

APOLLO

The periodic table: Classification of elements

SL

Chemistry

First assessment 2025

14 questions | questions

14. Germanium has several stable oxidation states. Which row shows these species in order of increasing radius?

A. Ge^{4+} , Ge^{2+} , Ge , Ge^{4-} .

B. Ge^{4-} , Ge^{4+} , Ge^{2+} , Ge .

C. Ge , Ge^{4-} , Ge^{4+} , Ge^{2+} .

D. Ge^{2+} , Ge , Ge^{4-} , Ge^{4+} .

- 15.** Which statement explains the trend in first ionisation energy from sodium, Na, to chlorine, Cl?
- A. Nuclear charge increases.
 - B. Electronegativity decreases.
 - C. Atomic radius increases.
 - D. Shielding decreases.

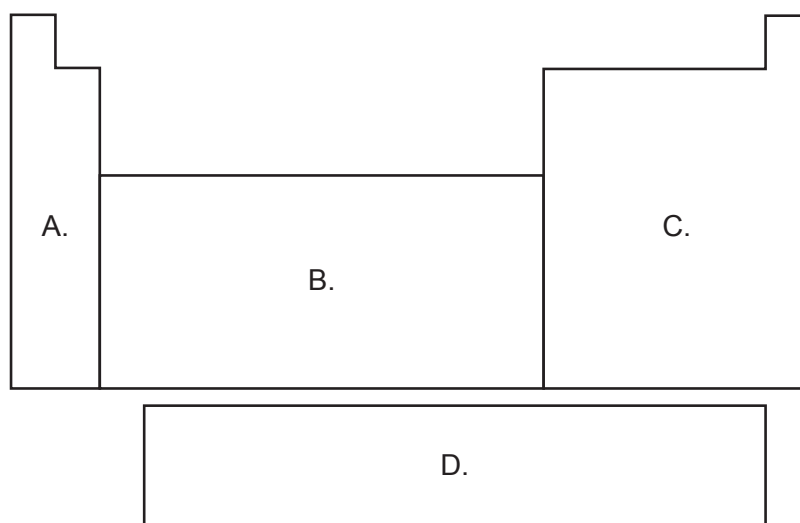
16. Which elements would react with each other most vigorously?

- A. K(s) and Br₂(g)
- B. K(s) and Cl₂(g)
- C. Na(s) and Br₂(g)
- D. Na(s) and Cl₂(g)

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11. Which label shows the d-block elements of the periodic table?



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- 12.** Why do group 17 elements have higher first ionization energies than group 1 elements in the same period?
- A. Group 17 elements have more electrons in the valence shell.
 - B. Group 17 elements have more filled energy levels.
 - C. Group 17 elements have more paired electrons.
 - D. Group 17 elements have more protons in the nucleus.

11. Which of these elements is in the f-block of the periodic table?

- A. Ra
- B. Lu
- C. Rf
- D. Nh

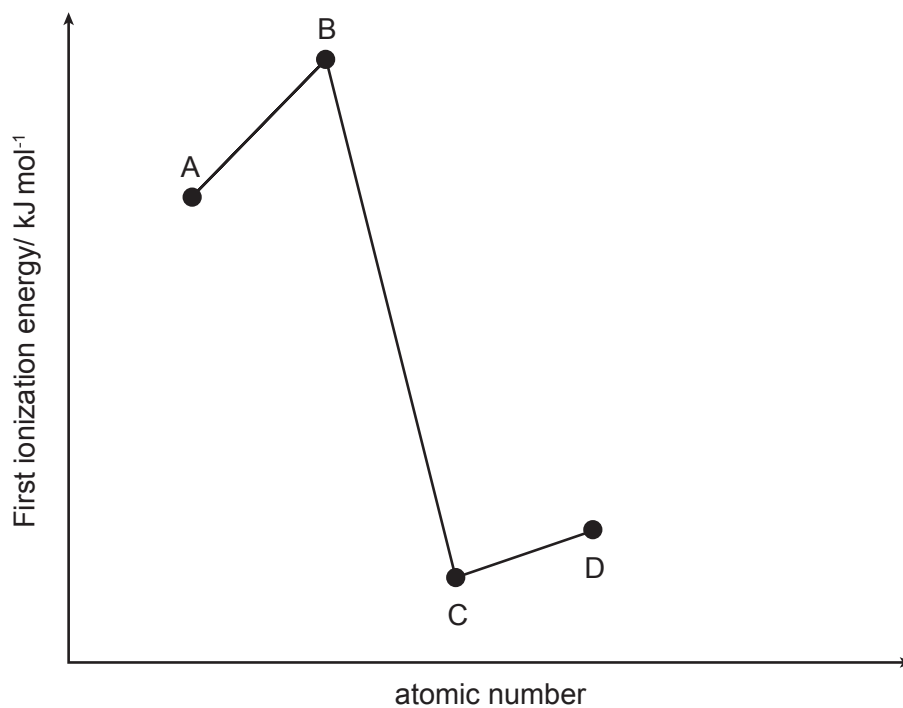
13. Which pair of elements would react with each other the least vigorously?

