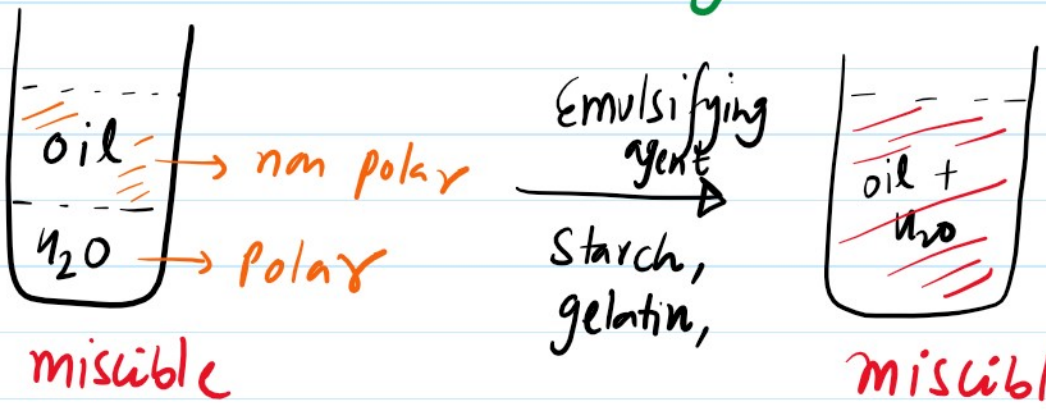
CATALYSIS 2M05

Thursday, July 21, 2022 3:44 PM

Emulsifying agent :- It stabilises solution, so that they are miscible.

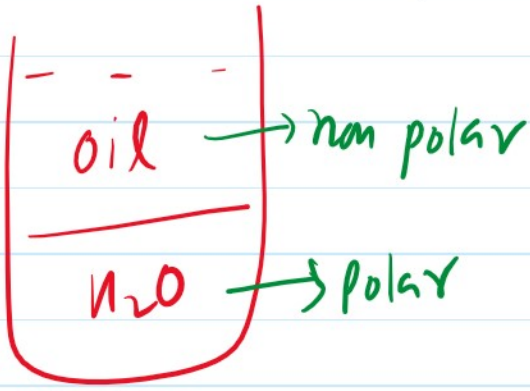


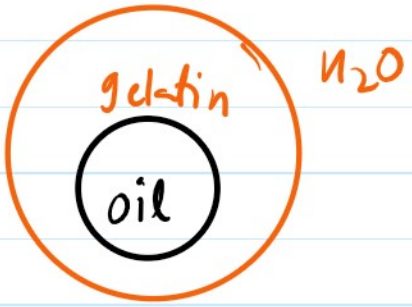
o/w

Emulsifying agent: Starch, gelatin proteins

w/o

lamp black





Catalyst : a subs. which can change (↑ or ↓) speed of a rxn.

↝ mass & chemical composition of catalyst do not change after the rxn

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Ex: $KClO_3 \xrightarrow{\Delta} KCl + O_2$

Without catalyst : High temp required

$KClO_3 \xrightarrow{MnO_2} KCl + O_2$

With catalyst : rxn occurs at lower temp. & faster rate.

→ **Promoter & Poison :**

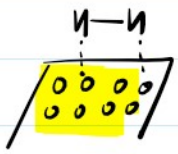
① Promoter : It ↑s activity of catalyst
OR
It enhances activity of catalyst

