

3.1 The Periodic Table & Periodic Trends

Question Paper

Course	DP IB Chemistry
Section	3. Periodicity
Topic	3.1 The Periodic Table & Periodic Trends
Difficulty	Hard

Time allowed: 20
Score: /10
Percentage: /100

Question 1

The species Cl^- , K^+ and Ar are isoelectronic. This means that they have the same number of electrons.

In which order do their radii decrease?

	largest	→	smallest
A	K^+	Cl^-	Ar
B	Cl^-	Ar	K^+
C	K^+	Ar	Cl^-
D	Ar	K^+	Cl^-

[1 mark]

Question 2

The atomic radius of the elements decreases across period 3. Which of the following statements explain(s) this phenomenon?

1
electrons shells are added across Period 3 which increases the nuclear force of attraction

2
the nuclear charge increases across Period 3 due to increasing atomic number

3
there is a greater force of attraction between the nucleus and the electrons

A. 1 and 2

B. 1, 2 and 3

C. 2 and 3

D. 1 only

[1 mark]

Question 3

The first ionisation energy of beryllium is higher than the first ionisation energy of boron.

Which statement explains why?

- A. boron has a full outer shell
- B. boron has a larger atomic radius than beryllium
- C. beryllium has a more stable electronic configuration
- D. the atomic number of beryllium is higher than boron

[1 mark]

Question 4

The electronic configurations of four different atoms are shown.

Which atom has the highest first ionisation energy?

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

[1 mark]

Question 5

Use of the periodic table is relevant to this question.

Sir Humphrey Davy discovered the elements magnesium, boron, sodium and calcium.

Which of the elements Sir Davy discovered has the **third** lowest first ionisation energy in its Period and the **third** smallest atomic radius in its Group?

- A. magnesium
- B. boron
- C. sodium
- D. calcium

[1 mark]

Question 6

Which of the following pairs does the second element have a higher 1st ionisation energy than the first element?

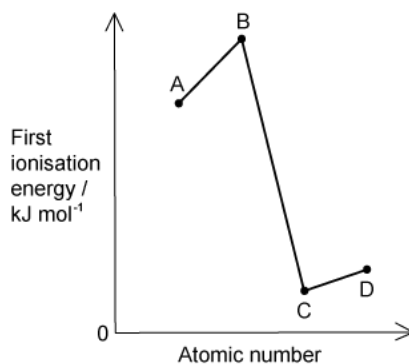
	First element	Second element
A	Mg	Al
B	N	O
C	Ne	Na
D	K	Na

[1 mark]

Question 7

Shown on the graph are the relative values of the first ionisation energies of four elements that have consecutive atomic numbers. One of the elements reacts with hydrogen to form a covalent compound with formula HX .

Which element could be X?



[1 mark]

Question 8

A periodic table is need for this question

Below are four statements about energy levels and electrons. Which is the correct statement?

- A. 18 is the maximum number of electrons in the 4th energy level
- B. 10 is the maximum number of electrons in one d orbital
- C. Yttrium is the first element with an electron in an f subshell
- D. In a main energy level, the subshell with the highest energy is f

[1 mark]

Question 9

Element J has a lower first ionisation energy and higher melting point than the element preceding it in the periodic table.

Its ion is isoelectronic with argon.

What is the identity of element J?

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

[1 mark]

Question 10

Which statement about electron affinity and electronegativity is correct?

- A. Electron affinity increases down a group, but electronegativity decreases
- B. Electron affinity decreases down a group, but electronegativity increases
- C. Electron affinity and electronegativity both decrease down a group
- D. There is no clear trend in electron affinity down a group but electronegativity decreases

[1 mark]