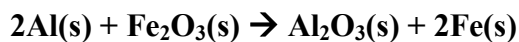


- Aluminium acts as a reducing agent in the thermite reaction where Fe_2O_3 is reduced to metallic iron. Write a balanced equation for the thermite reaction.

Marks
4

What is the maximum theoretical mass of Fe that can be produced when 270 g of Al reacts with excess Fe_2O_3 in the thermite reaction?

The number of moles of aluminium is given by

$$\text{number of moles} = \text{mass (in g)} / \text{atomic mass}$$

The atomic mass of Al is 26.98 g mol^{-1} so 270 g corresponds to $270 / 26.98 = 10.0$ mol.

The chemical equation shows that two moles of Al produce two moles of Fe (or 1 mole produces 1 mole). The maximum yield of Fe is there 10.0 mol.

The mass of iron is given by

$$\text{mass (in g)} = \text{number of moles} \times \text{atomic mass}$$

The atomic mass of Fe is 55.85 g mol^{-1} so 10 mol of iron corresponds to

$$\text{mass of iron} = 10.0 \times 55.85 = 560 \text{ g}$$

Answer: 560 g