

Quantitative Chemistry – GCSE Combined Science Chemistry

1. **No.2.7**

100 cm³ of the copper sulfate solution contains 1.8 g of copper sulfate.

Calculate the mass of copper sulfate in 25 cm³ of this copper sulfate solution.

[2 marks]

Mass = _____ g

2. **No.3.6**

3.94 g of gold reacts with chlorine to produce 6.07 g of gold chloride.

The word equation for the reaction is:

gold + chlorine → gold chloride

Calculate the mass of chlorine that reacts with 3.94 g of gold.

[1 mark]

Mass = _____ g

3. No.3.7

Calculate the relative formula mass (M_r) of gold chloride (AuCl_3).

Relative atomic masses (A_r): Cl = 35.5 Au = 197

[2 marks]

Relative formula mass (M_r) = _____

4. No.5.7

A copper sulfate solution contained 0.100 moles of copper sulfate dissolved in 0.500 dm^3 of water.

Calculate the mass of copper sulfate in 30.0 cm^3 of this solution.

Relative formula mass (M_r): $\text{CuSO}_4 = 159.5$

[4 marks]

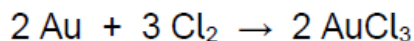
Mass = _____ g

5. No.6.3

Gold reacts with the elements in Group 7 of the periodic table.

0.175 g of gold reacts with chlorine.

The equation for the reaction is:



Calculate the mass of chlorine needed to react with 0.175 g of gold.

Give your answer in mg

Relative atomic masses (A_r): Cl = 35.5 Au = 197

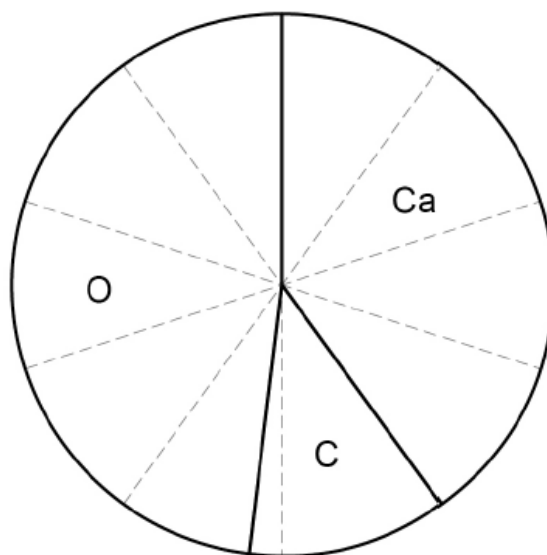
[5 marks]

Mass of chlorine = _____ mg

6. No.5.2

Figure 4 shows the percentage by mass of the elements calcium, carbon and oxygen in calcium carbonate.

Figure 4



What is the percentage by mass of calcium in calcium carbonate?

[1 mark]

Percentage = _____ %

7. No.5.3

At high temperature, sodium nitrate decomposes into sodium nitrite and oxygen.

A student heats three samples of sodium nitrate.

The mass of each sample was 4.50 g

The mass of solid after heating was recorded.

Table 2 shows the mass of solid after heating in each experiment.

Table 2

Experiment	Mass of solid after heating in g
1	3.76
2	3.98
3	4.09

Calculate the mean mass of solid after heating.

Give your answer to 3 significant figures.

[3 marks]

Mean mass of solid after heating = _____ g

8. No.6.5

A solution of hydrochloric acid contains 3.2 g of hydrogen chloride in 50 cm^3

Calculate the concentration of hydrogen chloride in g per dm^3

[3 marks]

Concentration = _____ g per dm^3

9. No.7.5

Calculate the percentage by mass of oxygen in ammonium nitrate (NH_4NO_3).

