

Friday worksheet – 1a Excess reagents and pH

- 1) 230ml of 0.753M Mg(OH)<sub>2</sub> is added to 172 mL of 0.570M H<sub>3</sub>PO<sub>4</sub> What is the resulting pH of the final solution at 25 °C?

*Step 1 write the chemical equation for this reaction*



*Step 2 Find the mols of each reactant*

$$\text{mols of Mg}(\text{OH})_2 = C \times V = 0.753 \times 0.230 = 0.1732$$

$$\text{mols of H}_3\text{PO}_4 = C \times V = 0.570 \times 0.172 = 0.0980$$

*Step 3 find the limiting reactant*

*If all the H<sub>3</sub>PO<sub>4</sub> reacted we would need 1.5 X 0.0980 ( 0.147) mol of Mg(OH)<sub>2</sub>*

*We have 0.1732 mol of Mg(OH)<sub>2</sub> clearly too much, hence it is in excess. The limiting reactant is H<sub>3</sub>PO<sub>4</sub>.*

*Step 4 Calculate the mol of Mg(OH)<sub>2</sub> in excess.*

$$0.173 - 0.147 = .0.026$$

*Step 5 calculate the mol of OH<sup>-</sup> present after the reaction.*



*So for 0.026 mol of Mg(OH)<sub>2</sub> we will have 2 X 0.026 (0.052) mol of OH<sup>-</sup>*

*Step 6 Calculate the [OH<sup>-</sup>] present*

$$[\text{OH}^{-}] = n/V = 0.052 / 0.402 = 0.13 = 10^{-0.89}$$

*Step 7 find the [H<sub>3</sub>O<sup>+</sup>]*

$$[\text{OH}^{-}][\text{H}_3\text{O}^{+}] = 10^{-14}$$

$$[\text{H}_3\text{O}^{+}] = 10^{-14.00} / 10^{-0.89} = 10^{-13.11}$$

*Step 8 find the pH*

$$\text{pH} = 13.1$$