

$$1) 3.7 \text{ mol Al}_2\text{O}_3 \times \frac{4 \text{ mol Al}}{2 \text{ mol Al}_2\text{O}_3} = \boxed{7.4 \text{ mol Al}}$$

$$2) a) 5 \text{ g CaC}_2 \times \frac{\text{mol CaC}_2}{64.6 \text{ g CaC}_2} \times \frac{1 \text{ mol C}_2\text{H}_2}{1 \text{ mol CaC}_2} \times \frac{26 \text{ g C}_2\text{H}_2}{\text{mol C}_2\text{H}_2} = \boxed{2.02 \text{ g C}_2\text{H}_2}$$

$$b) 4 \text{ g H}_2\text{O} \times \frac{\text{mol H}_2\text{O}}{18 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol CaC}_2}{2 \text{ mol H}_2\text{O}} = \boxed{1.36 \text{ mol CaC}_2}$$

$$3) 2.7 \text{ mol C}_2\text{H}_4 \times \frac{3 \text{ mol O}_2}{\text{mol C}_2\text{H}_4} = 8.1 \text{ mol O}_2 \text{ Needed}$$

$\boxed{\text{O}_2 \text{ is limiting}}$

$$4) a) 5 \text{ g Mg} \times \frac{\text{mol Mg}}{24.3 \text{ g Mg}} \times \frac{2 \text{ mol HCl}}{1 \text{ mol Mg}} \times \frac{36.5 \text{ g HCl}}{\text{mol HCl}} = 15 \text{ g HCl Needed}$$

$$b) 6 \text{ g HCl} \times \frac{\text{mol HCl}}{36.5 \text{ g HCl}} \times \frac{1 \text{ mol MgCl}_2}{2 \text{ mol HCl}} \times \frac{95.3 \text{ g MgCl}_2}{\text{mol MgCl}_2} = \boxed{7.8 \text{ g MgCl}_2}$$

only have 6g \therefore HCl limiting

$$5) \frac{7}{8.5} \times 100 = \boxed{82\%}$$

$$6) 1.87 \text{ g Al} \times \frac{\text{mol Al}}{27 \text{ g Al}} \times \frac{3 \text{ mol Cu}}{2 \text{ mol Al}} \times \frac{63.5 \text{ g Cu}}{\text{mol Cu}} = 6.6 \text{ g Cu}$$

$$\% \text{ Yield} \Rightarrow \frac{4.65}{6.6} \times 100 = \boxed{70.4\%}$$