

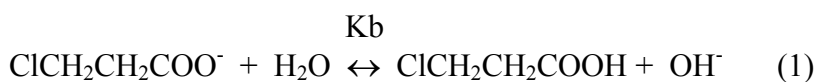
Quiz 2
Chem 311
Fall 2002

Calculate the pH of a 0.050 M solution of sodium 3-chloropropanoate (ClCH₂CH₂COONa).

$$K_a(\text{3-Chloropropanoic Acid}) = 7.8 \times 10^{-5}$$

$$K_w = 1.01 \times 10^{-14}$$

Sodium 3-chloropropanoate is a soluble salt that completely dissociates (just like sodium acetate). So, I have a weak base, ClCH₂CH₂COO⁻, at a F_B = 0.050 M. (2)



$$K_b = \frac{[\text{ClCH}_2\text{CH}_2\text{COOH}][\text{OH}^-]}{[\text{ClCH}_2\text{CH}_2\text{COO}^-]} = K_w/K_a \quad (2)$$

$$(1.01 \times 10^{-14}) / (7.8 \times 10^{-5}) = x^2 / F_B = x^2 / (0.050) \quad (1)$$

$$x = [\text{OH}^-] = 2.544 \times 10^{-6} \text{ M} \quad (1)$$

$$[\text{H}_3\text{O}^+] = K_w / [\text{OH}^-] = 3.969 \times 10^{-9} \text{ M} \quad (1)$$

$$\text{pH} = 8.40 \quad (2)$$