Marks

- Balance the following equation: **2**

$$Fe_2O_3(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$$

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

- Calculate the mass of sodium hydroxide required to make 500 mL of a 0.200 M aqueous solution. **6**

The number of moles in a solution is given by

number of moles = concentration (in M) × volume (in L)

The solution contains 0.2 × 500/1000 = 0.1 moles of NaOH.

The molar mass of NaOH is 22.99 (Na) + 16.00 (O) + 1.01 = 40.00 g mol^{-1}.

The mass of NaOH required is 0.1 × 40.00 = 4.00 g

Answer: **4.00 g**

What volume of the above solution would be required to neutralise 50.0 mL of 0.100 M hydrochloric acid solution?

The neutralization is a 1:1 reaction:

$HCl + NaOH \rightarrow NaCl + H_2O$

50.0 mL of 0.1000 HCl contains 0.1 × 50/1000 = 0.005 moles

The volume is given by

volume (in L) = number of moles (in mol) / concentration

The volume of the 0.200 M NaOH containing 0.005 moles is therefore:

volume = 0.005 / 0.200 = 0.025 L or 25 mL

Answer: **25.0 mL**