

~~Supernotes~~

Acid-Base Eq (15) Buffers (3)

A buffer is made from $0.305\text{M CH}_3\text{COOH}$ and $0.406\text{M CH}_3\text{COO}^- \text{Na}^+$. What will be the new pH if the following are added to 50ml of this buffer.

(a) 2.0mL of 0.350M HCl and (b) 2.00mL of 0.0805M NaOH .

$$pK_a \text{ CH}_3\text{COOH} = \underline{4.74}$$

$$pH \text{ of buffer} = \underline{4.86}$$

Ans

Calc mols in buffer.

$$50.0\text{mL} \times 0.305\text{M} = 15.25\text{mmol CH}_3\text{COOH}$$

$$50.0\text{mL} \times 0.406\text{M} = 20.30\text{mmol CH}_3\text{COO}^-$$

(a) $2.0\text{mL} \times 0.350\text{M} = 0.7\text{mmol}$ acid (HCl)
 acid reacts with base; base conc. will decrease
 acid conc. will increase.

$$\{H^+\} = (15.25 + 0.7)\text{mmol} = 15.95\text{mmol}$$

$$\{CH_3COO^-\} = (20.3 - 0.7)\text{mmol} = 19.6\text{mmol}$$

(no vol
 req'd
 b/c ratio)

$$pH = pK_a + \log \left\{ \frac{\text{base}}{\text{acid}} \right\} = 4.74 + \log \left(\frac{19.6}{15.95} \right) = \boxed{4.83}$$

0.0895

(b) $2.0\text{mL} \times 0.0805\text{M} = 0.161\text{mmol}$ base

base reacts with acid; acid conc. will decrease
 base conc. will increase.

$$\{H^+\} = (15.25 - 0.161)\text{mmol} = 15.089\text{mmol}$$

$$\{CH_3COO^-\} = (20.3 + 0.161)\text{mmol} = 20.461\text{mmol}$$

$$pH = 4.74 + \log \left(\frac{20.461}{15.089} \right) = \boxed{4.87}$$

0.1332