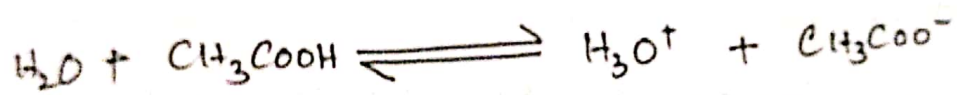


(4)

① Strong electrolytes: The substances which ionise almost completely into ions in aqueous solution are called strong electrolytes. For ex.  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , etc.



② Weak electrolytes: The substances which ionise to a small extent in aqueous solution are called weak electrolytes. For ex.  $\text{CH}_3\text{COOH}$ ,  $\text{NH}_4\text{OH}$ , etc.



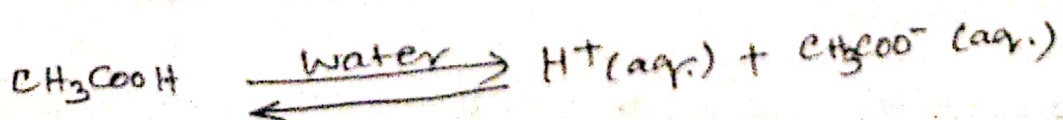
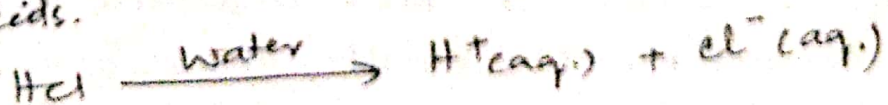
### ACID-BASE CONCEPT :

1. Arrhenius concept of acids and Bases: According to

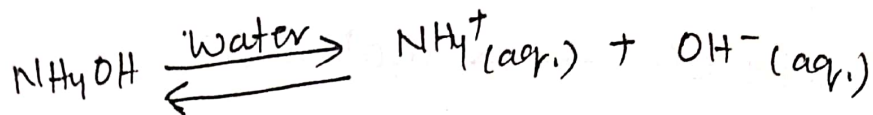
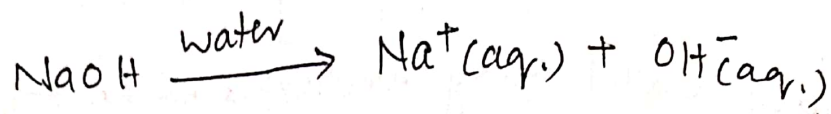
this concept (1887)  $\rightarrow$

an acid is a substance which dissociates in aqueous solution to give hydrogen ion,  $\text{H}^+(\text{aq.})$  and base is a substance which dissociates in aqueous solution to give hydroxide ion,  $\text{OH}^-(\text{aq.})$ .

For ex. substances such as  $\text{HCl}$ ,  $\text{HNO}_3$ ,  $\text{CH}_3\text{COOH}$ ,  $\text{HCl}$  etc. are acids.

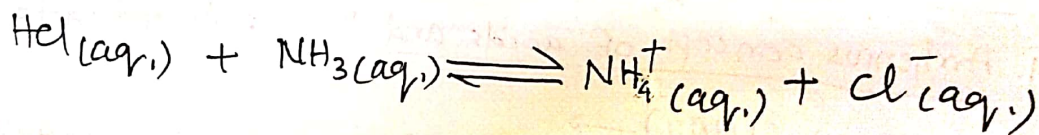


And substances such as NaOH, KOH, NH<sub>4</sub>OH are bases



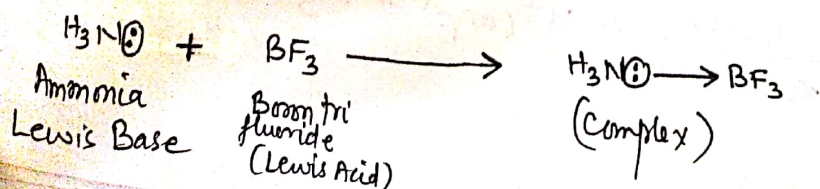
2. Bronsted-Lowry concept: According to this concept an acid is a substance which can donate proton (H<sup>+</sup>) while base is a substance which can accept a proton (H<sup>+</sup>).

For ex. in following reaction HCl loses a proton so it is an acid while NH<sub>3</sub> accepts a proton, so it is a base



3. Lewis concept of Acid & base: According to this concept an acid is a substance which can accept a pair of electrons while a base is a substance which can donate a pair of electrons. For ex. BF<sub>3</sub>, AlCl<sub>3</sub>, FeCl<sub>3</sub> are Lewis acids while :NH<sub>3</sub>, :F<sup>-</sup> are Lewis base.

In following reaction BF<sub>3</sub> molecule accepts a pair of electrons so, it is an acid (Lewis) while :NH<sub>3</sub> donates a pair of electrons so, it is a base (Lewis).



6

Degree of ionisation or dissociation : It is defined

as the fraction of the total

number of molecules of an electrolyte (acid or base) which ionises into ions. , Thus

Degree of ionisation,

$$\alpha = \frac{\text{Number of molecules of the electrolyte which ionises}}{\text{Total number of molecules of the electrolyte.}}$$

If 'c' is the number of moles of acid in 1 litre of the solution and  $\alpha$  is the degree of ionisation then the conc. of each species at equilibrium are:



Initial  
conc.

c

0

0

Equilibrium  
conc.

$c(1-\alpha)$

$c\alpha$

$c\alpha$

$$[\text{HA}] = c(1-\alpha), [\text{H}_3\text{O}^+] = c\alpha, [\text{A}^-] = c\alpha$$

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]} = \frac{c\alpha \cdot c\alpha}{c(1-\alpha)}$$

$$K_a = \frac{c\alpha^2}{1-\alpha}$$

For weak acids,  $\alpha$  is very small so  $1-\alpha \approx 1$

$$\therefore \boxed{K_a = c\alpha^2}$$