

GCSE Chemistry

Worksheet: Concentration of solutions

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Concentration of solutions

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

concentration in g/dm^3 = mass of solute in g $\div$ volume of solution in dm^3

0 1 . 1

A student dissolves 160 g of potassium nitrate in water to make 2 dm^3 of solution.

Calculate the concentration of the solution in g/dm^3 .

.....

.....

.....

.....

Concentration = g/dm^3

[2 marks]

0 2

The concentration of a solution can be calculated using the equation:

concentration in g/dm^3 = mass of solute in g $\div$ volume of solution in dm^3

0 2 . 1

A student dissolved 12 g of sodium chloride in water to make 0.50 dm^3 of solution.

Calculate the concentration of the solution.

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.....

.....

.....

Concentration = g/dm^3

[2 marks]

0 2 . 2

How many cm^3 are there in 1 dm^3 ?

.....

.....

.....

.....
[1 mark]

0 2 . 3

Calculate the mass of solute in 2.0 dm^3 of a solution with a concentration of 15 g/dm^3 .

.....

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.....

Mass = g

[2 marks]

0 3

Many chemical reactions take place in solutions. The concentration of a solution can be measured in g/dm^3 .

0 3 . 1

A student dissolved 5.0 g of copper sulfate in water to make 250 cm^3 of solution. Calculate the concentration of the solution in g/dm^3 .

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.....

.....

.....

Concentration = g/dm^3

[2 marks]

0 3 . 2

Calculate the mass of sodium hydroxide in 25.0 cm^3 of a solution with a concentration of 40 g/dm^3 .

.....

.....

.....

.....

Mass = g

[2 marks]

0 3 . 3

A student needs 3.0 g of potassium nitrate. The student has a solution of potassium nitrate with a concentration of 60 g/dm³.

Calculate the volume of solution, in cm³, that contains 3.0 g of potassium nitrate.

.....

.....

.....

.....

Volume = cm³

[2 marks]

0 4

A student is making 250 cm³ of a solution of known, accurate concentration from a solid solute.

0 4 . 1

Name the piece of apparatus used to weigh the solid solute accurately.

.....

.....

.....

.....

[1 mark]

0 4 . 2

After the solute is dissolved in a small volume of water in a beaker, the solution is transferred to a 250 cm³ volumetric flask and made up to the mark.

Name the piece of apparatus that should be used to add the final few cm³ of water accurately.

.....

.....

.....

.....

[1 mark]

0 4 . 3

Explain why a volumetric flask, rather than a beaker, is used to make the solution up to its final volume.

.....

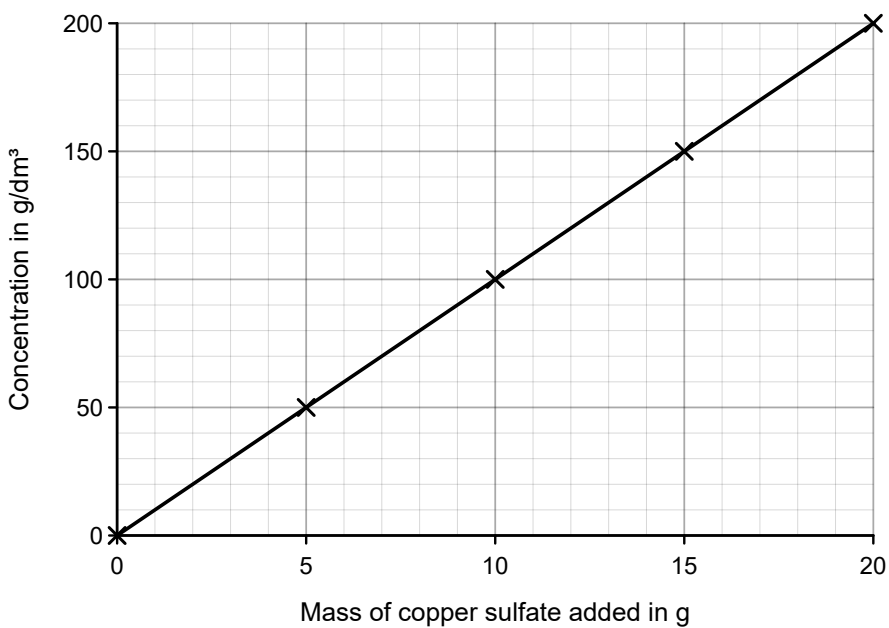
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[1 mark]

0 5

A technician made 100 cm³ of copper sulfate solution using different masses of copper sulfate. Figure 1 shows the concentration of the solution made from each mass.

Figure 1



0 5 . 1

Use Figure 1 to find the concentration of the solution made using 12 g of copper sulfate.

.....

.....

.....

Concentration = g/dm³

[1 mark]

0 5 . 2

Describe the relationship between the mass of copper sulfate added and the concentration of the solution, for this fixed volume.

.....

.....

.....

.....

[2 marks]

0 5 . 3

Calculate the concentration of a solution made using 7.5 g of copper sulfate in 100 cm³ of solution.

.....

.....

.....

