Answer on Question #63570 - Chemistry – Inorganic Chemistry

Determine the pH when 5.89 g of sodium acetate ($NaOOCCH_3$) is dissolved in 190 mL of water. K_a of acetic acid is $1.8\ 10^{-5}$.

Solution.

$NaOOCCH_3 \leftrightarrow Na^+ + CH_3COO^-$

$CH_3COO^- + H_2O \rightarrow CH_3COOH + OH^-$

$K_a = 1.8 \cdot 10^{-5}$; $pK_a = -\lg K_a = 4.74$

$$pH = 7 + \frac{1}{2} pK_{CH_3COOH} + \frac{1}{2} \lg C_{NaOOCCH_3}$$

$C(NaOOCCH_3) = \nu(NaOOCCH_3)/V(solution) = m(NaOOCCH_3)/(M(NaOOCCH_3) \times V(solution)) = 5.89/((23+32+24+3) \times 0.19) = 0.378$ mol/L

$pH = 7 + 1/2 \times 4.74 + 1/2 \times \lg(0.378) = 9.16$

Answer: pH = 9.16