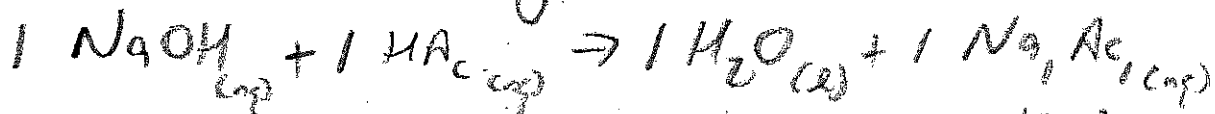


Weak Acid Titrated by Strong BASE

Add 75.0 mL of 0.100 M NaOH to 50.0 mL of a 0.100 M $\text{HC}_2\text{H}_3\text{O}_2$ (HAc)

Using stoichiometry to get rid of all NaOH

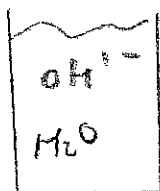


$$\begin{aligned} \text{mole OH}^{-}_{\text{add}} &= (75.0 \text{ mL}) \left(\frac{1 \text{ L}}{1000 \text{ mL}} \right) (0.100 \text{ M NaOH}) \left(\frac{1 \text{ mole OH}^{-}_{\text{add}}}{1 \text{ mole NaOH}} \right) \\ &= 7.50 \times 10^{-3} \text{ mole OH}^{-}_{\text{add}} \end{aligned}$$

$$\text{mole HAc}_I = (50.0 \text{ mL}) \left(\frac{1 \text{ L}}{1000 \text{ mL}} \right) (0.100 \text{ M HAc}) = 5.00 \times 10^{-3} \text{ mole HAc}$$

Since OH^{-} & HAc are in 1:1 molar ratio, there is not enough HAc to consume all OH^{-} .

o o It is a strong base bucket now X
X
X



Strong
Base

$$\text{mole OH}^{-}_{\text{left}} = \text{mole OH}^{-}_{\text{add}} - \text{mole OH}^{-}_r$$

$$= 7.50 \times 10^{-3} \text{ mole OH}^{-}_{\text{add}} - (5.00 \times 10^{-3} \text{ mole HAc}_I) \left(\frac{1 \text{ mole OH}^{-}_r}{1 \text{ mole HAc}_I} \right)$$

$$= 7.50 \times 10^{-3} \text{ mole OH}^{-}_{\text{add}} - 5.00 \times 10^{-3} \text{ mole OH}^{-}_r$$

$$= 2.5 \times 10^{-3} \text{ mole OH}^{-}_{\text{left}}$$

$$V = (75.0 \text{ mL} + 50.0 \text{ mL}) \left(\frac{1 \text{ L}}{1000 \text{ mL}} \right) = 0.125 \text{ L}$$

$$[\text{OH}^{-}] = \frac{2.5 \times 10^{-3} \text{ mole OH}^{-}}{0.125 \text{ L}} = 2.0 \times 10^{-2} \text{ M}$$

$$\text{pOH} = -\log[\text{OH}^{-}] = -\log(2.0 \times 10^{-2} \text{ M}) = 1.698$$

$$\text{pH} = 14.000 - 1.698 = 12.302$$

$\text{pH} = 12.30$