

Ex (14) calculate the pH at the equivalence point when 40.0mL of .0250M benzoic acid ( $C_6H_5COOH$ ,  $K_a = 6.3 \times 10^{-5}$ ) is titrated with .050M NaOH.

$$n_{C_6H_5COOH} = .0250M \cdot .040L = \underline{\underline{1 \times 10^{-3} \text{ mol}}}$$

$$1.59 \times 10^{-10} = \frac{x^2}{.0125 - x}$$

at equivalence pt.

$$n_{\text{HA}} = n_{\text{base}}$$

$\therefore$  .040L of NaOH needed to reach it.

$$V_{\text{new}} = 80\text{mL or } 0.80\text{L}$$

$$[C_6H_5COO^-] = \frac{1 \times 10^{-3} \text{ mol}}{0.80\text{L}} = .0125\text{M}$$

$$1.59 \times 10^{-10} = \frac{x^2}{.0125}$$

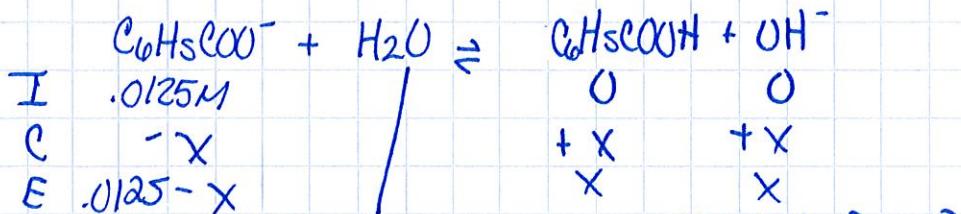
$$1.99 \times 10^{-12} = x^2$$

$$1.41 \times 10^{-6} = x = [OH^-]$$

$$-\log 1.41 \times 10^{-6} = pOH$$

$$5.85 = pOH$$

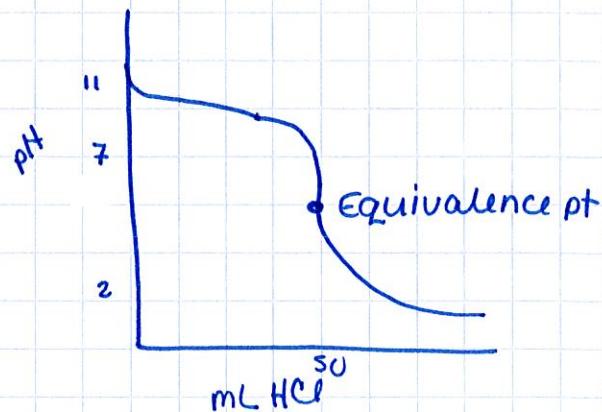
$$8.15 = pH$$



$$K_b = \frac{1 \times 10^{-14}}{6.3 \times 10^{-5}} = 1.59 \times 10^{-10} = \frac{[C_6H_5COOH][OH^-]}{[C_6H_5COO^-]}$$

### c. Strong Acid- Weak Base Titration (HCl) (NH<sub>3</sub>)

pH at equivalence point  $< 7$ .



## D. Titrations of Polyprotic Acids (ie. $\text{H}_3\text{PO}_4$ )

