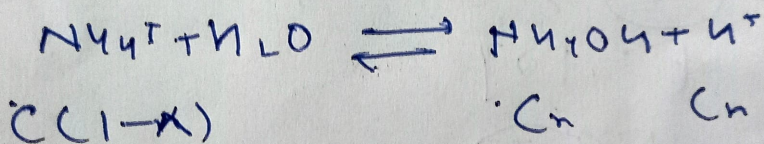


Q.] Calculate the hydrolysis constant for NH_4Cl . pH value and $[\text{OH}^-]$ in $0.1 \text{ M NH}_4\text{Cl}$.
 ($K_{\text{NH}_4\text{OH}} = 1.75 \times 10^{-5}$ $K_w = 10^{-14}$)

Solⁿ

$$K_h = \frac{K_w}{K_b} \Rightarrow K_h = \frac{10^{-14}}{1.75 \times 10^{-5}} = 5.7 \times 10^{-10}$$

Hydrolysis of NH_4Cl :



$$K_h = \frac{C_h^2}{C(1-x)} \Rightarrow x^2 = \frac{K_h}{C} \approx \frac{5.7 \times 10^{-10}}{0.1} = 5.7 \times 10^{-9}$$

$$[\text{H}^+] = Cx = 0.1 \times 7.55 \times 10^{-5} = 7.55 \times 10^{-6} \text{ M}$$

$$\text{pH} = -\log [\text{H}^+] = -\log (7.55 \times 10^{-6}) = 5.12$$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{10^{-14}}{7.55 \times 10^{-6}} = \boxed{1.3 \times 10^{-9} \text{ M}}$$