Ex: $N_2 + 3H_2 \longrightarrow 2NH_3$

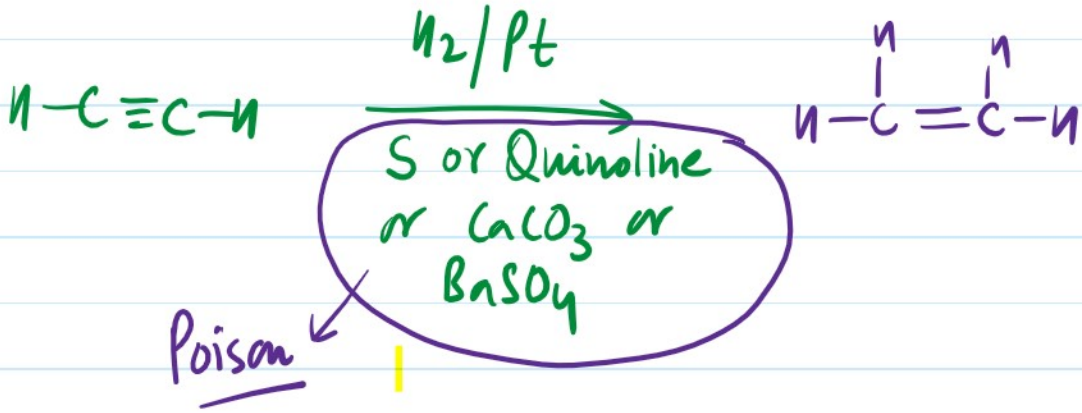
Haber's process : Catalyst : Fe
Promoter : Mo
(Molybdenum)

② Poison : It ↓s activity of catalyst.

$H-C\equiv C-H \xrightarrow[\text{[}H-\overset{H}{\underset{|}{C}}=\overset{H}{\underset{|}{C}}-H\text{]}]{H_2/Pt} H-\overset{H}{\underset{H}{\overset{|}{\underset{|}{C}}}}-\overset{H}{\underset{H}{\overset{|}{\underset{|}{C}}}}-H$



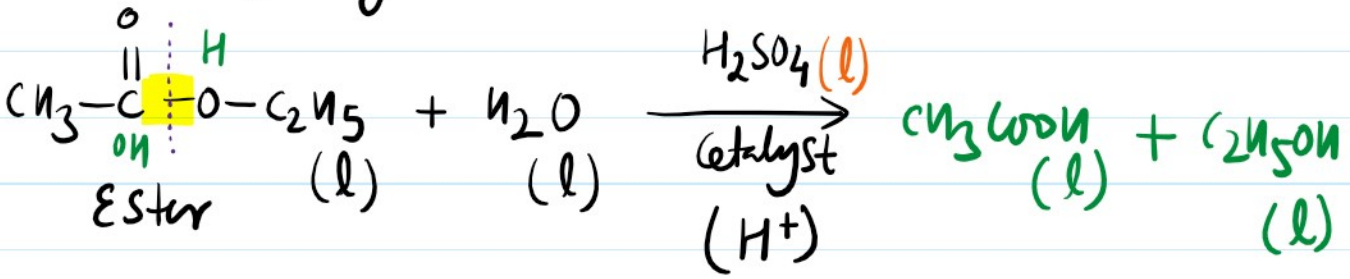
H_2/Pt $\quad$ H H



Homogenous & heterogeneous catalysis :-

1) **Homogenous catalysis:** when reactant & catalyst are in same phase.

Ex: Hydrolysis of Ester:



2) **Heterogenous catalysis :-** when reactant & Catalyst are present in different phase.

Ex: ① $N_2(g) + 3H_2(g) \xrightarrow{Fe(s)} 2NH_3(g)$

⁂ ② Contact process of manufacture of sulphuric acid :

Step 1 : $S + O_2 \longrightarrow SO_2(g)$

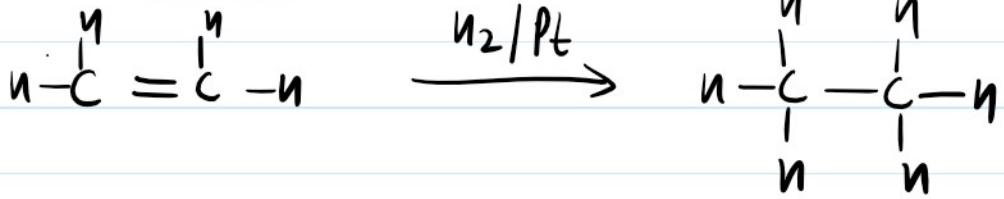
'S containing compd'

's containing compd'

