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?

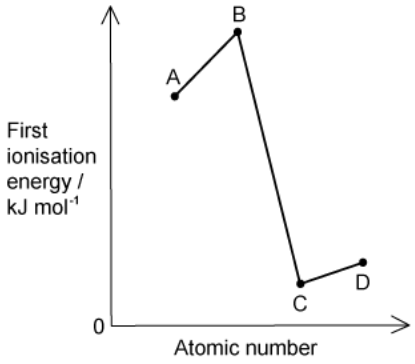
	First element	Second element
A	Mg	Al
B	N	O
C	Ne	Na
D	K	Na

[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 4^{th} 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]