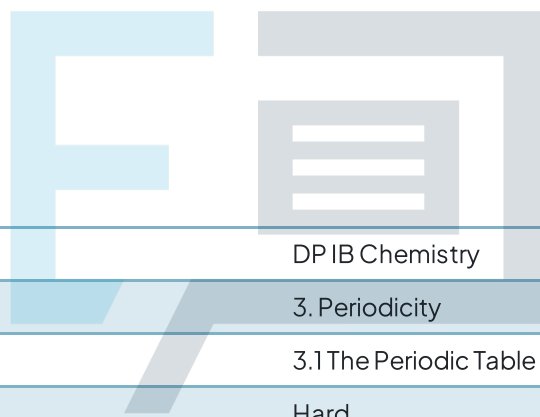




# 3.1 The Periodic Table & Periodic Trends

## Question Paper



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

# Exam Papers Practice

To be used by all students preparing for DP IB Chemistry SL  
Students of other boards may also find this useful

### Question 1

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

In which order do their radii decrease?

	largest	→	smallest
A	$\text{K}^+$	$\text{Cl}^-$	Ar
B	$\text{Cl}^-$	Ar	$\text{K}^+$
C	$\text{K}^+$	Ar	$\text{Cl}^-$
D	Ar	$\text{K}^+$	$\text{Cl}^-$

[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]

# Exam Papers Practice

### 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?

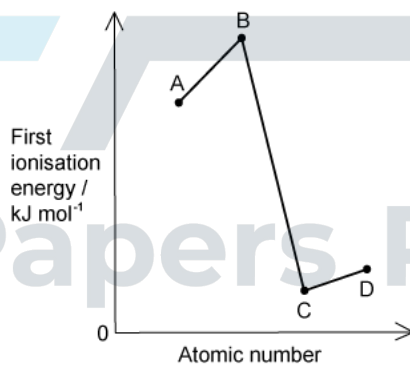
	First element	Second element
<b>A</b>	Mg	Al
<b>B</b>	N	O
<b>C</b>	Ne	Na
<b>D</b>	K	Na

[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<sup>th</sup> 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]

# Exam Papers Practice

### 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]