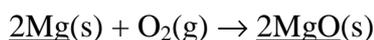


Reacting masses problems 1

Worked example (this looks tricky, but it's straightforward if you follow it carefully)

What mass of magnesium oxide is formed by the complete combustion of 12g of magnesium?

Write down the balanced symbol equation if it is not given, and underline the substances mentioned in the question:



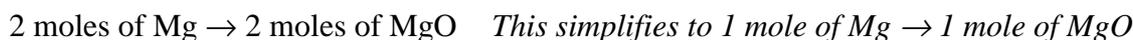
Write down the relative atomic masses of each element needed by the question, and work out the relative formula mass of any compound needed:

$$A_r(\text{Mg}) = 24 \quad A_r(\text{O}) = 16 \quad \therefore M_r(\text{MgO}) = 24 + 16 = 40$$

Work out the number of moles of the substance in the question for which you have mass, volume or concentration information:

$$\text{number of moles of magnesium} = \frac{\text{mass of magnesium}}{A_r \text{ of magnesium}} = \frac{12}{24} = 0.5 \text{ mol}$$

Work out the stoichiometry between the substances underlined in the equation (in other words, how many moles of one gives how many moles of the other):



Work out how many moles of the other substance must be involved:

If 1 mole of Mg gives 1 mole of MgO, 0.5 mol of Mg must give 0.5 mol of MgO

Finally, work out the mass (or, volume or concentration if asked for in the question):

$$\text{mass of magnesium oxide} = \text{number of moles of MgO} \times M_r(\text{MgO}) = 0.5 \times 40 = 20\text{g}$$

Therefore, 20g of magnesium oxide is formed from 12g of magnesium.

1. What mass of magnesium oxide is formed by the complete combustion of 6g of magnesium?
2. Carbon reacts with oxygen to form carbon dioxide according to the following equation:
$$\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$$

What mass of carbon dioxide is formed by the complete combustion of 12g of carbon?
3. Sulphur burns in air to form sulphur dioxide: $\text{S}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$
 - a) Work out the mass of sulphur that must be burned to produce 64g of sulphur dioxide.
 - b) How much sulphur must be burned to produce 8g of sulphur dioxide?
4. Copper(II) oxide can be reduced by hydrogen: $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{g})$
What mass of copper can be obtained from 15.9g of copper(II) oxide?
5. Iron reacts with sulphur to form iron(II) sulphide: $\text{Fe}(\text{s}) + \text{S}(\text{s}) \rightarrow \text{FeS}(\text{s})$
How much iron would be needed to make 4.4g of iron(II) sulphide?