- A. Lithium and fluorine
- B. Lithium and iodine
- C. Caesium and fluorine
- D. Caesium and iodine

14. The relative values of the first ionization energies of four elements which have consecutive atomic numbers are shown.

An element X reacts with oxygen to form an acidic oxide.

Which element could be X?



11. Which element is a p-block metal?

- A. Sn
- B. Te
- C. Cd
- D. At

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13. Which oxide is the most basic?

A. MgO

B. Al_2O_3

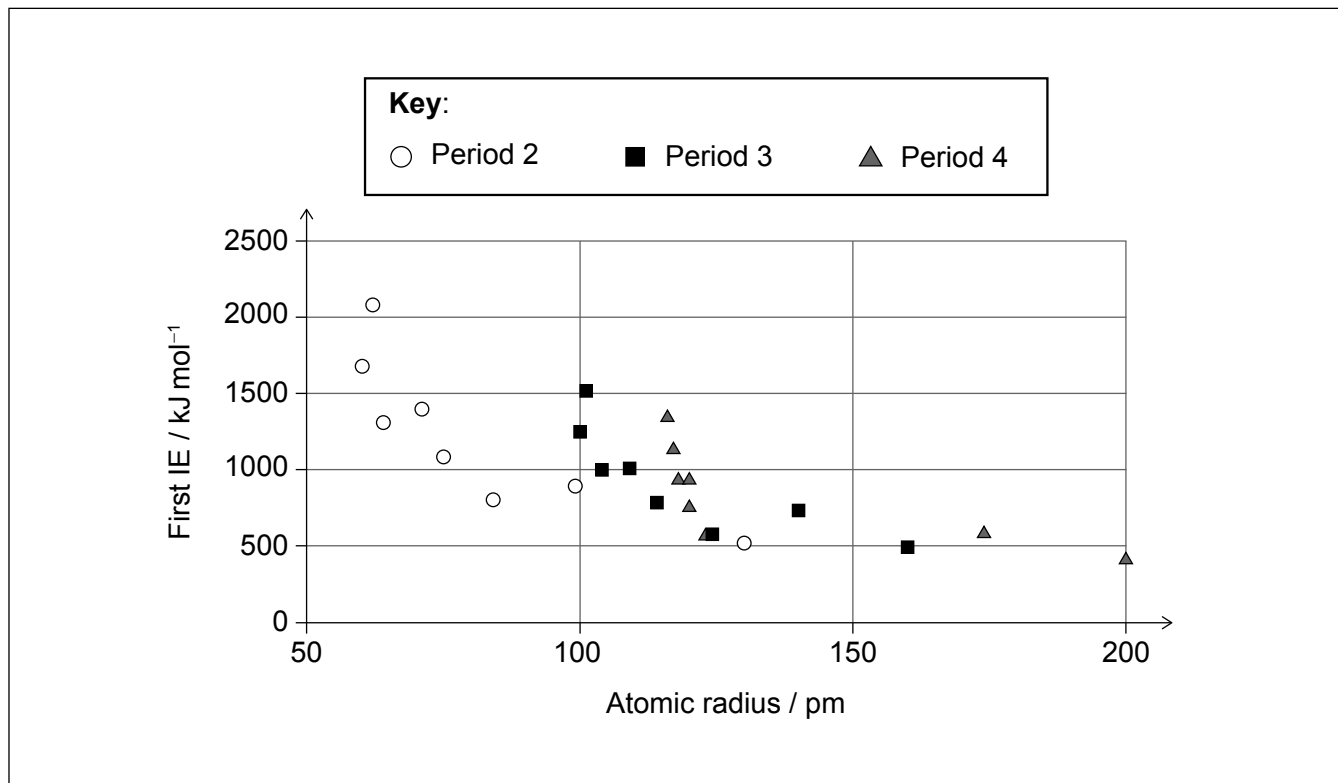
C. SiO_2

D. SO_3

Section B

Answer **all** questions. Answers must be written within the answer boxes provided.