Relative atomic masses (A_r): H = 1 N = 14 O = 16

Relative formula mass (M_r): $\text{NH}_4\text{NO}_3 = 80$

[3 marks]

Percentage by mass of oxygen = _____ %

10. No.1.5

A solution of hydrochloric acid contains 3.2 g of hydrogen chloride in 50 cm³

Calculate the concentration of hydrogen chloride in g per dm³

[3 marks]

Concentration = _____ g per dm³

11. No.2.5

Calculate the percentage by mass of oxygen in ammonium nitrate (NH₄NO₃).

Relative atomic masses (A_r): H = 1 N = 14 O = 16

Relative formula mass (M_r): NH₄NO₃ = 80

[3 marks]

Percentage by mass of oxygen = _____ %

12. No.4.6

How many atoms are there in 1 g of argon?

The Avogadro constant is 6.02×10^{23} per mole.

Relative atomic mass (A_r): Ar = 40

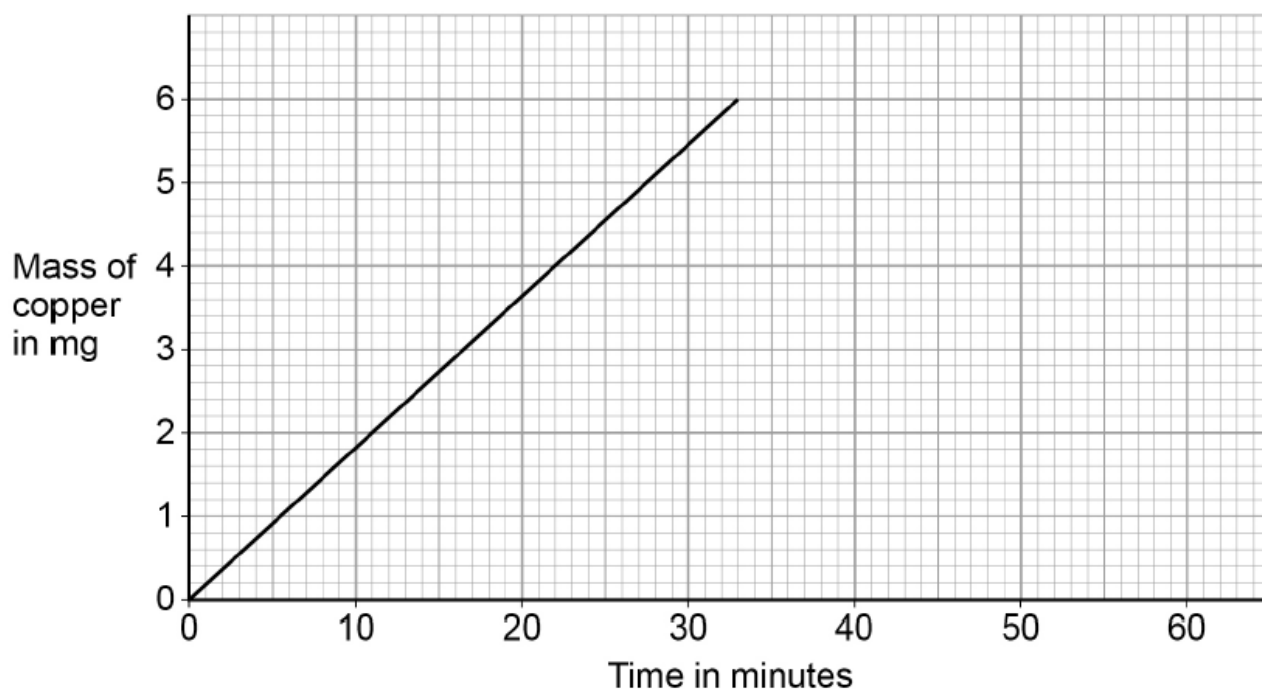
[2 marks]

Number of atoms in 1 g = _____

13. No.5.5

Figure 5 shows the expected mass of copper produced each minute.

Figure 5



Determine the expected mass of copper after 24 hours.

Use **Figure 5**.

[3 marks]

Mass = _____ mg

14. No.5.7

Calculate the gradient of the line in **Figure 6**.

Give the unit.

[3 marks]

Gradient _____

Unit _____