DATE : / 20
PAGE No

5/4/19

* Acid-base concept :

1. Arrhenius Concept :

According to this concept the substance which give H^+ ions in the solution are known as acid and the substance which give $OH^\ominus$ in the solution are known as Base

for Ex:

$$HCl \rightleftharpoons H^+ + Cl^\ominus$$

strong acid

$$NaOH \rightleftharpoons Na^+ + OH^\ominus$$

Strong Base

The acid which give largeno. of H^+ ions are known as strong acids

for Ex: HCl, H_2SO_4, HI, HNO_3 etc

The Acids which give lesser no. of H^+ ions are known as weak acid

for Ex: CH_3COOH, H_3PO_4, H_2CO_3, HF, etc

The basic solution which give large no. of $OH^\ominus$ ion in solution are known as strong basic

DATE : / 20
PAGE No

for Ex: NaOH, KOH etc

The basic which give lesser no. of $OH^{\ominus}$ ions are known as weak base.

for Ex: NH_4OH, $Mg(OH)_2$, $Zn(OH)_2$, $Al(OH)_3$

(2) Bronsted ≠ Lowry concept:

Acc. to concept, the substance which can give H^+ in solution are known as acidic and the substance which can accept H^+ are known as base.

for Ex: $HCl \rightleftharpoons H^+ + Cl^{\ominus}$

Acid

$CH_3COOH \rightleftharpoons H^+ + CH_3COO^{\ominus}$

Acid

$NH_4^+ \rightleftharpoons NH_3 + H^{\oplus}$

Acid

$H_2SO_4 \rightleftharpoons H^+ + SO_4^{-2}$

$NH_3 + H^+ \rightleftharpoons NH_4^+$

base

$NO_3^{\ominus} + H^+ \rightleftharpoons HNO_3$

Base.

DATE: / 20
PAGE No

$OH^{\ominus} + H^{+} \rightleftharpoons H_2O$

Base

$H_2SO_4^{\ominus} + H^{+} \rightleftharpoons H_2SO_4$ → amphoteric

* **Amphoteric:-**

The substance which can behave as acid as well as base are known as amphoteric

For Ex:-

$H_2O, HSO_4^{\ominus}, HCO_3^{-}$, etc.

$H_2O \rightleftharpoons H^{+} + OH^{\ominus}$

Acid

$H_2O + H^{+} \rightleftharpoons H_3O^{+}$

Base

$HSO_4^{\ominus} \rightleftharpoons H^{+} + SO_4^{2-}$

Acid

$HSO_4^{\ominus} + H^{\oplus} \rightleftharpoons H_2SO_4$

Base

$HCO_3^{\ominus} \rightleftharpoons H^{+} + CO_3^{2}$

$HCO_3^{\ominus} + H^{+} \rightleftharpoons H_2CO_3$

DATE : / 20
PAGE No

The Proton (H^+) remains associated with H_2O in the form of H_3O^+

$$H^+ + H_2O \rightleftharpoons H_3O^+$$

Therefore H_3O^+ may also be used in place of H^+ and this concept may be explained in the form of H_3O^+

$$HCl + H_2O \rightleftharpoons H_3O^+ + Cl^-$$
Acid

$$NO_3^- + H_3O^+ \rightleftharpoons HNO_3 + H_2O$$
Base

Therefore proton donors are known and proton acepter are known as Base.

$$HCl \rightleftharpoons H^+ + Cl^-$$

the Proton Acid and Base which differ only by one proton (H^+) is known as Conjugate Acid Base pair

for Ex! $HCl \rightleftharpoons H^+ + Cl^-$
Acid Base

DATE : / 20
PAGE No

HCl and $Cl^{\ominus}$ pair is conjugate acid base pair HCl is conjugate acid of $Cl^{\ominus}$ base and $Cl^{\ominus}$ is conjugate base of HCl acid.

$$CH_3COOH \rightleftharpoons CH_3COO^{\ominus} + H^{\oplus}$$
Acid base

CH_3COOH, $CH_3COO^{\ominus}$ Pair is conjugate acid base pair.

* In Conjugate Acid base pair, if acidic strong then its Conjugate base will be weak

$$HCl \rightleftharpoons H^{+} + Cl^{\ominus}$$
strong acid weak base

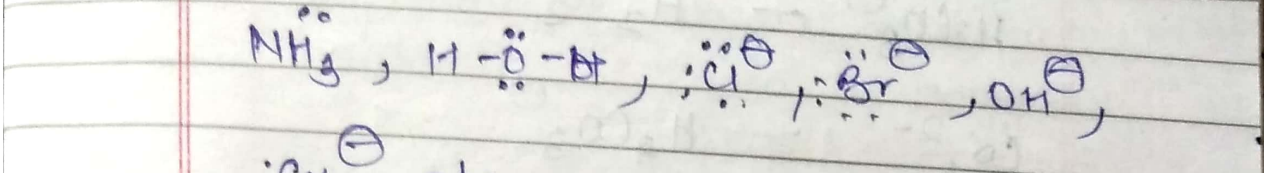
* Lewis Concept:
Acc. to this Concept the Substance which can accept lone pair of e's are known as acid and the Substance which can donate ~~Con~~ Lonepair of e are known as base.

For Ex: H^+, $:\ddot{\underset{\cdot\cdot}{Cl}}^{\oplus}$, $:\ddot{\underset{\cdot\cdot}{Br}}^{+}$, CH_3^+, BF_3,

$AlCl_3$ etc

DATE : / 20
PAGE No

are lewis acid, and can accept lone pair of e$^{\ominus}$s.



$:CH_3^{\ominus}$ etc. are lewis basis and donate lone pair of electrons.

Que Give Conjugate base following.

i) $HCO_3^{\ominus} \rightleftharpoons H^+ + CO_3^{2-}$

$H_2O \rightleftharpoons OH^{\ominus}$

$HNO_3^{\ominus} \rightleftharpoons NO_3^{-2}$

HF
$NH_4^{\ominus} \longrightarrow$

$OH^{\ominus} \Rightarrow O^{2-}$ (oxide ion)

DATE : / 20
PAGE No

Q. give Conjugate acid of following

$HCO_3^{\ominus}$ — H_2CO_3

CO_3^{2-} — $HCO_3^{\ominus}$

$I^{\ominus}$ → $HI^{\ominus}$

$HSO_4^{\ominus}$ ⇒ H_2SO_4

$OH^{\ominus}$ ⇒ H_2O

NH_3 ⇒ $NH_4^{\oplus}$