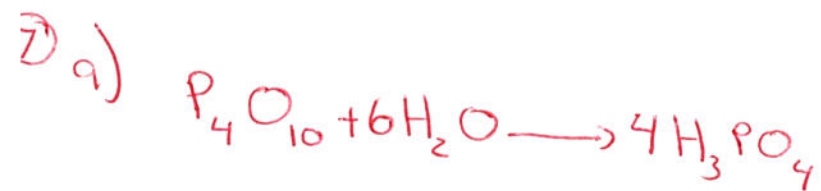


Section 2 Review Chapter 9



$$8.85 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.8 \text{ g Fe}} \times \frac{1 \text{ mol H}_2}{1 \text{ mol Fe}} \times \frac{2.0 \text{ g H}_2}{1 \text{ mol H}_2} = \boxed{0.317 \text{ g H}_2} \leftarrow \text{theoretical}$$

$$\% \text{ Yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{0.27 \text{ g H}_2}{0.317 \text{ g H}_2} \times 100 = \boxed{85.12\%}$$



b) $100.0 \text{ g P}_4\text{O}_{10} \times \frac{1 \text{ mol P}_4\text{O}_{10}}{284 \text{ g P}_4\text{O}_{10}} \times \frac{4 \text{ mol H}_3\text{PO}_4}{1 \text{ mol P}_4\text{O}_{10}} \times \frac{98.0 \text{ g H}_3\text{PO}_4}{1 \text{ mol H}_3\text{PO}_4} = \boxed{138.0 \text{ g H}_3\text{PO}_4}$
Limiting: P_4O_{10}

$$200.0 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.0 \text{ g H}_2\text{O}} \times \frac{4 \text{ mol H}_3\text{PO}_4}{6 \text{ mol H}_2\text{O}} \times \frac{98.0 \text{ g H}_3\text{PO}_4}{1 \text{ mol H}_3\text{PO}_4} = \boxed{725 \text{ g H}_3\text{PO}_4}$$

excess: H_2O

c) $\% \text{ Yield} = \frac{126.2 \text{ g H}_3\text{PO}_4}{138.0 \text{ g H}_3\text{PO}_4} \times 100 = \boxed{91.45\%}$



$$3.5 \text{ mol TiCl}_4 \times \frac{1 \text{ mol TiO}_2}{1 \text{ mol TiCl}_4} = \boxed{3.5 \text{ mol TiO}_2} \text{ Limiting: TiCl}_4$$

$$4.5 \text{ mol } \cancel{\text{Ti}} \text{O}_2 \times \frac{1 \text{ mol TiO}_2}{1 \text{ mol O}_2} = \boxed{4.5 \text{ mol TiO}_2} \text{ excess: O}_2$$

8 cont.

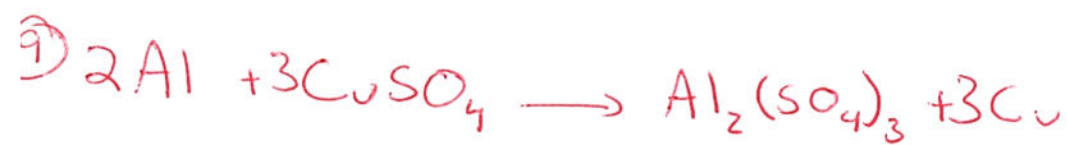
$$3.5 \text{ mol TiCl}_4 \times \frac{1 \text{ mol TiO}_2}{1 \text{ mol TiCl}_4} = \boxed{3.5 \text{ mol TiO}_2} \text{ product 1}$$

$$3.5 \text{ mol TiCl}_4 \times \frac{2 \text{ mol Cl}_2}{1 \text{ mol TiCl}_4} = \boxed{7.0 \text{ mol Cl}_2} \text{ product 2}$$

~~4.5 mol~~

$$3.5 \text{ mol TiCl}_4 \times \frac{1 \text{ mol O}_2}{1 \text{ mol TiCl}_4} = \boxed{3.5 \text{ mol O}_2} \text{ ~~not~~ used}$$

$$\begin{array}{ccc} \text{Left over} = & 4.5 \text{ mol O}_2 & - & 3.5 \text{ mol O}_2 & = & \boxed{1.0 \text{ mol O}_2} \\ & \text{started w/} & & \text{used up} & & \text{left over} \end{array}$$



$$1.85 \text{ g Al} \times \frac{1 \text{ mol Al}}{27.0 \text{ g Al}} \times \frac{3 \text{ mol Cu}}{2 \text{ mol Al}} \times \frac{63.5 \text{ g Cu}}{1 \text{ mol Cu}} = \cancel{6.56} \boxed{6.53 \text{ g Cu}} \\ \text{theoretical}$$

