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 $1s^2 2s^2$
B $1s^2 2s^2 2p^4$
C $1s^2 2s^2 2p^6$
D $1s^2 2s^2 2p^6 3s2$

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**	**Examiner's Comments** 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).
			Total	**1**	
4			**D**	**1**	**Examiner's Comments** As is often the case, candidates find structure and bonding difficult. Many candidates selected silicon (C) instead of the correct response of sulfur (D).
			Total	**1**	
5			**C**	**1**	**Examiner's Comments** Most candidates correctly selected C (number of protons) but a sizeable number selected D (relative atomic mass) or B (number of electrons) instead.
			Total	**1**	
6			**A**	**1 (AO 1.2)**	**Examiner's Comments** The majority of candidates knew the key factor affecting the relative ionisation energies of nitrogen and oxygen.
			Total	**1**	
7			A	**1**	**Examiner's Comments** Most candidates correctly identified Si as

					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**	