

SMART EXAM RESOURCES
9701 AS CHEMISTRY TOPIC QUESTIONS
TOPIC: ATOMIC STRUCTURE
SUB-TOPIC: SUB-SHELLS/SHELLS/ORBITALS/QUANTUM
NUMBERS-VOCABULARY
SET-2

1.3.1-Shells-Subshells-Orbitals-and-Principle-Quantum-Number-Set-2-qp-ms

1.

Scientists are trying to synthesise a new element with proton number 119. The element is predicted to be a Group 1 element in Period 8 of the Periodic Table.

Which predictions are likely to be correct about this element?

- 1 The outermost occupied orbital of one atom of this element will be an s orbital.
- 2 The atomic radius will be the largest of the seven elements in Group 1.
- 3 It will have a greater first ionisation energy than element 118.

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

2.

Carbon and nitrogen are adjacent in the Periodic Table.

Which properties do they both have?

- 1 There is an empty 2p orbital in each atom of the element.
- 2 The principal quantum number of the highest occupied orbital is 2.
- 3 They can form compounds in which their atoms form four bonds.

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

3.

X is an element that has

- its outer electrons in the 4th principal quantum shell,
- a higher 1st ionisation energy than calcium.

What could be the identity of **X**?

- 1 bromine
- 2 krypton
- 3 xenon

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

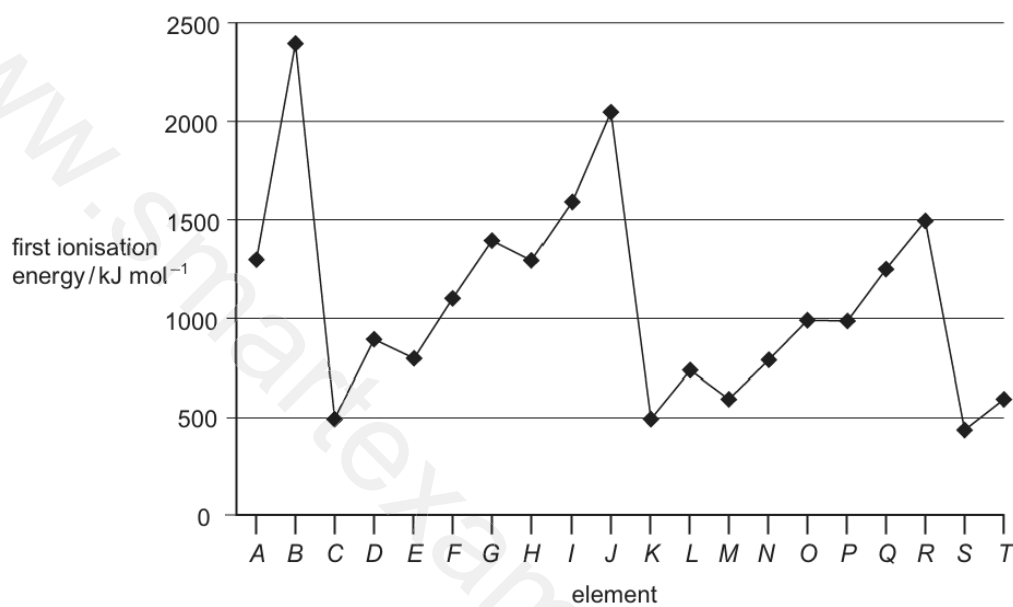
A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

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

- A) A
- B) B
- C) C
- D) D

4.

- 4 The first ionisation energies of successive elements in the Periodic Table are represented in the graph.



Which of these statements about this graph are correct?

- 1 Elements B, J and R are in Group 0 of the Periodic Table.
- 2 Atoms of elements D and L contain 2 electrons in their outer shells.
- 3 Atoms of elements G and O contain half-filled p orbitals.

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

5.

What is the order of increasing energy of the listed orbitals in the atom of titanium?

- A 3s 3p 3d 4s
- B 3s 3p 4s 3d
- C 3s 4s 3p 3d
- D 4s 3s 3p 3d

6.

Which of the following particles would, on losing an electron, have a half-filled set of p orbitals?

- A C^-
- B N
- C N^-
- D O^+

7.

Gallium nitride, GaN, could revolutionise the design of electric light bulbs because only a small length used as a filament gives excellent light at low cost.

Gallium nitride is an ionic compound containing the Ga^{3+} ion.

What is the electron arrangement of the nitrogen ion in gallium nitride?

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

8.

In which pair do both atoms have one electron only in an s orbital in their ground states?

- A Ca, Sc
- B Cu, Be
- C H, He
- D Li, Cr

9.

The first seven ionisation energies of an element between lithium and neon in the Periodic Table are as follows.

1310	3390	5320	7450	11 000	13 300	71 000	kJ mol^{-1}
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What is the outer electronic configuration of the element?

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

10.

The electronic configuration of an atom of sulfur is $1s^2 2s^2 2p^6 3s^2 3p^4$.

How many valence shell and unpaired electrons are present in one sulfur atom?

	valence shell electrons	unpaired electrons
A	2	1
B	4	2
C	6	0
D	6	2