

Periodicity (MCQ)

1. Which statement about the periodic table is **not** correct?
- A The elements are arranged in groups with similar chemical properties.
 - B The elements are arranged in periods with repeating trends in properties
 - C The elements are arranged in order of increasing atomic number.
 - D The elements in the halogen group increase in reactivity down the group.

Your answer

[1]

2. Which set of elements in the solid state contain a simple molecular lattice, a giant covalent lattice and a giant metallic lattice?
- A S, Si, Al
 - B P, Si, C
 - C S, P, Si
 - D Mg, P, S

Your answer

[1]

3. The first five successive ionisation energies of an element **Y** are shown below.

1st	2nd	3rd	4th	5th
496	4563	6913	9544	13352

What is the formula of a chloride of **Y**?

- A YCl
- B YCl_2
- C YCl_3
- D YCl_4

Your answer

[1]

4. Which element has induced dipole–dipole interactions (London forces) in its solid lattice?

- A boron
- B magnesium
- C silicon
- D sulfur

Your answer

[1]

5. What determines the order of elements in the Periodic Table?

- A first ionisation energy
- B number of electrons in the outer shell
- C number of protons in the nucleus
- D relative atomic mass

Your answer

[1]

6. Which statement best explains why nitrogen has a larger first ionisation energy than oxygen?

- A N atoms have less repulsion between p-orbital electrons than O atoms.
- B N atoms have a smaller nuclear charge than O atoms.
- C N atoms lose an electron from the 2s subshell, while O atoms lose an electron from the 2p subshell.
- D N atoms have an odd number of electrons, while O atoms have an even number.

Your answer

[1]

7. Which element has the highest melting point?

- A silicon
- B phosphorus
- C sulfur
- D chlorine

Your answer

[1]

8. How many electrons are removed from 2.02×10^{-2} g of Ne(g) atoms to form Ne⁺(g) ions?

- A 3.36×10^{-26}
- B 1.66×10^{-27}
- C 6.02×10^{20}
- D 1.22×10^{22}

Your answer

[1]

9. What is the shape around the carbon atoms in graphene?

- A linear
- B pyramidal
- C tetrahedral
- D trigonal planar

Your answer

[1]

10. Electron configurations for atoms of different elements are shown below.

Which electron configuration represents the element with the largest first ionisation energy?

- A $1s^22s^2$
- B $1s^22s^22p^4$
- C $1s^22s^22p^6$
- D $1s^22s^22p^63s^2$

Your answer

[1]

11. Successive ionisation energies of four elements in Period 3 are shown below.

Which letter could represent magnesium?

	Ionisation energy / kJ mol^{-1}				
	1st	2nd	3rd	4th	5th
A	1251	2298	3822	5159	6542
B	738	1451	7733	10543	13630
C	496	4563	6913	9544	13352
D	578	1817	2745	11577	14842

Your answer

[1]

12. Which element contains atoms with the largest radius?

- A. Na
- B. K
- C. Mg
- D. Ca

Your answer

[1]

13. The 1st to 8th successive ionisation energies, in kJ mol^{-1} , of an element in period 3 are:

1012 1903 2912 4957 6274 21,269 25,398 29,855

What is the element?

- A. Al
- B. Si
- C. P
- D. S

Your answer

[1]

14. A chemist determines some properties of two substances, **C** and **D**.

The results are shown in the table.

	C	D
Melting point / °C	660	801
Electrical conductivity when solid	Yes	No
Electrical conductivity when molten	Yes	Yes
Solubility in water	No	Yes

Which row correctly identifies the bonding and structure in **C** and **D**?

	C	D
A	giant ionic	giant metallic
B	giant ionic	giant ionic
C	giant metallic	giant metallic
D	giant metallic	giant ionic

Your answer

[1]

15. Which statement is **not** correct for Group 2 metals?

- A. An unpaired electron is present in an s-orbital.
- B. Chemical reactivity increases with increasing atomic number.
- C. The first ionisation energy decreases with increasing atomic number.
- D. Atomic radius increases with increasing atomic number.

Your answer

[1]

16. Which particles are attracted in metallic bonding?

- A. anions and delocalised electrons
- B. cations and delocalised electrons
- C. oppositely charged ions
- D. protons and electrons

Your answer

[1]

17. This question is about trends in the periodic table.

Which trend is correct?

- A. melting point decreases from lithium to carbon
- B. boiling point decreases from fluorine to iodine
- C. first ionisation energy decreases from lithium to caesium
- D. first ionisation energy increases from nitrogen to oxygen

Your answer

[1]

END OF QUESTION PAPER

Mark scheme – Periodicity (MCQ)

Question			Answer/Indicative content	Marks	Guidance
1			D	1 (AO1.1)	
			Total	1	
2			A	1 (AO 1.1)	
			Total	1	
3			A	1	<p><u>Examiner's Comments</u></p> <p>Success depended on identifying the group of Y and working out the formula of the chloride. Most candidates recognised the large increase between 1st and 2nd ionisation energies, leading to the conclusion that Y is in Group 1 and the correct formula is YCl (A).</p>
			Total	1	
4			D	1	<p><u>Examiner's Comments</u></p> <p>As is often the case, candidates find structure and bonding difficult. Many candidates selected silicon (C) instead of the correct response of sulfur (D).</p>
			Total	1	
5			C	1	<p><u>Examiner's Comments</u></p> <p>Most candidates correctly selected C (number of protons) but a sizeable number selected D (relative atomic mass) or B (number of electrons) instead.</p>
			Total	1	
6			A	1 (AO 1.2)	<p><u>Examiner's Comments</u></p> <p>The majority of candidates knew the key factor affecting the relative ionisation energies of nitrogen and oxygen.</p>
			Total	1	
7			A	1	<p><u>Examiner's Comments</u></p> <p>Most candidates correctly identified Si as</p>

					giant covalent. A common error was answer option D.
			Total	1	
8			C	1	
			Total	1	
9			D	1	Examiner's Comments B and C were common incorrect answers
			Total	1	
10			C	1	Examiner's Comments Many candidates did not take into account the trend across periods, with A being a common incorrect answer.
			Total	1	
11			B	1	Examiner's Comments Generally scored well.
			Total	1	
12			B	1	
			Total	1	
13			C	1	
			Total	1	
14			D	1	
			Total	1	
15			A	1	
			Total	1	
16			B	1	
			Total	1	
17			C	1	
			Total	1	