SMART EXAM RESOURCES
9701 AS CHEMISTRY TOPIC QUESTIONS
TOPIC: ATOMIC STRUCTURE
SUB-TOPIC:ATOMIC-IONIS RADII TRENDS
SET-1

Trends-in-Atomic-Radius-and-Ionic-Radius-Set-1-qp-ms

1.

Which element has the **second** smallest atomic radius in its group and the **second** highest electrical conductivity in its period?

A boron

B calcium

C magnesium

D sodium

2.

Three statements about potassium and chlorine and their ions are listed.

1 The atomic radius of a potassium atom is greater than the atomic radius of a chlorine atom.

2 The first ionisation energy of potassium is greater than the first ionisation energy of chlorine.

3 The ionic radius of a potassium ion is greater than the ionic radius of a chloride ion.

Which statements are correct?

A 1 only **B** 2 only **C** 1 and 3 **D** 2 and 3

3.

Three statements about potassium and chlorine and their ions are listed.

1 The atomic radius of a potassium atom is greater than the atomic radius of a chlorine atom.

2 The first ionisation energy of potassium is greater than the first ionisation energy of chlorine.

3 The ionic radius of a potassium ion is greater than the ionic radius of a chloride ion.

Which statements are correct?

A 1 only **B** 2 only **C** 1 and 3 **D** 2 and 3

4.

Which row is correct?

	statement	reason
A	The first ionisation energy of phosphorus is greater than that of magnesium.	electron is lost from a 3p orbital in both cases
B	The melting point of phosphorus is greater than that of magnesium.	phosphorus has more valence electrons than magnesium
C	The atomic radius of phosphorus is smaller than that of magnesium.	phosphorus has greater nuclear charge than magnesium
D	The electrical conductivity of phosphorus is smaller than that of magnesium.	bonding changes from ionic in magnesium to covalent in phosphorus

5.

Why is the ionic radius of a sulfide ion larger than the ionic radius of a potassium ion?

A Ionic radius always decreases with increasing atomic number.

B Positive ions always have smaller radii than negative ions.

C The potassium ion has more protons in its nucleus than the sulfide ion.

D The sulfide ion is doubly charged; the potassium ion is singly charged.

6.

V and Z are both elements in Period 3 of the Periodic Table. Each element forms one stable ion that does not contain another element.

The atomic radius of each element and the ionic radius of the ion described above is shown.

element	atomic radius / nm	ionic radius / nm
V	0.186	0.095
Z	0.099	0.181

Which statement is correct?

A Ions of V and Z have the same number of full electron shells.

B Ions of Z are positively charged.

C Z has a greater electronegativity than V.

D V has more outer electrons than Z.

7.

Which statements help to explain the increase in melting point from sodium to aluminium?

1 The charge on the metal ion increases.

2 There are more delocalised electrons per metal ion.

3 The radius of the metal ion decreases.

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and **3** are correct	**1** and **2** only are correct	**2** and **3** only are correct	**1** only is correct

No other combination of statements is used as a correct response.

A) A

B) B

C) C

D) D

8.

The following species contain the same number of electrons.

In which order do their radii increase?

	smallest radius ⟶		largest radius
A	Ar	K^+	Ca^{2+}
B	Ca^{2+}	Ar	K^+
C	Ca^{2+}	K^+	Ar
D	K^+	Ar	Ca^{2+}

9.

Use of the Data Booklet is relevant to this question.

In which pairs do both species have the same number of unpaired p electrons?

1 Al^{2-} and O^+

2 N and Cl^{2+}

3 C and Cl^+

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and **3** are correct	**1** and **2** only are correct	**2** and **3** only are correct	**1** only is correct

No other combination of statements is used as a correct response.

A) A

B) B

C) C

D) D

10.

Carbon and silicon have the same outer electronic structure.

Why is a Si–Si bond weaker than a C–C bond?

A Silicon atoms have a larger atomic radius than carbon atoms.

B Silicon has a greater nuclear charge than carbon.

C Silicon has a smaller first ionisation energy than carbon.

D Silicon is more metallic than carbon.