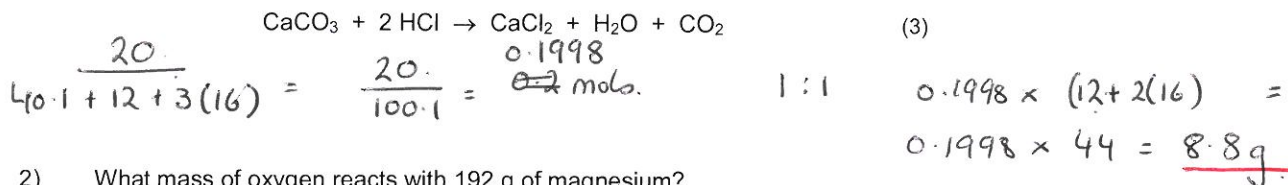
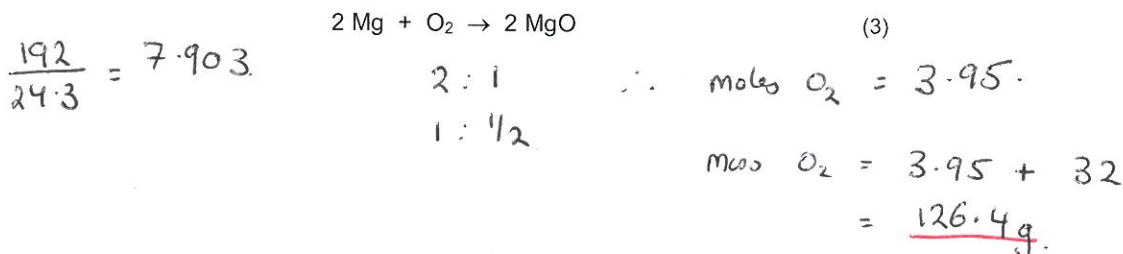


## Moles – Reacting mass calculations

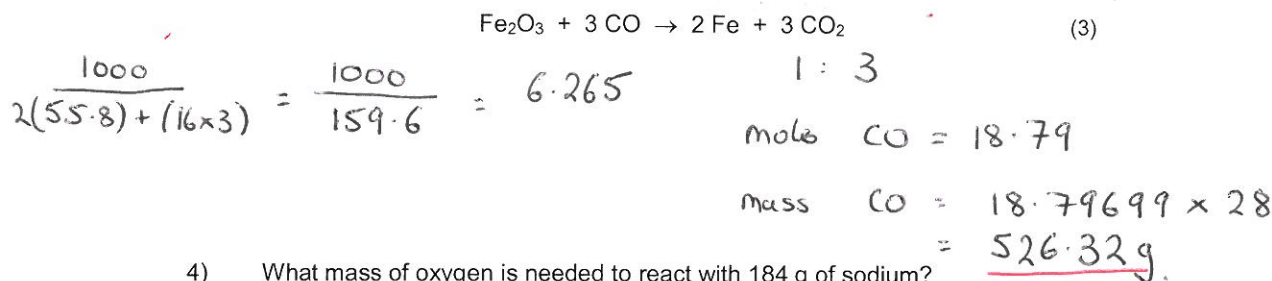
- 1) What mass of carbon dioxide is formed when 20 g of calcium carbonate reacts with hydrochloric acid?



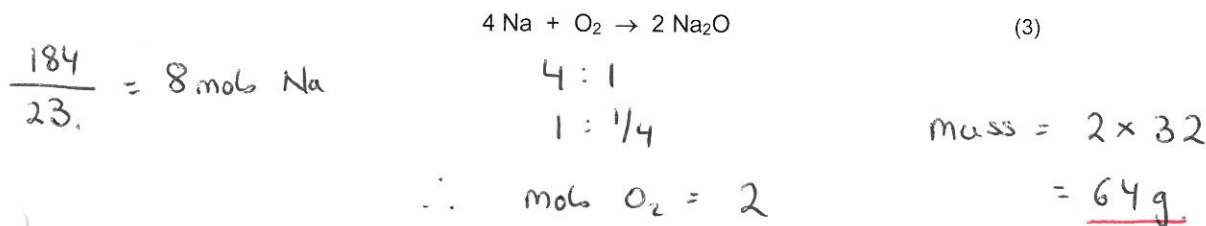
- 2) What mass of oxygen reacts with 192 g of magnesium?



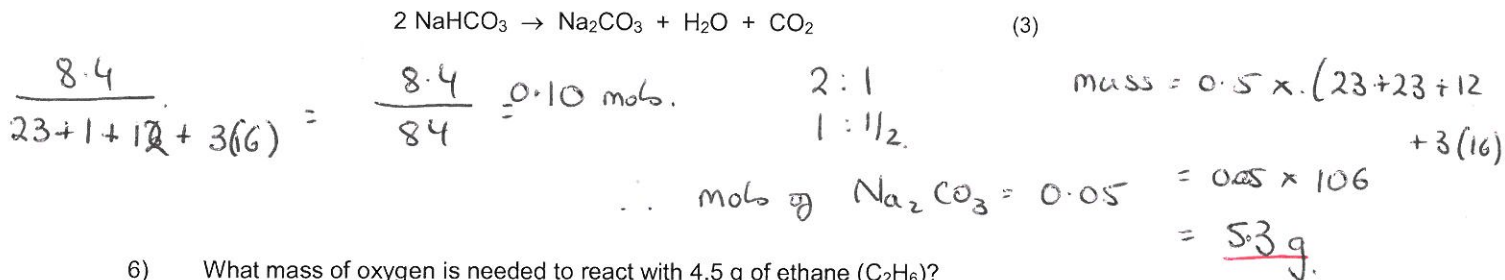
- 3) What mass of carbon monoxide is needed to react with 1 kg of iron oxide?



