STRONG ACID TITRATED BY STRONG BASE

Add 150.0 mL of 0.100M $NaOH$ to 50.0 mL of 0.200M HNO_3

Using stiochiometry to get rid of all $NaOH$

$$1\ NaOH_{(aq)} + 1\ HNO_{3(aq)} \rightarrow 1\ H_2O_{(l)} + 1\ Na_1(NO_3)_{1(aq)}$$

$$mol\,OH^{1-}_{Add} = (150.0\,mL)\left(\frac{1L}{1000mL}\right)(0.100M\ NaOH)\left(\frac{1\,mol\,OH^{1-}}{1\,mol\,NaOH}\right) =$$

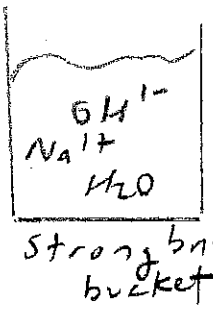
$$= 0.0150\,mol\,OH^{1-}_{Add}$$

$$mol\,HNO_{3_I} = (50.0mL)\left(\frac{1L}{1000mL}\right)(0.200M\ HNO_3) = 0.0100\,mol\,HNO_{3_I}$$

* There is more OH^{1-} than HNO_3, so we need to calculate *
* how much OH^{1-} is left after consuming all HNO_3. *
** Bucket is STRONG BASE BUCKET **

$$mol\,OH^{1-}_{Left} = mol\,OH^{1-}_{Add} - mol\,OH^{1-}_{Con}$$

$$= 0.0150\,mol\,OH^{1-} - \left[(0.0100\,mol\,HNO_{3_I})\left(\frac{1\,mol\,OH^{1-}_{Con}}{1\,mol\,HNO_{3_I}}\right)\right]$$



strong base bucket

$$= 0.0150\,mol\,OH^{1-} - 0.0100\,mol\,OH^{1-}_{Con}$$

$$= 5.00\times10^{-3}\,mol\,OH^{1-}_{Left}$$

$$V = (150.0mL + 50.0mL) = 200.mL\left(\frac{1L}{1000mL}\right) = 0.200L$$

$$[OH^{1-}] = \frac{5.00\times10^{-3}\,mol\,OH^{1-}}{0.200L} = 0.0250M$$

$$pOH = -\log[OH^{1-}],\ -\log(0.0250M) = -(-1.6020) = 1.6020$$

$$pH = 14.0000 - pOH = 14.0000 - 1.6020 = 12.3980$$

$$\boxed{pH = 12.398}$$