

## Calculations from Equations

- ① what mass of calcium oxide could be obtained by heating 25g of Limestone,  $\text{CaCO}_3$ ?



$$\frac{25}{100} = 0.25 \text{ moles of } \text{CaCO}_3 \quad 0.25 \times 56 = \underline{\underline{14g}}$$

- ② In the blast furnace, haematite  $\text{Fe}_2\text{O}_3$  is converted to iron



what mass of iron can be obtained from 16 tonnes of iron oxide?

$$\text{Fe}_2\text{O}_3 = 160$$

$$\frac{16}{160} = 0.1 \text{ moles} \times 2 = 0.2 \text{ moles of Fe.}$$

$$0.2 \times 56 = 11.2 \text{ tonnes.}$$

- ③ what mass of nitric acid can be produced from 1 tonne of nitrogen gas?



$$\frac{1}{28} = 0.036 \text{ moles of } \text{N}_2$$

$$0.036 \times 2 = 0.072 \text{ moles of } \text{HNO}_3$$

$$0.072 \times 63 = 4.536 \text{ tonnes}$$



- ④ Titanium is manufactured by heating titanium(IV) chloride with sodium



what mass of sodium is required to produce 1 tonne of titanium?

~~$$\frac{1}{48} = 0.021 \text{ moles of Ti}$$~~

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$$\times 4 = 0.83 \text{ moles of Na}$$

$$0.83 \times 23 = \underline{\underline{1.916 \text{ tonnes}}}$$

- ⑤ 2.67g of aluminium chloride was dissolved in water and an excess of silver nitrate solution was added to give a precipitate of silver chloride:



what mass of silver chloride precipitate would be formed?

$$\frac{2.67}{133.5} = 0.02 \text{ moles of AlCl}_3 \times 3 = 0.06 \text{ moles of AgCl}$$

~~$$0.06 \times 143.5 = 8.61 \text{ g}$$~~

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- ⑥ Calcium hydroxide is manufactured by heating calcium carbonate strongly to produce calcium oxide, and then adding a controlled amount of water to produce calcium hydroxide:



a) what mass of water would you need to add to calcium oxide to produce <sup>from</sup> 1 tonne of calcium carbonate?

b) what mass of calcium hydroxide would you ultimately produce from 1 ~~tonne~~ tonne of calcium carbonate?

$$\frac{1}{100} = 0.01 \text{ moles of CaCO}_3 \quad 0.01 \times 18 = 0.18 \text{ tonnes of H}_2\text{O}$$

$$\text{b) } 0.01 \times 74 = \underline{\underline{0.74 \text{ tonnes}}}$$