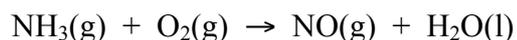
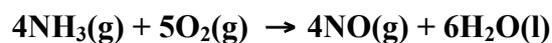


- Balance the following equation:



Marks
3



Calculate the mass of NH_3 required to produce 140. g of water.

The molar mass of H_2O is:

$$\text{molar mass} = [2 \times 1.008 (\text{H}) + 16.00 (\text{O})] \text{ g mol}^{-1} = 18.016 \text{ g mol}^{-1}$$

Hence, the number of moles of water produced is:

$$\text{number of moles} = \text{mass} / \text{molar mass} = (140. \text{ g}) / (18.016 \text{ g mol}^{-1}) = 7.771 \text{ mol}$$

From the balanced equation, 4 mol of NH_3 will produce 6 mol of H_2O . Hence, to produce 7.771 mol of H_2O so:

$$\text{number of moles of } \text{NH}_3 = (4/6) \times 7.771 \text{ mol} = 5.18 \text{ mol}$$

The molar mass of NH_3 is:

$$\text{molar mass} = [14.01 (\text{N}) + 3 \times 1.008 (\text{H})] \text{ g mol}^{-1} = 17.034 \text{ g mol}^{-1}$$

The mass of NH_3 in 5.18 mol is therefore:

$$\text{mass} = \text{number of moles} \times \text{molar mass} = (5.18 \text{ mol}) \times (17.034 \text{ g mol}^{-1}) = 88.2 \text{ g}$$

Answer: **88.2 g**