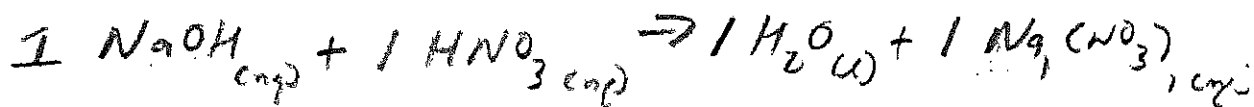


STRONG ACID TITRATED BY STRONG BASE

Add 100.0 ml of 0.100 M NaOH to 50.0 ml of 0.200 M HNO₃

Using stoichiometry to get rid of all NaOH



$$\begin{aligned} \text{mol OH}^{-}_{\text{add}} &= (100.0 \text{ ml}) \left(\frac{1 \text{ L}}{1000 \text{ ml}} \right) (0.100 \text{ M NaOH}) \left(\frac{1 \text{ mol OH}^{-}}{1 \text{ mol NaOH}} \right) = \\ &= 0.0100 \text{ mol OH}^{-}_{\text{add}} \end{aligned}$$

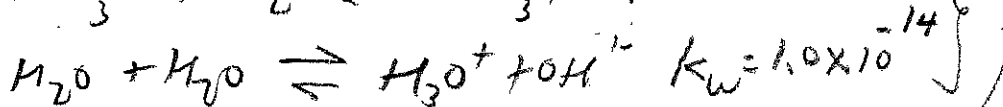
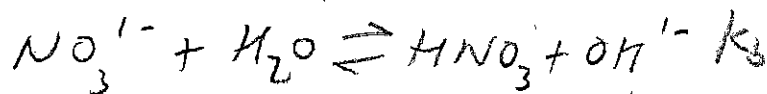
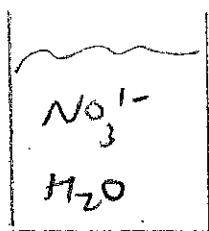
$$\text{mol HNO}_3_{\text{left}} = \text{mol HNO}_3_{\text{I}} - \text{mol HNO}_3_{\text{con}}$$

$$\begin{aligned} \text{mol HNO}_3_{\text{left}} &= \left[(50.0 \text{ ml}) \left(\frac{1 \text{ L}}{1000 \text{ ml}} \right) (0.200 \text{ M}) \right] - \left[(0.0100 \text{ mol OH}^{-}) \left(\frac{1 \text{ mol HNO}_3_{\text{con}}}{1 \text{ mol OH}^{-}} \right) \right] \\ &= 0.0100 \text{ mol HNO}_3_{\text{I}} - 0.0100 \text{ mol HNO}_3_{\text{con}} \end{aligned}$$

mol HNO₃ = 0 moles ∴ There are no HNO₃ or NaOH in bucket

called Equivalence POINT !!!

only thing in bucket is conjugate base (NO₃⁻)



$K_b \ll K_w$ so auto-ionization of water runs bucket.

only since NO₃⁻ does not react with H₂O!

$$\therefore [\text{H}^{+}] = 1.0 \times 10^{-7} \text{ M}$$

$$\text{pH} = -\log [\text{H}^{+}] = -(1.0 \times 10^{-7} \text{ M}) = -(-7.00)$$

pH = 7.00