1. The graph shows the variation of the first ionization energy with atomic radius for periods 2, 3 and 4 of the periodic table, with the d-block elements omitted.



- (a) Annotate the graph with an additional data point, marked with a cross (X), for scandium. Use sections 9 and 10 of the data booklet. [1]
- (b) Suggest why there might be a link between the two variables in the graph. [1]

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(Question 1 continued)

(c) The graph shows a relationship between first ionization energy and atomic radius.

(i) State the type of relationship between the variables. [1]

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(ii) Compare and contrast the trends shown by the different periods. [2]

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13. In which block of the periodic table would element 119 be placed, if it is found in the future?

- A. s
- B. p
- C. d
- D. f

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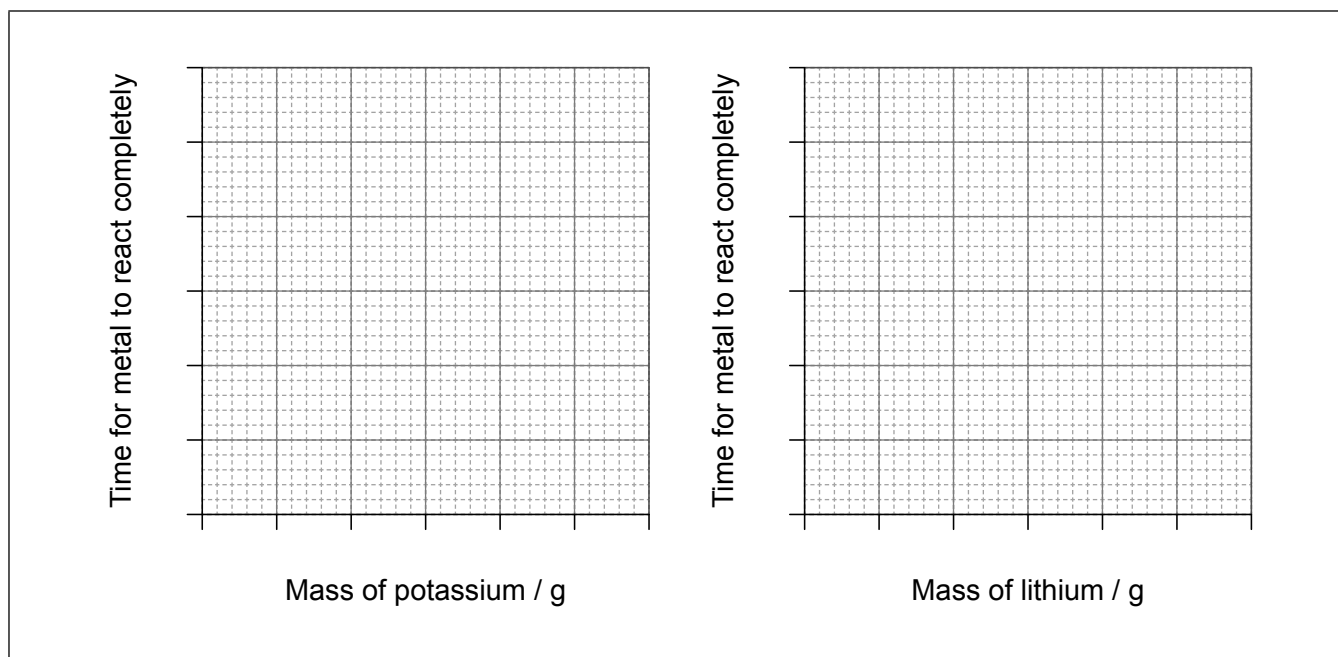
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- 15.** The block structure of the periodic table groups elements according to which characteristic?
- A. atomic number
 - B. atomic mass
 - C. electron configuration
 - D. reactivity

3. In a simulation, equal masses of potassium and lithium are added to water and the time taken for the metals to fully react is recorded. Five different increasing masses of each metal are used, and the reaction is timed.

(a) Sketch the graphs on the axes to show the expected results of this experiment.

[2]



- (b) Suggest a reason why comparing the time for complete reaction of equal masses is not a valid measure of reactivity.

[1]

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- (c) Lithium carbide, Li_2C_2 , is one of many compounds of lithium and carbon. Determine the percentage covalent character and bonding type in this compound by using sections 9 and 17 of the data booklet.

[2]

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(Question 3 continued)

(d) Draw the Lewis formula of the anion in the salt Li_2C_2 .

[2]



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