Dissociation

2019, 2020

Definition:- Any acid or base on dissolving in water gives H^+ or OH^-.

$$HCl \rightarrow H^+ + Cl^-$$
$$NaOH - Na^+ + OH^-$$

[To break into ions]

The dissociation constant for weak acid depend on their Str.

$$K \propto S^2$$

If for two weak acid dissociation constant are Ka, Kb and stregth are S_1, S_2

Then $\boxed{\frac{S_1^2}{S_2^2} = \frac{K_a}{K_b}}$

(Relative Str) or $\boxed{\frac{S_1}{S_2} = \sqrt{\frac{K_a}{K_b}}}$

2018

Q The dissociation constant of formic acid and acetic are 21.4×10^{-4} and 1.81×10^{-5} respectively. find the relative Str of acid

Sol

K_1 or $K_a = 21.4 \times 10^{-4}$

K_2 or $K_b = 1.81 \times 10^{-5}$

$$\frac{S_1}{S_2} = \sqrt{\frac{K_1}{K_2}}$$

$$= \sqrt{\frac{21.4 \times 10^{-4}}{1.81 \times 10^{-5}}}$$

$$= \sqrt{\frac{2140}{18.1}}$$

$\sqrt{118.23}$

$= 10.8$ or 10.9 Ans

2019

Hydrolysis Constant

To dissolve any acid or base (OH^-) in water.

(H^+)

Relation

$$K_w = K_a \times K_h$$

- K_w — Hydrolysis Constant
- K_a — Dissociation Constant
- $K_w = 10^{-14}$

$$[H^+][OH^-] = 10^{-14}$$

VVI

Q. 2019 Calculate the hydrolysis constant of NaCN ($K_a = 1.8 \times 10^{-5}$)

↓

- उसका कोई काम नहीं है Q में

Sol

$$K_w = K_a \times K_h$$

$$K_h = \frac{10^{-14}}{1.8 \times 10^{-5}} \quad \frac{K_w}{K_a}$$

S

9

$$K_h = 0.55 \times 10^{-9}$$

$$= 5.5 \times 10^{-10} \quad \text{Ans}$$

In KCN

Hydrolysis Percentage

$$h = \sqrt{\frac{K_h}{C}}$$

- K_h — Hydrolysis Constant
- C — Concentration

$$K_w = K_h \times K_a$$

$$h = \sqrt{\frac{K_w}{K_a \times C}}$$

Ex Find hydrolysis % age of $\left(\frac{1N}{80}\right)$ NaCN ($K_a = 1.3 \times 10^{-9}$)

Sol $h = \sqrt{\frac{K_w}{K_a \times C}}$ $\quad C = \frac{1}{80}, \; K_w = 10^{-14}$

Always fix

So, $h = \sqrt{\frac{10^{-14}}{1.3 \times 10^{-9} \times \frac{1}{80}}}$

जो $\frac{N}{80}$ है उसमे C का मान रहता है
N के साथ $\frac{1}{80}$

$= \sqrt{\frac{80 \times 10^{-5}}{1.3}}$

$= \sqrt{6.15 \times 10^{-5}}$ Check

$= \sqrt{61.5 \times 10^{-6}}$

$= 7.8 \times 10^{-3}$ Ans

Formula

1. H in % age $= h = \sqrt{\frac{K_w}{K_a \times C}}$

2. H in Constant or NaCN $= K_w = K_a \times K_h$

3. H in relative str $= \frac{S_1}{S_2} = \sqrt{\frac{K_a}{K_b}}$ or $\frac{K_1}{K_2}$

Hydrolysis Constant

Acid, Base

$K_w \rightarrow [H^+] \times [OH^-]$

$K_w = 10^{-14}$

$K_w = K_a \times K_h$

$K_w = 10^{-14}$

K_a → Dissociation Constant

K_h → Hydrolysis Constant

Q Hydrolysis constant $K_h = ?$

$$K_w = K_a \times K_b$$

$$10^{-14} = 1.8 \times 10^{-5} \times K_h$$

$$K_h = \frac{10 \times 10^{-14}}{18 \times 10^{-5}}$$

$$= 0.55 \times 10^{-9}$$

$$= 5.5 \times 10^{-10}$$

Hydrolysis %age

$$h = \sqrt{\frac{K_h}{C}}$$

K_h → Hydrolysis constant

C → Concentration

Q1- Find hydrolysis %age of 1M NaCN ($K_a = 1.3 \times 10^{-9}$)

Sol

$$K_w = K_a \times K_h$$

$$10^{-14} = 1.3 \times 10^{-9} \times K_h$$

$$K_h = \frac{10 \times 10^{-14}}{1.3 \times 10^{-9}}$$

$$= 0.77 \times 10^{-5}$$

$$h = \sqrt{\frac{K_h}{C}}$$

$$= \sqrt{\frac{0.77 \times 10^{-5}}{\frac{1}{80}}}$$

$$= \sqrt{0.77 \times 80 \times 10^{-5}}$$

$$= \sqrt{6.16 \times 10^{-4}}$$

$$= 2.48 \times 10^{-2}$$