

GCSE Combined Science: Trilogy

Worksheet: Relative formula mass

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Relative formula mass

NAME _____	CLASS _____	DATE _____
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Relative atomic masses (A_r): H = 1, C = 12, N = 14, O = 16, Na = 23, S = 32

0 1 . 1

Which compound has the greatest relative formula mass (M_r)?

Tick (✓) **one** box.

Sodium hydroxide, NaOH

☐

Sodium carbonate, Na₂CO₃

☐

Sodium sulfate, Na₂SO₄

☐

Sodium nitrate, NaNO₃

☐

[1 mark]

0 1 . 2

Calculate the relative formula mass (M_r) of urea, CO(NH₂)₂.

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.....

.....

.....

M_r =

[2 marks]

0 1 . 3

State the units of relative formula mass.

.....

.....

[1 mark]

0 2

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

0 2 . 1

Calculate the relative formula mass (M_r) of water, H_2O .

.....

.....

.....

.....

$M_r =$

[2 marks]

0 2 . 2

How many atoms in total are shown in the formula H_2O ?

.....

.....

.....

Number of atoms =

[1 mark]

0 3

Relative atomic masses (A_r): O = 16, Na = 23

0 3 . 1

Calculate the relative formula mass (M_r) of sodium oxide, Na_2O .

.....

.....

.....

.....

M_r =

[2 marks]

0 3 . 2

How many atoms in total are shown in the formula Na_2O ?

.....

.....

.....

Number of atoms =

[1 mark]

0 4

Relative atomic masses (A_r): H = 1, C = 12, N = 14, O = 16, Na = 23, Cl = 35.5

0 4 . 1

What is the relative formula mass (M_r) of water, H_2O ?

Tick (✓) **one** box.

17

18

19

33

☐

☐

☐

☐

[1 mark]

0 4 . 2

Calculate the relative formula mass (M_r) of sodium chloride, NaCl.

.....

.....

.....

$M_r =$

[1 mark]

0 4 . 3

Calculate the relative formula mass (M_r) of ammonia, NH_3 .

.....

.....

.....

$M_r =$

[1 mark]

0 4 . 4

Calculate the relative formula mass (M_r) of carbon dioxide, CO_2 .

.....

.....

.....

$M_r =$

[1 mark]

0 5

Relative atomic masses (A_r): H = 1, O = 16, Ca = 40

0 5 . 1

Calculate the percentage by mass of oxygen in calcium hydroxide, $\text{Ca}(\text{OH})_2$.
Give your answer to 3 significant figures.

.....

.....

.....

.....

.....

Percentage of oxygen = %

[3 marks]

0 6

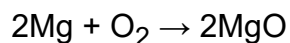
In a balanced equation, the sum of the relative formula masses of the reactants in the quantities shown equals the sum of the relative formula masses of the products in the quantities shown.

Table 1

Substance	Relative formula mass (M_r)
CuO	79.5
HCl	36.5
H ₂ O	18

0 6 . 1

Magnesium burns in oxygen:



Relative atomic masses (A_r): O = 16, Mg = 24

Show that the total relative formula mass of the reactants is equal to the total relative formula mass of the products.

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.....

.....

[2 marks]

0 6 . 2

Copper(II) oxide reacts with hydrochloric acid:

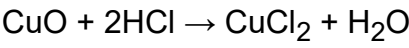


Table 1 shows the relative formula masses of three of the substances.
Use the equation and Table 1 to calculate the relative formula mass of copper(II) chloride, CuCl_2 .

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.....

M_r of CuCl_2 =

[2 marks]

0 6 . 3

Explain why the total relative formula masses of the reactants and of the products are equal in a balanced equation.

.....

.....

[1 mark]

0 7

Paracetamol has the formula $\text{C}_8\text{H}_9\text{NO}_2$.
Relative atomic masses (A_r): H = 1, C = 12, N = 14, O = 16

0 7 . 1

Calculate the relative formula mass (M_r) of paracetamol.

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.....

.....

M_r =

[1 mark]

0 7 . 2

Calculate the percentage by mass of oxygen in paracetamol.
Give your answer to 3 significant figures.