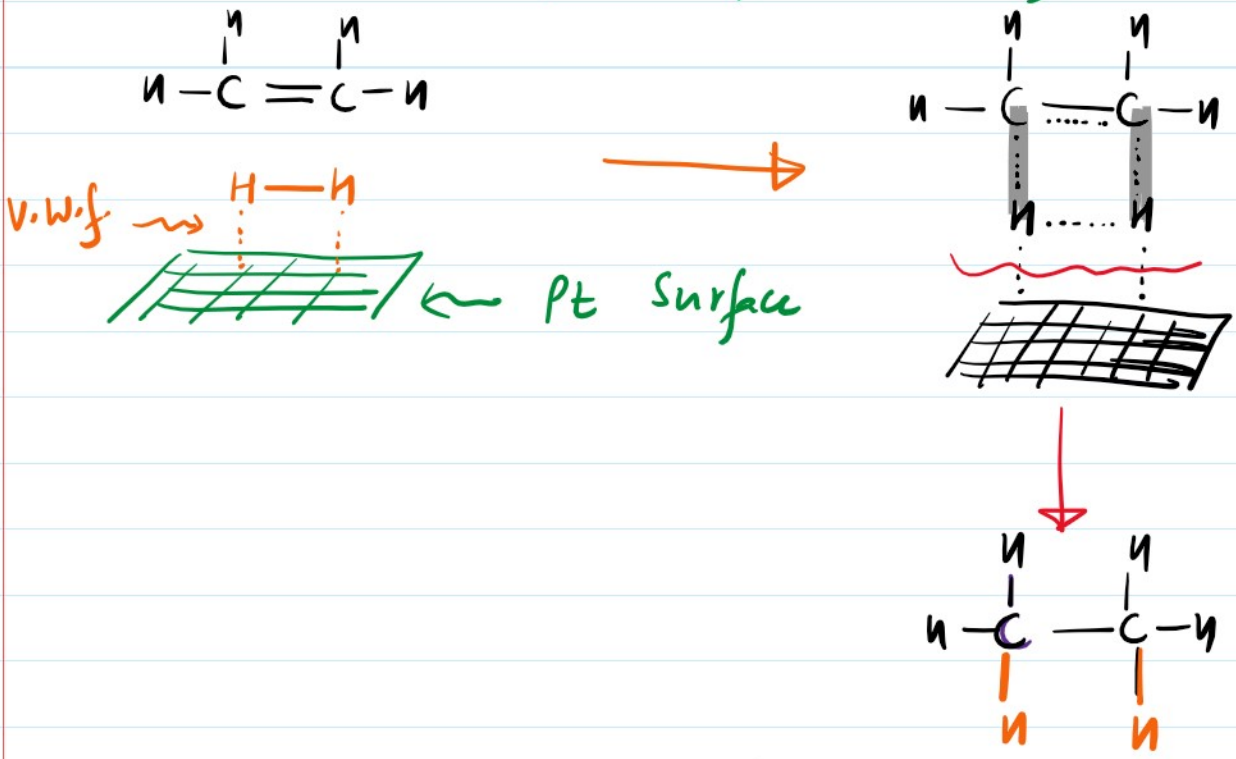
step 2: $SO_2(g) \xrightarrow[\text{Catalyst}]{V_2O_5(s)} SO_3(g)$

step 3: $SO_2 + H_2O \longrightarrow H_2SO_4$

Mechanism of Catalysis :

Rxn 

Mechanism : (adsorption phenomenon)



Enzymes : Bio catalysts produced from living organism or plants.

⇝ Enzymes catalyse biological rxns (bio-chemical rx^n)

Ex: Inversion of Cane sugar

1) $C_{12}H_{22}O_{11}$ (Sugar) $\xrightarrow[H_3O^+]{\text{Invertase}}$ Glucose + Fructose

2) Milk $\xrightarrow[\text{(Enzyme)}]{\text{lacto bacilli}}$ Curd

Properties of Enzymes :-

① Highly efficient :- Even a single molecule of Enzyme can catalyse million of reactant molecules per minute.

② Highly Selective : one Enzyme can catalyse single rx^n.

③ optimum pH & temp :- optimum temp: 25°-37°C
optimum pH : 5-7

⇝ Enzymes are colloidal sln^n in water.

Mechanism of Enzyme:

2 step process

step 1) $E + S \longrightarrow ES$

S: Substrate (reactant)

ES: activated complex

step 2) $ES \longrightarrow E + P$