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Class ⇒ B.Sc. (Part-1) Subsidiary
Subject ⇒ Chemistry
Chapter ⇒ Ionic Equilibrium
Topic ⇒ PKa , PKb

Name ⇒ Dr. Amarendra Kumar,
Deptt. of Chemistry,
Jain College, Ara.

PKa
OR
Ionization Constants of weak Acids

An acid HA in water establishes the following equilibrium

$$HA + H_2O \rightleftharpoons H_3O^+ + A^-$$

Applying law of Mass action, we get the equilibrium constant.

$$K = \frac{[H_3O^+][A^-]}{[HA][H_2O]}$$

Hence the dissociation constant of an Acid HA.

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

For weak acids, values of Ka are usually quite small and can be conveniently represented in a logarithmic form similar to pH.

Thus we can define the PKa of an acid is

$$PK_a = -\log K_a .$$

The negative sign in the defining eqn. for PKa, the stronger the acid, the smaller is its value of PKa.

pK_b

OR

Ionization of Weak Bases

A base B establishes the following equilibrium

$$B + H_2O \rightleftharpoons BH^+ + OH^-$$

Therefore, the dissociation constant for base B is K_b.

$$\therefore K_b = \frac{[BH^+][OH^-]}{[B]}$$

Because the K_b values for weak bases are usually small numbers, the same kind of logarithmic notation is often used to represent their equilibrium constants. Thus pK_b is defined as

$$pK_b = -\log K_b$$

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