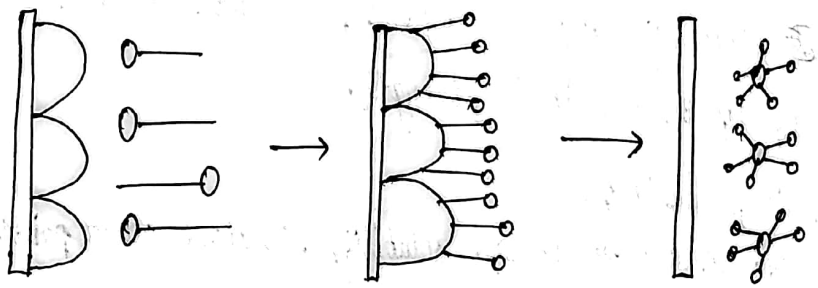
* Absorption of Surfactants :-

Surface tension of surfactants normally falls to a lower limit and becomes constant after.



* What happens during washing ? or, How does micelles work ?

Ans:-

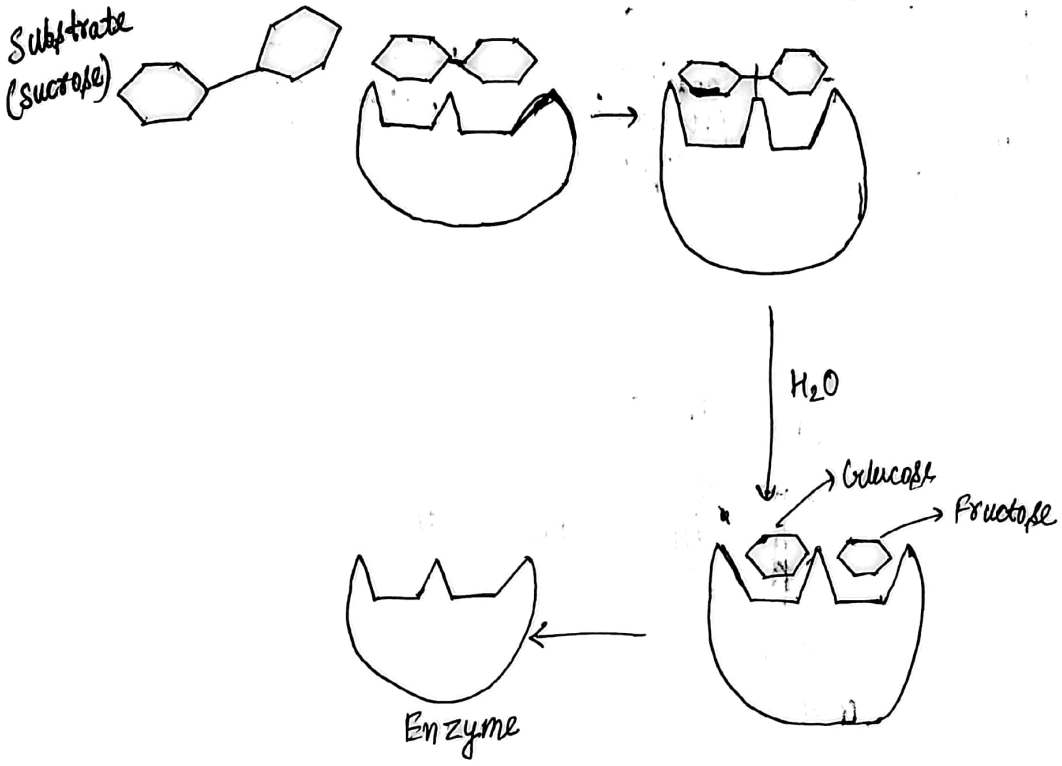


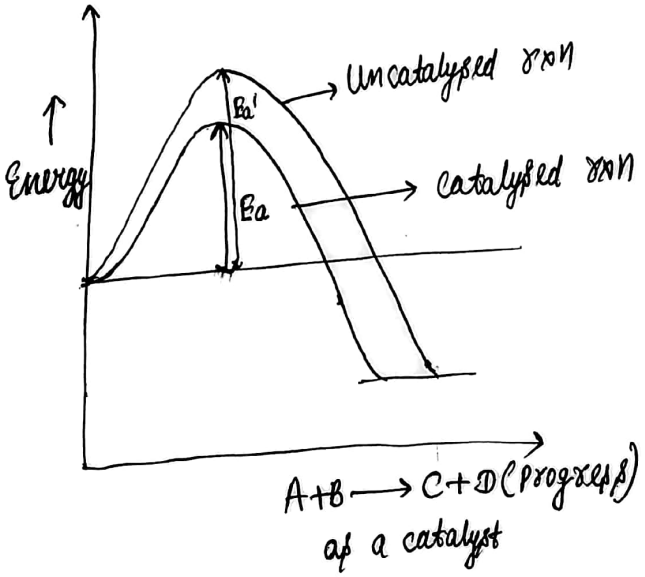
Schmutz - Tensid Interaction

Catalysis by enzymes :-

. **Enzymes :-** A protein that acts as a catalyst for a biological reaction

Enzyme rxn :- $E + S \longrightarrow ES \longrightarrow P + E$



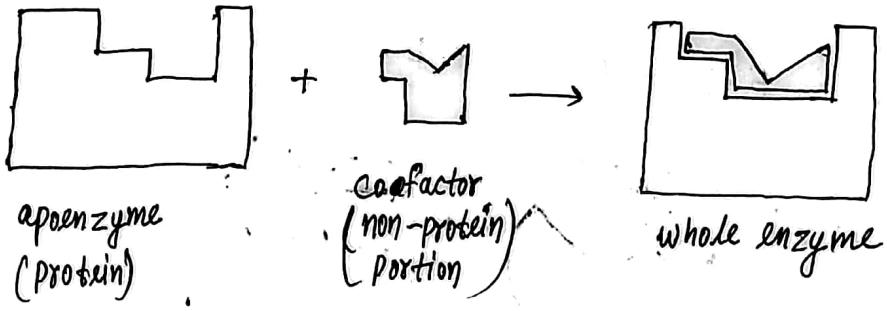


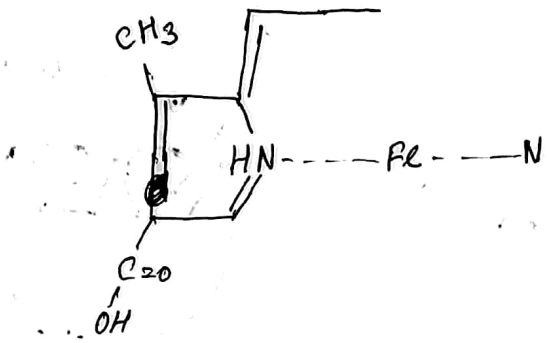
as a catalyst

Enzyme coafactors :- i) Many enzymes are conjugated proteins that require non-protein portions known as <u>coafactors.</u>

ii) Some coafactors are metal ions, non protein groups known as coenzymes.

iii) An enzyme may require a metal ion, a coenzyme or both to function.





