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class \Rightarrow B.Sc. (Part-I) subsidiarysubject \Rightarrow Chemistrychapter \Rightarrow Ionic EquilibriumTopic \Rightarrow K_a , K_b Name \Rightarrow Dr. Amarendra Kumar,

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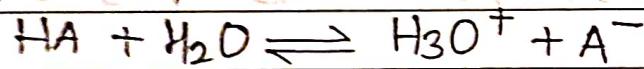
Jain College, Ara.

 K_a

OR

Ionization constants of weak Acids

An acid HA in water establishes the following equilibrium



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

$$K = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}][\text{H}_2\text{O}]}$$

Hence the dissociation constant of an Acid HA.

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$$

for weak acids, values of K_a are usually quite small and can be conveniently represented in a logarithmic form similar to pH.Thus we can define the P_{K_a} of an acid

is

$$P_{K_a} = -\log K_a$$

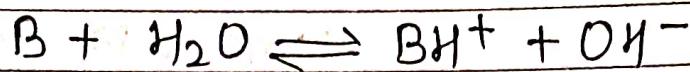
The negative sign in the defining eqn. for P_{K_a} , the stronger the acid, the smaller is its value of P_{K_a} .

pK_b

OR

Ionization of weak bases

A base B establishes the following equilibrium



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:

$$pK_b = -\log K_b$$

$$pK_b = -\log \frac{[BH^+][OH^-]}{[B][H_2O]}$$

$$pK_b = -\log \frac{[BH^+][OH^-]}{[B][H_2O]}$$

For strong bases, pK_b will be zero.

$$pK_b = pOH$$