

GCSE Combined Science: Trilogy

Worksheet: Metals and non-metals

TIME 30 min	TOTAL 27 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Metals and non-metals

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

The elements in the periodic table can be classified as metals or non-metals.

0 1 . 1

Where are metals found in the periodic table?

Tick (✓) **one** box.

To the left and towards the bottom

☐

To the right and towards the top

☐

Only in Group 0

☐

Only in the first row

☐

[1 mark]

0 1 . 2

Complete the sentence.

Tick (✓) **one** box.

Metals are elements that react to form

negative ions

☐

positive ions

☐

shared pairs of electrons

☐

small molecules

☐

[1 mark]

0 1 . 3

Give **two** physical properties that are typical of metals.

[2 marks]

0 1 . 4

Are most elements metals or non-metals?

[1 mark]

0 2

Elements can be classified as metals or non-metals.

0 2 . 1

Approximately what fraction of the elements in the periodic table are metals?

Tick (✓) **one** box.

About a quarter

☐

About a half

☐

About three-quarters

☐

All of them

☐

[1 mark]

0 3

Table 1 shows some properties of four elements, **P**, **Q**, **R** and **S**.

Table 1

Element	Melting point in °C	Conducts electricity when solid?	Appearance at room temperature	What happens to its oxide
P	1538	yes	shiny grey solid	reacts with acids to form a salt
Q	115	no	dull yellow brittle solid	dissolves in water to form an acidic solution
R	-101	no	green gas	dissolves in water to form an acidic solution
S	98	yes	soft shiny solid	dissolves in water to form an alkaline solution

0 3 . 1

Give **two** pieces of evidence from Table 1 that element **S** is a metal, even though its melting point is low.

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[2 marks]

0 3 . 2

One other element in Table 1 is a metal.
Identify this element. Give a reason for your answer.

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[2 marks]

0 3 . 3

Give **one** property in Table 1 that shows element **Q** is a non-metal.

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[1 mark]

0 3 . 4

Describe how atoms of element **S** form ions.

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[2 marks]

0 4

Element **X** has a density of 1.85 g/cm^3 . In its compounds, X forms X^{2+} ions.

Element **Y** has a density of 3.5 g/cm^3 . Y does not form positive ions; it shares electrons to form covalent bonds.

0 4 . 1

Classify X and Y as metals or non-metals. Give a reason for each answer.

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[2 marks]

0 4 . 2

Explain why density alone is not a reliable way to decide whether an element is a metal.

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[2 marks]

0 5

Table 2 shows the electronic structures of four elements, **P**, **Q**, **R** and **S**.

Table 2

Element	Electronic structure
P	2,8,1
Q	2,8,6
R	2,8,3
S	2,8,7

0 5 . 1

Use the electronic structures to classify each element as a metal or a non-metal.

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[4 marks]

0 6

The way an element reacts depends on the arrangement of electrons in its atoms.

0 6 . 1

Explain, in terms of electronic structure, why the elements on the left-hand side of the periodic table are metals.

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[2 marks]

0 6 . 2

The electronic structure of aluminium is 2,8,3. Aluminium forms ions with a charge of 3+. Explain why.

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[2 marks]

0 6 . 3

The electronic structure of sulfur is 2,8,6. Sulfur is a non-metal. Predict the charge on a sulfide ion. Explain your answer.

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[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 Combined Science: Trilogy · Worksheet: Metals and non-metals · 27 marks

Question 1 (5 marks)

01.1 [1 mark]

Correct: To the left and towards the bottom

01.2 [1 mark]

Correct: positive ions

01.3 [2 marks]

Answer: e.g. good conductors of electricity; shiny

- good conductor of electricity (1)
- good conductor of heat / thermal energy (1)
- shiny (when freshly cut or polished) (1)
- malleable / can be hammered into shape (1)
- ductile / can be drawn into wires (1)
- high melting point (1)
- high density (1)
- sonorous (1)

Any 2 of the points above.

Notes: Ignore 'strong' and 'hard'.

01.4 [1 mark]

Answer: metals

- metals (1)
-

Question 2 (1 mark)

02.1 [1 mark]

Correct: About three-quarters

Question 3 (7 marks)

03.1 [2 marks]

Answer: It conducts electricity when solid; it is shiny; its oxide forms an alkaline solution.

- it conducts electricity (when solid) (1)
- it is shiny (1)
- its oxide forms an alkaline solution (1)

Any 2 of the points above.

03.2 [2 marks]

Answer: P; it conducts electricity when solid (it is shiny and its oxide reacts with acids to form a salt).

- P (1)
- it conducts electricity when solid / it is shiny / its oxide reacts with acids to form a salt (1)

Notes: The reason mark depends on P. Ignore 'high melting point' on its own.

03.3 [1 mark]

Answer: e.g. it does not conduct electricity

- does not conduct electricity (1)
- dull (1)
- brittle (1)
- its oxide forms an acidic solution (1)

Any 1 of the points above.

Notes: Ignore 'low melting point' on its own.

03.4 [2 marks]

Answer: They lose (outer) electrons to form positive ions.

- (atoms) lose (outer shell) electron(s) (1)
 - (to form) positive ions (1)
-

Question 4 (4 marks)

04.1 [2 marks]

Answer: X is a metal because it forms positive ions; Y is a non-metal because it does not form positive ions.

- X is a metal, because it forms positive ions (1)
- Y is a non-metal, because it does not form positive ions / it shares electrons (1)

04.2 [2 marks]

Answer: Y is a non-metal but has a higher density than the metal X; some metals have low densities.

- Y (a non-metal) has a higher density than X (a metal) (1)
- so densities of metals and non-metals overlap / some metals have low densities (e.g. Group 1 metals) (1)

Question 5 (4 marks)

05.1 [4 marks]

Answer: P: metal; Q: non-metal; R: metal; S: non-metal.

- P: metal (1)
- Q: non-metal (1)
- R: metal (1)
- S: non-metal (1)

Notes: Reasons are not required.

Question 6 (6 marks)

06.1 [2 marks]

Answer: Their atoms have only 1, 2 or 3 outer electrons, which they lose to form positive ions.

- (atoms have) few electrons in the outer shell / 1, 2 or 3 outer electrons (1)
- (so they) lose electrons to form positive ions (1)

06.2 [2 marks]

Answer: Each atom loses its 3 outer electrons, leaving a full outer shell (2,8).

- aluminium atoms lose 3 (outer) electrons (1)
- to get a full outer shell / the electronic structure of a noble gas / 2,8 (1)

06.3 [2 marks]

Answer: 2⁻; each sulfur atom gains 2 electrons to fill its outer shell (2,8,8).

- 2⁻ / -2 (1)
- sulfur atoms gain 2 electrons (to get a full outer shell / 2,8,8) (1)

Notes: The explanation mark can be awarded for 'gains 2 electrons' even if the charge is given as 2⁺.