* How Enzyme works :-

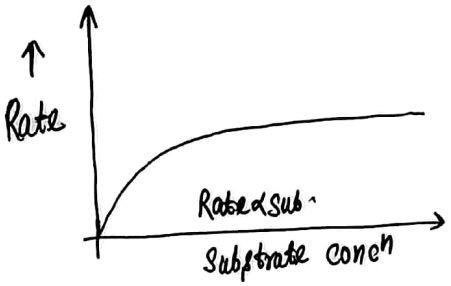
Two models:-

(1.) Lock and Key model

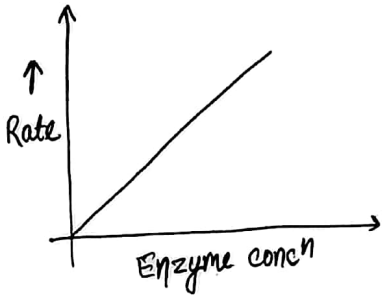
(2.) Induced-fit model

* Effect of concentration on enzyme activity:-

Rate of rxn depends on conc^n of enzyme as well as substrate. At low substrate conc^n, the rxn rate is directly proportion to substrate conc^n. With increasing substrate conc^n, the rate drops off as more of the active sides are occupied.

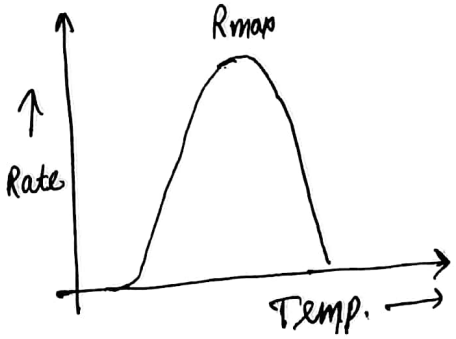


→ The rxn rate varies directly with enzyme conc^n as long as the substrate conc^n does not become a limitation.



→ Effect of temp. and pH on enzyme activity:-

Increase in temp^r, increase in rate of enzyme catalysed rxn. The rates reach a max. then begin to decrease. The decrease in rate at higher temp^r is due to the denaturation of the enzymes.



The catalytic activity of enzymes