

Summary =
Lec 8

Definitions for Acid and Base =

1 Arrhenius =

Acid = produce "H⁺" } when dissolved in H₂O.
Base = produce "OH⁻"

2 B.L =

Acid = proton "H⁺" donor.
Base = proton "H⁺" acceptor.

Note = [H⁺] = [H₃O⁺]

3 Lewis =

Acid = accept e⁻.
Base = e⁻ donate.

* Types of Acids, depending on # of H⁺:

- monoprotic = HNO₃
- polyprotic
 - diprotic = H₂SO₄
 - triprotic = H₃PO₄

Amphoteric substance = consider neither Acid or Base => like H₂O

can be Acid when reacts with Base
ex: NH₃ + H₂O ⇌ NH₄⁺ + OH⁻
Base Acid

can be base when reacts with Acid =
ex: HCN + H₂O ⇌ H₃O⁺ + CN⁻
Acid Base

* Note = Amphoteric ≠ amphiprotic
Acid OR Base "hydrophilic" AND "polar" hydrophobic "non-polar"

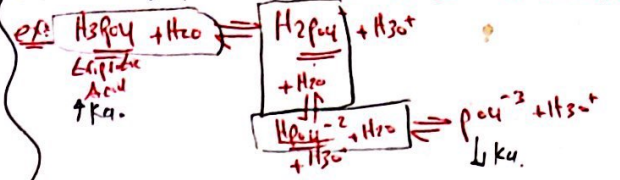
Acid and Base strength = strong Acid and base → dissociate 100% in H₂O.

strong Acid → HCl → H⁺ + Cl⁻ → [HCl] = [H⁺] = [Cl⁻] → No K_a
strong Base → NaOH → Na⁺ + OH⁻ → [NaOH] = [Na⁺] = [OH⁻] → No K_b

Weak Acid and base = dissociate partially.
Weak Acid → HCN + H₂O ⇌ H₃O⁺ + CN⁻ → [HCN] ≠ [products]
Weak Base → NH₃ + H₂O ⇌ NH₄⁺ + OH⁻
K_a = $\frac{[H_3O^+][CN^-]}{[HCN]}$ → there is K_a.
K_b = $\frac{[NH_4^+][OH^-]}{[NH_3]}$ → there is K_b.

[NH₃] + [OH⁻] [NH₄⁺] = [OH⁻] → there is K_b.
K_b = $\frac{[products]}{[Base]} = \frac{[OH^-]^2}{[NH_3]}$

As we said about types of Acid =
(mono + poly) protic =>



strong Acid + strong Base ⇌ weak base + weak Acid
conjugate conjugate.

Weak Acid + weak Base ⇌ strong Base + strong Acid

يعني القوية القوية (تقطين) ضعيفة ضعيف، هكذا
يعني علاقة عكسية بين الجهد والقوة مع المرافق لكل
* As we said → K_a = $\frac{[H_3O^+]}{[Acid]}$ → K_a > 1 → product favored
→ K_a < 1 → Reactant favored

→ imp Relations → ↑ K_a → ↑ [H₃O⁺] → ↓ pK_a → ↓ pH → strong Acid
pK_a = -log K_a
pH = -log [H₃O⁺]
[molarity] = $\frac{\# \text{ mole}}{\text{Volume}}$
mole = $\frac{\text{mass}}{\text{m.w}}$ → mass = M * V * m.w

* Equivalat =
For acids and bases = # of moles "HCl = 1 [H⁺]"
"ion s" => $\frac{\text{m.w}}{\text{charge}}$ "Mg²⁺ = $\frac{24.3}{2} = 12.15$ "

→ plz Back to slides or sh 8 to practice

* Normality = N = $\frac{n}{V} * M$
↳ # of Eq.

⇒ For titration → # M "Acid" = # M "Base"

* $K_w = [OH^-][H_3O^+] = 10^{-14}$
some H⁺ = OH⁻
→ $\frac{M_1 * V_1}{Acid} = \frac{M_2 * V_2}{Base}$
pK_a → Acid ↓ pH
Acid → [H₃O⁺] > 10⁻⁷
water [H₃O⁺] = [OH⁻] = 10⁻⁷
Base → [OH⁻] > 10⁻⁷
↑ K_b ↑ Base ↑ pH

Solution