.....

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.....

.....

Percentage of oxygen = %

[2 marks]

0 7 . 3

A tablet contains 500 mg of paracetamol.
Calculate the mass of nitrogen in the tablet.
Give your answer to 3 significant figures.

.....

.....

.....

.....

Mass of nitrogen = mg

[2 marks]

0 7 . 4

Explain why the percentage by mass of paracetamol in a tablet can be different for different brands, but the percentage by mass of nitrogen in paracetamol is always the same.

.....

.....

.....

.....

[2 marks]

.....

0 8

Relative atomic masses (A_r): Al = 27, Cl = 35.5

0 8 . 1

Calculate the percentage by mass of chlorine in aluminium chloride, AlCl_3 .
Give your answer to 3 significant figures.

.....

.....

.....

.....

.....

Percentage of chlorine = %

[3 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Relative formula mass · 32 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: Sodium sulfate, Na_2SO_4

01.2 [2 marks]

Answer: 60

- $12 + 16 + 2 \times (14 + 1 + 1)$ (1)
 - 60 (1)
-

01.3 [1 mark]

- relative formula mass has no units (1)

Notes: Allow 'it is a ratio / relative quantity'.

Question 2 (3 marks)

02.1 [2 marks]

Answer: 18

- $(2 \times 1) + 16$ (1)
 - 18 (1)
-

02.2 [1 mark]

Answer: 3

- 3 (1)
-

Question 3 (3 marks)

03.1 [2 marks]

Answer: 62

- $(2 \times 23) + 16$ (1)
- 62 (1)

03.2 [1 mark]

Answer: 3

- 3 (1)
-

Question 4 (4 marks)

04.1 [1 mark]

Correct: 18

04.2 [1 mark]

Answer: 58.5

- 58.5 (1)

04.3 [1 mark]

Answer: 17

- 17 (1)

04.4 [1 mark]

Answer: 44

- 44 (1)
-

Question 5 (3 marks)

05.1 [3 marks]

Answer: 43.2%

- M_r of $\text{Ca}(\text{OH})_2 = 74$ (1)
- $(32 \div 74) \times 100$ (1)
- 43.2 (%) (1)

Notes: An answer that is correct but not given to 3 significant figures scores one mark fewer.

Question 6 (5 marks)

06.1 [2 marks]

- reactants: $(2 \times 24) + (2 \times 16) = 80$ (1)
 - products: $2 \times (24 + 16) = 80$ (1)
-

06.2 [2 marks]

Answer: 134.5

- $79.5 + (2 \times 36.5) = 152.5$ (1)
- $152.5 - 18 = 134.5$ (1)

Notes: Allow a correct answer calculated from relative atomic masses ($63.5 + 2 \times 35.5$) for 2 marks.

06.3 [1 mark]

- no atoms are lost or made / the same atoms are on both sides of the equation, just rearranged (1)
-

Question 7 (7 marks)

07.1 [1 mark]

Answer: 151

- 151 (1)

07.2 [2 marks]

Answer: 21.2%

- $(32 \div 151) \times 100$ (1)
- 21.2 (%) (1)

Notes: An answer that is correct but not given to 3 significant figures scores one mark fewer.

07.3 [2 marks]

Answer: 46.4 mg

- $(14 \div 151) \times 500$ (1)
- 46.4 (mg) (1)

Notes: An answer that is correct but not given to 3 significant figures scores one mark fewer.

07.4 [2 marks]

- the percentage of nitrogen in paracetamol is fixed by its formula, so it is the same in every sample of (pure) paracetamol (1)
- the percentage of paracetamol in a tablet depends on how much of the other ingredients (fillers) each manufacturer adds (1)

Question 8 (3 marks)

08.1 [3 marks]

Answer: 79.8%

- M_r of $\text{AlCl}_3 = 133.5$ (1)
- $(106.5 \div 133.5) \times 100$ (1)
- 79.8 (%) (1)

Notes: An answer that is correct but not given to 3 significant figures scores one mark fewer.
