

Period 3 trends in radius, energy and melting

Chemistry grades 11-12 (A Level · IB · Class 11-12) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test checks your understanding of period 3 trends. Answer every question, show working for calculations and name the particles and forces in each explanation. Marks are shown beside each part.

Level: Chemistry grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.2.1

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Ionisation energy (2 marks)

- Define the first ionisation energy. (1 mark)
- Write the equation for the first ionisation of sodium, with state symbols. (1 mark)

Question 2 Shrinking atoms (3 marks)

Explain why the atomic radius decreases from sodium to chlorine.

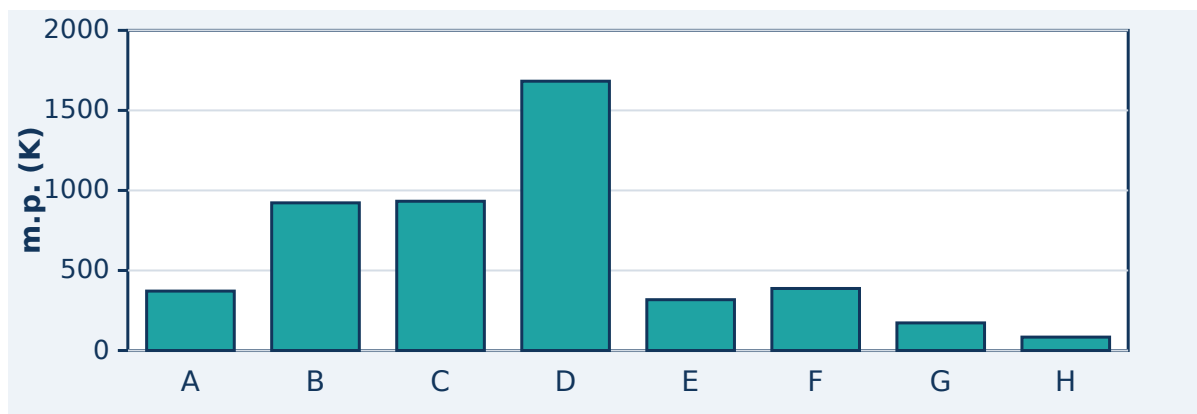
Question 3 Sulfur and phosphorus (3 marks)

The first ionisation energy of sulfur (1000 kJ/mol) is lower than that of phosphorus (1012 kJ/mol). Explain this.

Question 4 Kelvin gap (2 marks)

Sodium melts at 98 °C and magnesium at 650 °C. Convert both to kelvin and calculate the difference.

Question 5 Reading the melting point graph (3 marks)



Melting points (K) of the eight elements A to H of period 3, in order.

- Name element D and state its structure. (1 mark)
- Explain why element E has a much lower melting point than D. (1 mark)
- Explain why element H has the lowest melting point. (1 mark)

Question 6 Percentage change in radius (2 marks)

The atomic radius of magnesium is 160 pm and of sulfur 104 pm. Calculate the percentage decrease from magnesium to sulfur.

Question 7 Magnesium and aluminium (3 marks)

Explain why aluminium has a lower first ionisation energy than magnesium.

Question 8 Chlorine and sulfur (2 marks)

Explain why S₈ has a higher melting point than Cl₂.