

3.1 The Periodic Table & Periodic Trends

Question Paper

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| Course | DPIB Chemistry |
| Section | 3. Periodicity |
| Topic | 3.1 The Periodic Table & Periodic Trends |
| Difficulty | Easy |

Time allowed: 40
Score: /30
Percentage: /100

Question 1a

a)

Define the term *first ionisation energy* and state what is meant by the term *periodicity*.

[1 mark]

Question 1b

b)

Distinguish between the terms *group* and *period*.

[1 mark]

Question 1c

c)

State the property that determines the order in which elements are arranged in the periodic table.

[1 mark]

Question 1d

d)

State the relationship between the electron arrangement of an element and its group and period in the periodic table.

[2 marks]

Question 2a

a)

Explain the following statement.

The first ionisation energy of potassium is smaller than the first ionisation energy of calcium.

[2 marks]

Question 2b

b)

Explain the following statement.

The first ionisation energy of potassium is larger in value than rubidium

[2 marks]

Question 2c

c)

Using section 8 of the data booklet, explain the trend of decreasing electronegativity values of the Group 17 elements from F to I.

[3 marks]

Question 2d

d)

Define the term *electronegativity*.

[1 mark]

Question 3a

a)

Define what is meant by the term *electron affinity*.

[1 mark]

Question 3b

b)

State whether first electron affinity is an exothermic or endothermic process.

[1 mark]**Question 3c**

c)

Write an equation, including state symbols, for the first electron affinity of bromine.

[2 marks]**Question 3d**

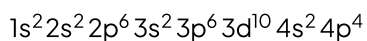
d)

State whether the first electron affinity of I is more or less exothermic than Br.

[1 mark]**Question 4a**

a)

An element has the following electron configuration.



i)

State which block of the periodic table the element is in.

ii)

State how many electrons it has in its outer shell.

[2 marks]

Question 4b

b)

Magnesium can be ionised to form a cation, Mg^+ .

i)

Write the electron configuration of an Mg^+

ii)

Define the term '*first ionisation energy*' in relation to magnesium.

[3 marks]

Question 4c

c)

The periodic table can be divided into blocks.

State why are silicon, carbon, oxygen and chlorine all classified as p-block elements.

[1 mark]

Question 4d

d)

This question is about the periodicity of period 3 elements.

i)

State the trend in atomic radius across period 3.

ii)

State the general trend in first ionisation energies across period 3.

[2 marks]

Question 5a

a)

Antimony, Sb, has atomic number 51.

Using section 6 of the data booklet, complete the table to show where antimony is found in the periodic table.

| Period | Block |
|--------|-------|
| | |

[1 mark]

Question 5b

b)

Identify the element that is in the d-block of the periodic table which forms a 3+ ion with the following electron configuration.



[1 mark]

Question 5c

c)

Ionisation energies can provide evidence for electron structure.

Write an equation, including state symbols, for the first ionisation energy of chlorine.

[1 mark]

Question 5d

An element Y has the following six first ionisation energies in kJ mol^{-1} . These are shown in the table below.

| | 1 st | 2 nd | 3 rd | 4 th | 5 th | 6 th |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Ionisation energy (kJ mol^{-1}) | 577 | 1820 | 2740 | 11 600 | 14 800 | 18 400 |

d)

State what group of the periodic table this element belongs to.

[1 mark]

