

citric acid $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$ $K_a = 7.1 \times 10^{-4}$

construct a buffer $\text{pH} = 3.50$

$$[\text{H}_3\text{C}_6\text{H}_5\text{O}_7] = ? \quad \text{pH} = \text{p}K_a + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

$$[\text{H}_2\text{C}_6\text{H}_5\text{O}_7^-] = ? \quad \text{p}K_a = -\log K_a = 3.15$$

$$3.50 = 3.15 + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

$$0.35 = \log \frac{[\text{A}^-]}{[\text{HA}]}$$

$$10^{0.35} = \frac{[\text{A}^-]}{[\text{HA}]} = \frac{2.24}{1}$$

better at
neutralizing
added
acid

$$[\text{A}^-] = 0.224 \text{ M}$$

$$[\text{HA}] = 0.100 \text{ M}$$



You mix 100 mL of 0.1 M $\text{C}_6\text{H}_5\text{COOH}$ with
50 mL of 0.1 M $\text{NaC}_6\text{H}_5\text{COO}^-$ $\text{pH} = ?$ BUFFER

$K_a \text{ C}_6\text{H}_5\text{COOH} = 6.5 \times 10^{-5} \Rightarrow 4.19$

$$M_2 = \frac{M_1 V_1}{V_2} \quad [\text{C}_6\text{H}_5\text{COOH}] = \frac{(0.1 \text{ M})(100 \text{ mL})}{150 \text{ mL}} = 0.067 \text{ M}$$

$$[\text{C}_6\text{H}_5\text{COO}^-] = \frac{(0.1 \text{ M})(50 \text{ mL})}{150 \text{ mL}} = 0.033 \text{ M}$$

$$\text{pH} = 4.19 + \log \frac{0.033}{0.067} = 3.88$$

citric acid $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$ $K_a = 7,1 \times 10^{-4}$

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$$[\text{H}_3\text{C}_6\text{H}_5\text{O}_7] = ? \quad \text{pH} = \text{p}K_a + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

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50ml of 0,1M $\text{C}_6\text{H}_5\text{COO}^-$ $\text{pH} = ?$ BUFFER

$$K_a \text{C}_6\text{H}_5\text{COOH} \quad 6,5 \times 10^{-5} \Rightarrow 4,19$$

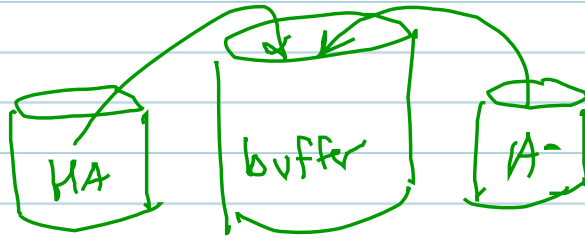
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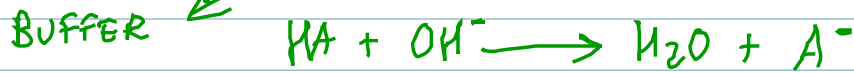
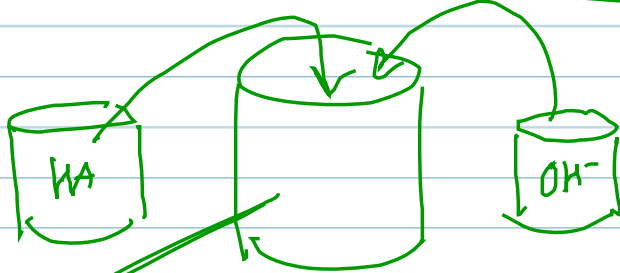
$$\text{pH} = 4,19 + \log \frac{0,033}{0,067} = 3,88$$

HOW TO MAKE (OR END UP WITH) A BUFFER

Scenario 1

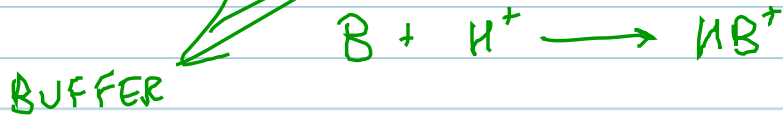
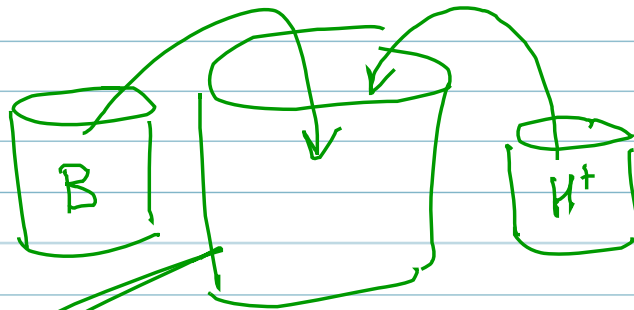


Scenario 2



IF $n_{\text{HA}} \approx 2 \times n_{\text{OH}^-}$

Scenario 3

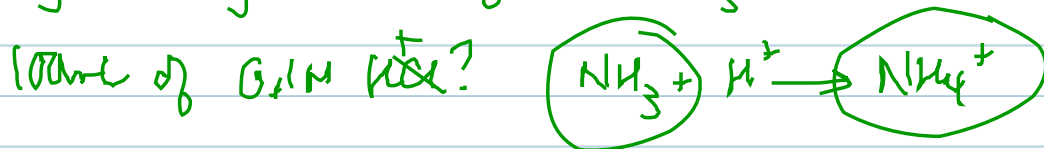


IF $n_{\text{B}} \approx 2 \times n_{\text{H}^+}$

What is the pH of a solution made

by mixing 100ml of 0.2M NH_3 with

100ml of 0.1M H^+ ?



STOICHI

$$\text{NH}_3: (0.2\text{M})(0.1\text{L}) = 0.02 \text{ mol NH}_3 \quad \text{XS}$$

$$\text{H}^+: (0.1\text{M})(0.1\text{L}) = 0.01 \text{ mol H}^+ \quad \text{LR}$$

0.02 mol NH_3 start

-0.01 mol react away \Rightarrow 0.01 mol NH_4^+

0.01 mol NH_3

$$[\text{NH}_4^+] = \frac{0.01 \text{ mol}}{0.2\text{L}} = 0.05\text{M}$$

$$K_a = 5.7 \times 10^{-10}$$
$$pK_a = 9.24$$

$$[\text{NH}_3] = \frac{0.01 \text{ mol}}{0.2\text{L}} = 0.05\text{M}$$

$$\text{pH} = 9.24 + \log \frac{0.05}{0.05}$$