.....

Concentration = g/dm³

[2 marks]

.....

0 6

A student found the concentration of a salt solution by evaporating the water.
The student:

- weighed an empty evaporating basin
- added 25.0 cm^3 of the salt solution to the basin
- heated the basin gently until all the water had evaporated
- weighed the basin and dry salt.

Table 1 shows the results.

Table 1

Measurement	Mass in g
Empty evaporating basin	45.12
Evaporating basin and dry salt	46.02

0 6 . 1

Calculate the mass of salt in 25.0 cm^3 of the solution.

.....

.....

.....

Mass = g

[1 mark]

0 6 . 2

Calculate the concentration of the salt solution in g/dm^3 .

.....

.....

.....

.....

Concentration = g/dm^3

[2 marks]

0 6 . 3

The student heated and reweighed the basin until the mass stopped changing.
Explain why.

.....

.....

[1 mark]

0 6 . 4

Calculate the mass of salt in 1.5 dm³ of this solution.

.....

.....

.....

Mass = g

[1 mark]

0 7

Solution A is made from 6 g of salt dissolved in water to make 200 cm³ of solution.
Solution B is made from 8 g of the same salt dissolved in water to make 400 cm³ of solution.

0 7 . 1

Calculate the concentration of solution A and of solution B, in g/dm³.

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.....

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.....

[2 marks]

0 7 . 2

A student says: ‘Solution B is more concentrated, because it contains more salt.’
Use your answers to evaluate this statement.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

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

Mark scheme

GCSE Chemistry · Worksheet: Concentration of solutions · 30 marks

Question 1 (2 marks)

01.1 [2 marks]

Answer: 80 g/dm^3

- $160 \div 2$ (1)
 - $80 \text{ (g/dm}^3\text{)}$ (1)
-

Question 2 (5 marks)

02.1 [2 marks]

Answer: 24 g/dm^3

- $12 \div 0.50$ (1)
 - $24 \text{ (g/dm}^3\text{)}$ (1)
-

02.2 [1 mark]

Answer: 1000

- 1000 (1)
-

02.3 [2 marks]

Answer: 30 g

- 15×2.0 (1)
 - 30 (g) (1)
-

Question 3 (6 marks)

03.1 [2 marks]

Answer: 20 g/dm^3

- $250 \text{ cm}^3 = 0.25 \text{ dm}^3$ (1)
- $5.0 \div 0.25 = 20 \text{ (g/dm}^3\text{)}$ (1)

Notes: An answer of 0.02 scores 1 mark.

03.2 [2 marks]

Answer: 1.0 g

- 40×0.0250 (1)
 - 1.0 (g) (1)
-

03.3 [2 marks]

Answer: 50 cm^3

- $3.0 \div 60 = 0.05 \text{ (dm}^3\text{)}$ (1)
 - 50 (cm^3) (1)
-

Question 4 (3 marks)

04.1 [1 mark]

Answer: (electronic) balance

- (electronic) balance (1)
-

04.2 [1 mark]

Answer: (dropping) pipette

- (dropping) pipette (1)
-

04.3 [1 mark]

- a volumetric flask measures one precise, accurate volume (marked with a single calibration line), whereas a beaker's scale is only approximate (1)
-

Question 5 (5 marks)

05.1 [1 mark]

Answer: 120 g/dm^3

- $120 \text{ (g/dm}^3\text{) (1)}$

05.2 [2 marks]

- the concentration is directly proportional to the mass added (the graph is a straight line through the origin) (1)
- doubling the mass added doubles the concentration (1)

05.3 [2 marks]

Answer: 75 g/dm^3

- $7.5 \div 0.100 \text{ (1)}$
- $75 \text{ (g/dm}^3\text{) (1)}$

Question 6 (5 marks)

06.1 [1 mark]

Answer: 0.90 g

- 0.90 (g) (1)

06.2 [2 marks]

Answer: 36 g/dm^3

- $25.0 \text{ cm}^3 = 0.0250 \text{ dm}^3 \text{ (1)}$
- $0.90 \div 0.0250 = 36 \text{ (g/dm}^3\text{) (1)}$

Notes: Allow ECF from part 1.

06.3 [1 mark]

- to make sure that all of the water had evaporated (so only salt was weighed) (1)

06.4 [1 mark]

Answer: 54 g

- 54 (g) (1)

Notes: Allow ECF from part 2.

Question 7 (4 marks)

07.1 [2 marks]

Answer: A: 30 g/dm^3 ; B: 20 g/dm^3

- A: $6 \div 0.200 = 30 \text{ (g/dm}^3\text{)} (1)$
 - B: $8 \div 0.400 = 20 \text{ (g/dm}^3\text{)} (1)$
-

07.2 [2 marks]

- solution A is more concentrated (30 g/dm^3 compared with 20 g/dm^3), so the student is wrong (1)
- B contains more salt, but it is dissolved in a larger (twice the) volume; concentration depends on the volume of solution as well as the mass of solute (1)

Notes: 'The student is wrong' on its own scores 0. Allow ECF from the concentrations calculated above.
