

Acid, Base, Buffer

→ Acid, Base and buffers play an important role in pharmaceutical chemistry, including pharmaceutical acids.

→ They are required for stability, compatibility and optimum distribution of pharmaceutical in various physiological system.

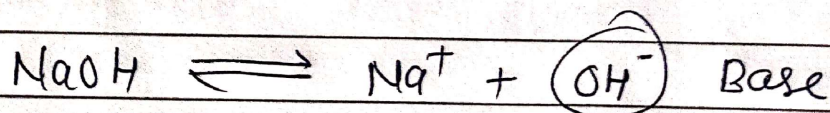
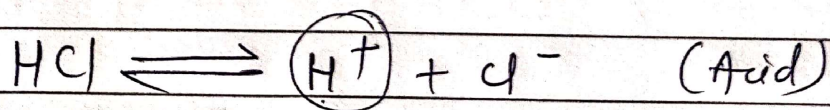
"Acid"

Several concept and theories are given for acid and base.

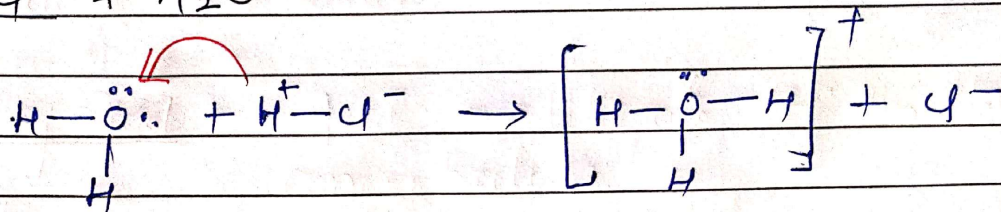
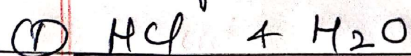
① Arrhenius Concept

Acids are substance \leq are capable to provide H^+ ion/proton when dissolved in H_2O and

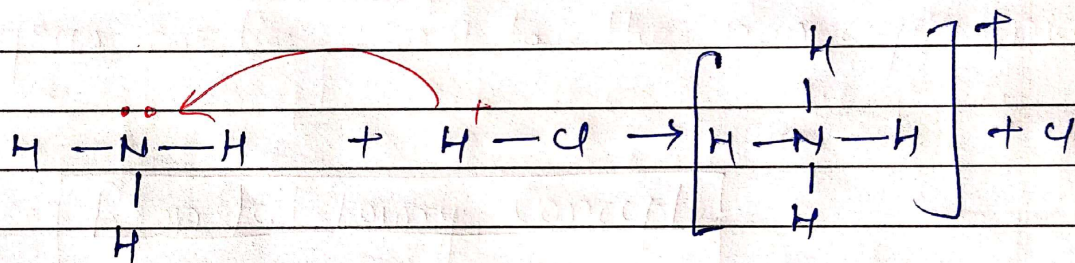
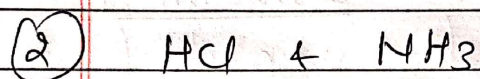
Bases are substance \leq provide OH^- when dissolved in H_2O .



⇒ According to neutralization reaction these two ion (H^+ , OH^-) combine to form solvent/salt.

Example

Water HCl gas Hydronium ion
(Bronsted Base) (Bronsted Acid)



(Ammonia) (HCl gas) Ammonium
(B. Base) (B. Acid) ion

Note

→ Bronsted Lowry concept is better than Arrhenius as.

(1) Not limited to aqueous solution only., it can be extended to gas phase.

(2) Release of OH^- is not necessary for base.

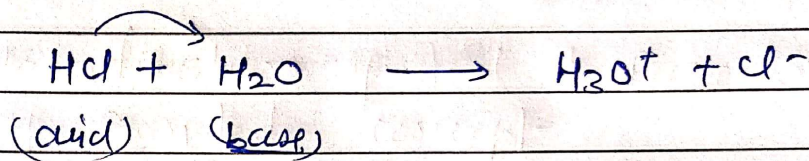
Base → Accept proton

Amphiprotic substance

Molecule that behave like both acid/base.

Ex. water. (H_2O)

(H^+) \rightleftharpoons HCl



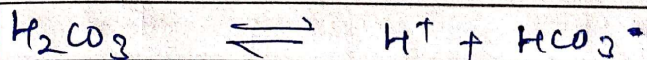
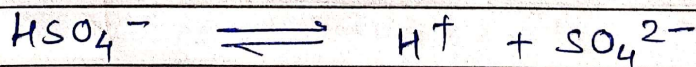
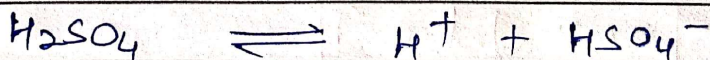
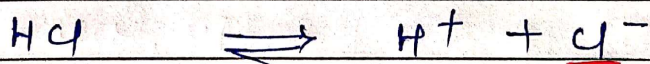
CONJUGATE ACID/BASE

→ The conjugate of an acid is the substance formed by the loss of proton.

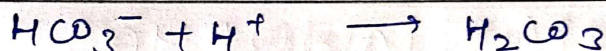
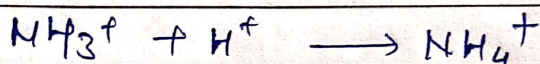
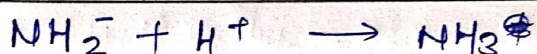
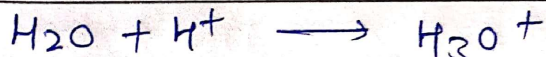
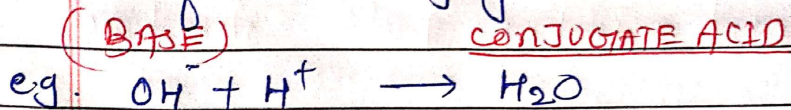
→ So according to above definition Bronsted Acid ~~is~~ ionise to a proton & conjugate base.

Acid

conjugate base



* When H^+ is added to an species (base) it forms conjugate base.

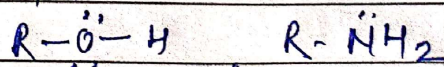
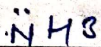
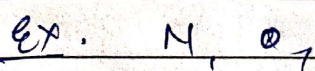


(3) LEWIS ACID-BASE CONCEPT

- This concept is given by G.N. Lewis
- It is extension of Bronsted-Lowry approach.
- According to the definition, Acid is an e^- pair acceptor.
- Base \longrightarrow e^- pair donor.

→ Lewis bases are of two types.

(1) Central atom contain L.P. (lone pair)



(2) All Anions

e.g. Cl^- , H^- , F^- , Br^- , OH^- , CN^-

⇒ Lewis Acid

(I) central atom have incomplete octet

e.g. B, Al, Mg, Be etc.

BF_3 , AlCl_3 , MgCl_2 , BeCl_2 .

(II) All cations

e.g. H^+ , Ag^+ etc.

★ The chemical reaction b/w Lewis acid and Lewis base result into a product that is called "adduct"

