



**ALEXANDER ROAD HIGH SCHOOL**

April 2021

**PHYSICAL SCIENCES CONTROL TEST**

50 MINUTES

PE

**GRADE 10**

TOTAL = 50

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Instructions:

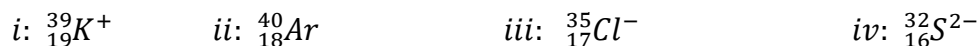
- The question paper consists of 6 questions.
  - Answer all the questions.
  - Answer section A on the answer sheet provided AND section B on folio sheets.
  - A non-programmable calculator may be used.
  - Number the answers correctly according to the numbering system.
  - Round off to two (2) decimal places where necessary.
  - A periodic table has been provided on the back of the answer sheet.
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**SECTION A** (*answer on the answer sheet*)

**QUESTION 1:**

Four possible options are provided as answers to the following questions. Each question has only one correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.5) on the answer sheet.

1.1 Which of the following substances have the same number of valence electrons



- A. i & ii only
- B. iii & iv only
- C. all of them
- D. none of them

1.2 The Group IV element in the 4<sup>th</sup> period of the periodic table is:

- A. tin (Sn)
- B. germanium (Ge)
- C. silicon
- D. sulphur

- 1.3 Which one of the following groups of elements show the correct trend of the atomic radii of elements?
- A.  $K > Fe > Zn > Kr$   
 B.  $K < Fe < Zn < Kr$   
 C.  $H > Li > Na > K$   
 D.  $K < Na < Li < H$
- 1.4 When an atom X of an element in Group VI reacts to become  $X^{2-}$ , the...
- A. mass number of X increases.  
 B. atomic number of X decreases.  
 C. charge of the **nucleus** increases.  
 D. number of filled orbitals increases.
- 1.5 Which ONE of the following electron configurations represents an alkali-earth?
- A.  $1s^2 2s^2$   
 B.  $1s^2 2s^2 2p^5$   
 C.  $1s^2 2s^2 2p^6$   
 D.  $1s^2 2s^2 2p^4$

**TOTAL SECTION A = [10]**

Question 2

For the following symbol:  ${}_{7}^{14}N$ , give or draw:

- 2.1.1 The name of the element. (1)  
 2.1.2 The number of all its subatomic particles. (3)  
 2.1.3 Its Aufbau diagram. (2)  
 2.1.4 Its sp-notation (2)  
 2.1.5 Its Lewis notation. (1)
- 2.2 Draw the Aufbau diagram of  $S^{2-}$  (2)  
 [11]

Question 3

An element has the following two isotopes  ${}^{64}M$  and  ${}^{67}M$  in the proportions:

60 % of  ${}^{64}M$  and 40% of  ${}^{67}M$

- 3.1 Define the term *isotope*. (2)  
 3.2 Calculate its relative atomic mass. (3)  
 3.3 What element is it most likely to be? (1)

[6]

#### Question 4

Identify the elements on the periodic table from the following descriptors. Write their name and symbol.

- 4.1 The Group VII element that is a gas at room temperature. (1)
- 4.2 A metalloid in the 3<sup>rd</sup> period. (1)
- 4.3 The halogen in the second period. (1)
- 4.4 The element that has the same electron configuration as an Ca<sup>2+</sup> ion. (1)
- 4.5 The transition element with 32 neutrons. (1)
- [5]

#### QUESTION 5

- 5.1 Explain the difference between ionisation energy and electron affinity. (4)

The first ionisation energy and electron affinity of the period 3 elements are shown in the table below.

<b>ELEMENT</b>	<b>FIRST IONISATION ENERGY (kJ.mol<sup>-1</sup>)</b>	<b>ELECTRON AFFINITY (kJ.mol<sup>-1</sup>)</b>
<b>Sodium</b>	496	53
<b>Magnesium</b>	738	0
<b>Aluminium</b>	578	44
<b>Silicon</b>	786	134
<b>Phosphorus</b>	1012	72
<b>Sulphur</b>	1000	200
<b>Chlorine</b>	1251	349
<b>Argon</b>	1521	0

- 5.2 Give a reason for the trend in the first ionisation energy as seen in the table. (2)
- [6]

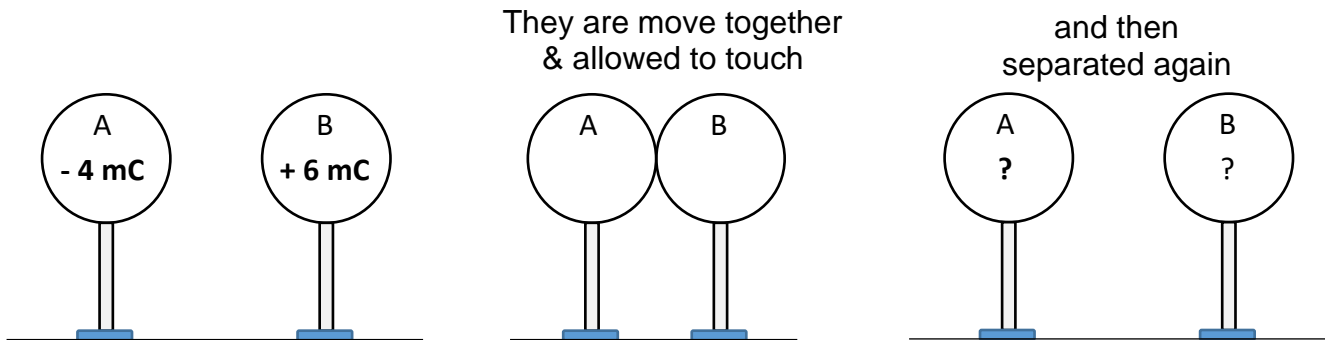
**Question 6** Formula:  $Q = nq_e$   $q_e = -1.6 \times 10^{-19} \text{ C}$

6.1 A balloon is rubbed against someone's hair.  
It picks up a positive charge of  $+ 0.35 \mu\text{C}$  (micro-coulombs).

6.1.1 Did it gain or lose electrons? **L2** (1)

6.1.2 How many electrons did the balloon gain or lose? **L2/3** (3)

6.2 Two identical balls, A & B, on insulated stands have respectively charges of:  
A:  $- 4 \text{ mC}$  and B:  $+ 6 \text{ mC}$



6.2.1 Explain what is happening, in terms of electrons, when they touch. (1)

6.2.2 Calculate the final charge on each ball. (3)

6.3 Given the Triboelectric Series alongside, consider rubbing a perspex ruler against your blazer which is made of 100% polyester.

6.3.1 What is the resulting charge on the ruler? (1)

6.3.2 Explain how it became charged in terms of electrons. (2)

6.3.3 How would it be different if human hair was used instead of your blazer? (1)

[8]

Very positive	air rabbit fur perspex glass human hair nylon wool fur silk
Slightly positive	aluminium
Neutral	cotton
Slightly negative	copper silver gold polyester PVC
Very negative	Teflon

**TOTAL SECTION B = [40]**