$$\% \text{ Yield} = \frac{\text{actual}}{\text{theoretical}}$$

$$0.566 = \frac{\text{actual}}{6.53 \text{ g Cu}}$$

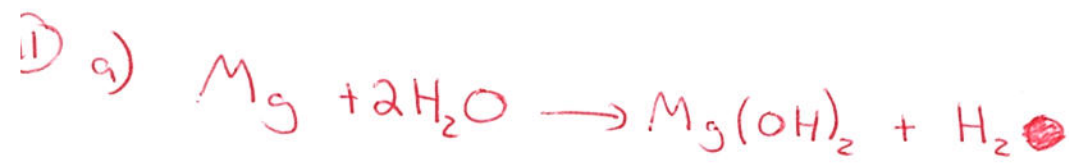
$$\boxed{\text{actual} = 3.69 \text{ g Cu}}$$



$$2.00 \times 10^3 \text{ g CaCO}_3 \times \frac{1 \text{ mol CaCO}_3}{100.1 \text{ g CaCO}_3} \times \frac{1 \text{ mol CaO}}{1 \text{ mol CaCO}_3} \times \frac{56.1 \text{ g CaO}}{1 \text{ mol CaO}} = \boxed{1120.9 \text{ g CaO}}$$

theoretical

$$1120.9 = 1.1209 \times 10^3 \quad \% \text{ Yield} = \frac{1.05 \times 10^3 \text{ g CaO}}{1.1209 \times 10^3 \text{ g CaO}} \times 100 = \boxed{93.67\%}$$



$$\text{b) } 10.1 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.3 \text{ g Mg}} \times \frac{1 \text{ mol Mg(OH)}_2}{1 \text{ mol Mg}} \times \frac{58.3 \text{ g Mg(OH)}_2}{1 \text{ mol Mg(OH)}_2} = \boxed{24.2 \text{ g Mg(OH)}_2}$$

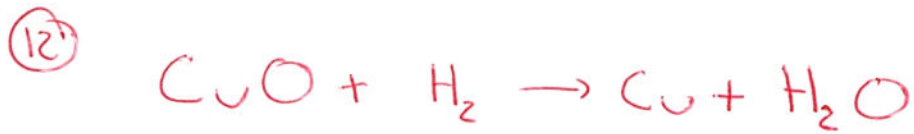
theoretical

$$\% \text{ Yield} = \frac{21.0 \text{ g Mg(OH)}_2}{24.2 \text{ g Mg(OH)}_2} \times 100 = \boxed{86.66\%}$$

$$\text{c) } 24 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.3 \text{ g Mg}} \times \frac{1 \text{ mol Mg(OH)}_2}{1 \text{ mol Mg}} \times \frac{58.3 \text{ g Mg(OH)}_2}{1 \text{ mol Mg(OH)}_2} = \boxed{57.6 \text{ g Mg(OH)}_2}$$

theoretical

$$0.95 = \frac{\text{actual}}{57.6 \text{ g Mg(OH)}_2} = \boxed{54.72 \text{ g Mg(OH)}_2}$$



a) $19.9 \text{ g CuO} \times \frac{1 \text{ mol CuO}}{79.5 \text{ g CuO}} \times \frac{1 \text{ mol Cu}}{1 \text{ mol CuO}} \times \frac{63.5 \text{ g Cu}}{1 \text{ mol Cu}} = \boxed{15.9 \text{ g Cu}}$
Limiting: CuO

b) $2.02 \text{ g H}_2 \times \frac{1 \text{ mol H}_2}{2.0 \text{ g H}_2} \times \frac{1 \text{ mol Cu}}{1 \text{ mol H}_2} \times \frac{63.5 \text{ g Cu}}{1 \text{ mol Cu}} = \boxed{64.1 \text{ g Cu}}$
Excess: H₂

% Yield = $\frac{15.0 \text{ g Cu}}{15.9 \text{ g Cu}} \times 100 = \boxed{94.33\%}$

c) $20.6 \text{ g CuO} \times \frac{1 \text{ mol CuO}}{79.5 \text{ g CuO}} \times \frac{1 \text{ mol Cu}}{1 \text{ mol CuO}} \times \frac{63.5 \text{ g Cu}}{1 \text{ mol Cu}} = \boxed{16.5 \text{ g Cu}}$
theoretical

$0.910 = \frac{\text{actual}}{16.5 \text{ g Cu}}$ actual = $\boxed{15.02 \text{ g Cu}}$