

Question #80638, Chemistry / General Chemistry | for completion

Calculate the pH of a solution of 20g sodium acetic in 500 ml of water (PKa acetic acid=4.75)

pH-?

$m(\text{CH}_3\text{COONa})=20\text{g}$

$V(\text{H}_2\text{O})= 500\text{ml} = 0.5 \text{ l}$

$\text{pK}_a = 4,75, \text{K}_a = 1.8 \cdot 10^{-5}$

Solution:

$\text{CH}_3\text{COONa} = \text{CH}_3\text{COO}^- + \text{Na}^+$

$\text{CH}_3\text{COO}^- + \text{H}_2\text{O} = \text{CH}_3\text{COOH} + \text{OH}^-$

$K = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-]} = \frac{K_w}{K_a}$

$[\text{CH}_3\text{COOH}] = [\text{OH}^-] = x$

$[\text{CH}_3\text{COO}^-] = C(\text{CH}_3\text{COONa}) = \frac{n(\text{CH}_3\text{COONa})}{v}$

$M(\text{CH}_3\text{COONa}) = 82\text{g/mol}, n = 20/82 = 0.244 \text{ mol}$

$C(\text{CH}_3\text{COONa}) = 0.244/0.5 = 0.488 \text{ g/mol}$

$x \cdot x / 0.488 = 10^{-14} / 1,8 \cdot 10^{-5}$

$x^2 = 5.5 \cdot 10^{-10}, x = 2.35 \cdot 10^{-5} = [\text{OH}^-]$

$[\text{H}^+] = \frac{K_w}{[\text{OH}^-]} = \frac{10^{-14}}{2,35 \cdot 10^{-5}} = 4 \cdot 10^{-10}, \text{ph} = -\lg(4 \cdot 10^{-10}) = 9.39$

Answer: pH= 9.39

Answer provided by www.AssignmentExpert.com