



$$K_a = \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]}$$

at +

1	0	0
1 - α	α	α

$$K_a = \frac{\alpha^2}{1 - \alpha} \quad \text{i) } (\alpha < 6.4 \times 10^{-2}) \text{ and } (1 - \alpha \approx 1)$$

$$\alpha = K_a$$

for C conc.

C	0	0
C - Cα	Cα	Cα

$$K_a = \frac{C \alpha^2}{C(1 - \alpha)} \approx K_a = \frac{C \alpha^2}{1}$$

$$\Rightarrow \left(\alpha = \sqrt{\frac{K_a}{C}} \right) \quad \boxed{[\text{H}^+] = C \alpha = \sqrt{K_a C}}$$

$$\text{pH} = -\log[\text{H}^+] = -\log \sqrt{K_a C} = -\frac{1}{2} \log K_a - \frac{1}{2} \log C$$

ii) Simi log p $[\text{OH}^-] = \sqrt{K_a C}$

$$\boxed{\text{pOH} = 14 - \log[\text{OH}^-]} \quad (\text{pOH})$$

Salt Hydrolysis

$$K_w = [\text{H}^+][\text{OH}^-] = 10^{-14} \quad \text{at } 300\text{K for pure water}$$

i) $\text{pH} < 7$ (conc. $\approx 10^{-7}$)

$$C_{\text{total}} = (10^{-7} + C) \quad \text{ex if } C = 10^{-8}$$

$$= 10^{-7} \left[1 + \frac{1}{10} \right] = \left(\frac{11}{10} \times 10^{-7} \right)$$