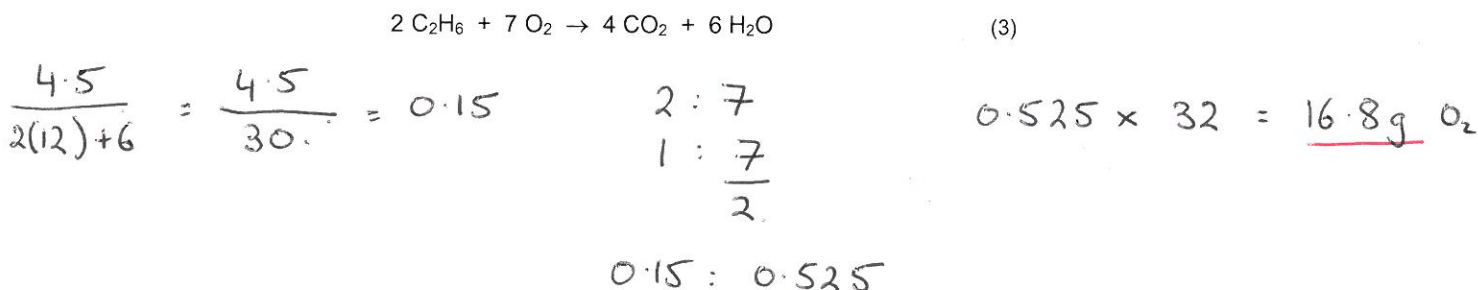
- 4) What mass of oxygen is needed to react with 184 g of sodium?



- 5) What mass of sodium carbonate is formed when 8.4 g of sodium hydrogencarbonate (NaHCO<sub>3</sub>) is decomposed by heat?



- 6) What mass of oxygen is needed to react with 4.5 g of ethane (C<sub>2</sub>H<sub>6</sub>)?



7) What mass of ammonia is made when 5.6 g of nitrogen reacts with excess hydrogen?

$$\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3 \quad (3)$$

$\frac{5.6}{28} = 0.2$   
 $1:3:2$   
 $0.2:0.6$   
 $0.4$   
 $0.4 \times (17) = \underline{6.8 \text{ g}}$

8) What mass of sulphur dioxide is formed from 96 g of sulphur trioxide?

$$2 \text{SO}_3 \rightarrow 2 \text{SO}_2 + \text{O}_2 \quad (3)$$

$\frac{96}{80.1} = 1.198$   
 $2:2$   
 $\text{mass} = \underline{76.8 \text{ g}}$

9) What mass of potassium oxide is formed when 9.75 g of potassium is burned in oxygen?

$$4 \text{K} + \text{O}_2 \rightarrow 2 \text{K}_2\text{O} \quad (3)$$

$\frac{9.75}{39.1} = 0.249$   
 $4:2$   
 $1:1/2$   
 $\text{K}_2\text{O} = 0.1246$   
 $= 0.1246 \times (39.1 + 39.1 + 16)$   
 $= \underline{11.74 \text{ g}}$

10) What mass of hydrogen is formed when 0.2 g of calcium reacts with hydrochloric acid?

$$\text{Ca} + 2 \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2 \quad (3)$$

$\frac{0.2}{40.1} = 0.0049$   
 $\text{Ca}:\text{H}_2$   
 $1:1$   
 $\text{mass H}_2 = 0.00498 \times 2 = \underline{0.0099 \text{ g}}$   
 $= 0.01 \text{ g}$

11) What mass of sodium is needed to reduce 1 kg of titanium chloride?

$$\text{TiCl}_4 + 4 \text{Na} \rightarrow \text{Ti} + 4 \text{NaCl} \quad (3)$$

$\frac{1000}{47.9 + 4(35.5)} = \frac{1000}{189.9} = 5.266$   
 $1:4$   
 $5.266 \times 23 = \underline{484.46 \text{ g}}$

12) What mass of carbon monoxide is needed to reduce 1 kg of iron oxide to iron?

$$\text{Fe}_2\text{O}_3 + 3 \text{CO} \rightarrow 2 \text{Fe} + 3 \text{CO}_2 \quad (3)$$

$\frac{1000}{189.9} = \frac{6265}{5.265}$   
 $1:3$   
 $6265:18796$   
 $5.265:15.797$   
 $15.797 \times 28 = \underline{520.3 \text{ g}}$

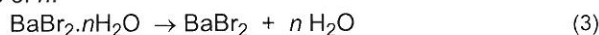
AS Q3

13) What mass of oxygen is needed to burn 110 g of propane (C<sub>3</sub>H<sub>8</sub>)?

$$\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O} \quad (3)$$

$\frac{110}{3(12)+8} = \frac{110}{44} = 2.5$   
 $1:5$   
 $2.5:12.5$   
 $12.5 \times 32 = \underline{400 \text{ g}}$

14) 4.17 g of hydrated barium bromide crystals (BaBr<sub>2</sub>·nH<sub>2</sub>O) gave 3.72 g of anhydrous barium bromide on heating to constant mass. Work out the relative molecular mass (M<sub>r</sub>) of the hydrated barium bromide and the value of n.



$\text{BaBr}_2$        $\text{H}_2\text{O}$   
 $3.72$        $(4.17 - 3.72) = 0.45$   
 $n = \underline{2}$        $\text{BaBr}_2 \cdot 2\text{H}_2\text{O}$

RMM    296.8      18

No. moles    0.0125      0.025

% smallest    1      2