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# VIDEO - 6

## Section:- Dissociation of Water

$$H_2O \rightleftharpoons H^+ + OH^-$$

$$H_2O + H_2O \rightleftharpoons H_3O^+ + OH^-$$

$$K = \frac{[H_3O^+][OH^-]}{[H_2O]^2} \Rightarrow K[H_2O]^2 = \boxed{[H_3O^+][OH^-] = K_w}$$

$\therefore K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}\ mol^2 dm^{-6}$ at 300K for pure water.

Here, $K_w$ is called Ionic Product.

## Section :- Salt Hydrolysis

# For Salt of Strong Acid and Strong Base

$$H_2O \rightleftharpoons H^+ + OH^-$$

$$K_w = [H^+][OH^-] = [H^+]^2$$

$$\therefore \boxed{[H^+] \Rightarrow \sqrt{K_w}}$$

# pOH of Salt of Weak Acid and Strong Base

$$pOH = \frac{-1}{2}[\log K_w - \log K_a + \log C]$$

$$\Rightarrow \frac{1}{2}[pK_w - pK_a - \log C_{salt}]$$

## # pH of Salt of Strong Acid and Weak Base

$$pH = \frac{1}{2}(pK_w - pK_b - \log C_{salt})$$