



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA

**GAUTENG DEPARTMENT OF EDUCATION  
PROVINCIAL EXAMINATION  
JUNE 2018  
GRADE 10**

**PHYSICAL SCIENCES**

**PAPER 2**

**TIME: 90 minutes / 1½ hours**

**MARKS: 100**

**10 pages, 1 data sheet and 1 graph sheet**

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**INSTRUCTIONS AND INFORMATION**

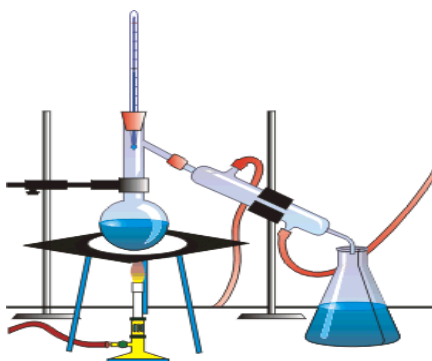
1. Write your name in the appropriate space on the ANSWER BOOK.
2. This question paper consists of **EIGHT** questions. Answer **ALL** the questions in the ANSWER BOOK.
3. Remove the graph paper from page 12 and hand it in with your ANSWER BOOK.
4. You may use a non-programmable calculator.
5. You may use appropriate mathematical instruments.
6. **YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.**
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.
9. Start **EACH** question on a **NEW** page in the ANSWER BOOK.
10. Leave **ONE** line between two sub-questions, for example between Question 2.1 and Question 2.2.
11. Show **ALL** formulae and substitutions in **ALL** calculations.
12. Round off your **FINAL** numerical answers to a minimum of **TWO** decimal places where needed.
13. Give brief motivations, discussions, et cetera where required.

**SECTION A**

**QUESTION 1**

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A – D) next to the question number (1.1 – 1.10) in your answer book. Each answer counts TWO MARKS.

1.1 Which separation method is shown by the picture below?



- A distillation
  - B chromatography
  - C purification
  - D sifting
- (2)

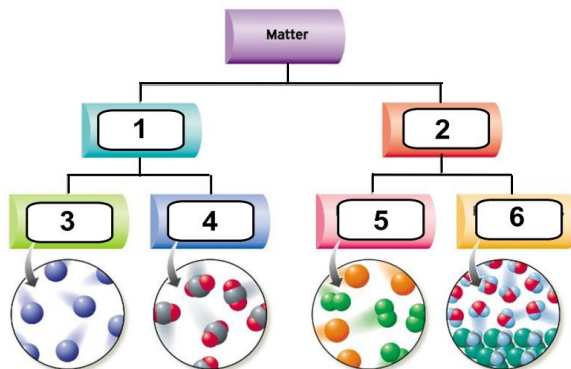
1.2 When a metal atom combines with a non-metal atom, the non-metal atom will

- A lose electrons and decrease in size.
  - B lose electrons and increase in size.
  - C gain electrons and decrease in size.
  - D gain electrons and increase in size.
- (2)

1.3 Which one of the names below represents the scientist that bombarded gold foil with positive particles and discovered that some of these positive particles are deflected by gold nuclei?

- A Rutherford
  - B Dalton
  - C Bohr
  - D Thomson
- (2)

1.4 In which of the following options are all the labels for the flow-chart correct?



	1	2	3	4	5	6
A	Pure substances	Impure substances	Elements	Compounds	Heterogeneous mixture	Homogeneous mixture
B	Pure substances	Impure substances	Elements	Compounds	Homogeneous mixture	Heterogeneous mixture
C	Impure substances	Pure substances	Compounds	Elements	Heterogeneous mixture	Homogeneous mixture
D	Impure substances	Pure substances	Elements	Compounds	Homogeneous mixture	Heterogeneous mixture

(2)

1.5 A neutron has a \_\_\_\_\_ charge.

- A neutral
- B positive
- C negative
- D magnetic

(2)

1.6 Which group of atoms / ions has the same amount of electrons?

- A  $\text{Br}^-$ ,  $\text{Kr}$ ,  $\text{K}^+$
- B  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Be}^{2+}$
- C  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$
- D  $\text{Cl}$ ,  $\text{Br}$ ,  $\text{I}$

(2)

1.7 The correct electron configuration for Magnesium is ...

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

(2)

- 1.8 Which ONE of the following symbols represents the Aton with the largest radius in period 4 on the periodic table?
- A **As**
  - B **Se**
  - C **Kr**
  - D Br
- (2)
- 1.9 Chemical bonds CANNOT be produced by ...
- A splitting electrons.
  - B gaining electrons.
  - C losing electrons.
  - D sharing electrons.
- (2)
- 1.10 When atom Z of an element in Group 3 becomes  $Z^{+3}$ , the ...
- A atomic number of Z decreases.
  - B mass number of Z increases.
  - C charge on the nucleus increases.
  - D number of occupied energy levels decreases.
- (2)

**TOTAL SECTION A: 20**

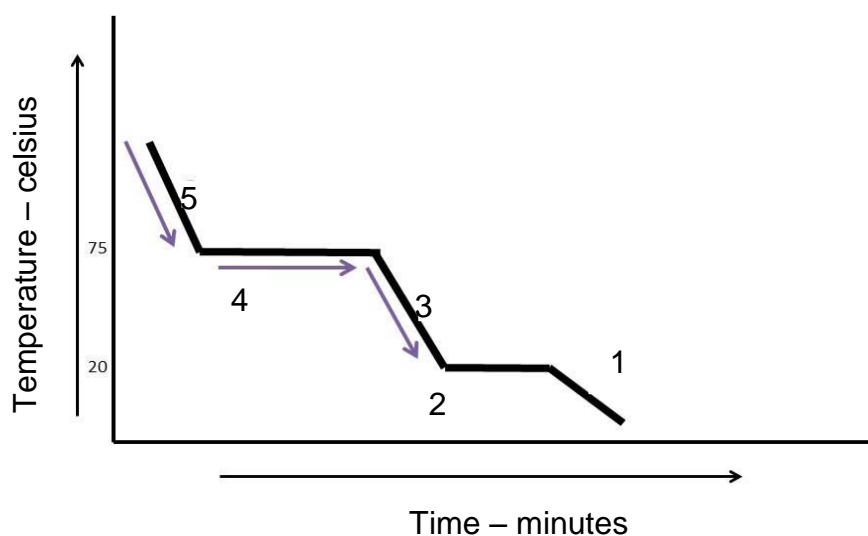
**SECTION B**

**QUESTION 2**

- 2.1 Materials have different properties for different applications. Give four (4) properties of materials we need to consider to select a material for an application. (4)
- 2.2 Differentiate between **homogenous** and **heterogeneous** mixtures. (2)
- 2.3 A mixture of salt water and clean sand in an Erlenmeyer flask can be separated by decanting.
- 2.3.1 What is meant by decanting? (1)
- 2.3.2 After the removal of the sand, how can the salt be removed from the water? Explain (2)
- 2.4 The type of bonding that takes place between two metals is called metallic bonding. Briefly discuss how metallic bonding takes place. (4)
- [13]**

**QUESTION 3**

Look at the following diagram and answer the questions:



3.1 Match the following to show which part of the graph represents the water in each of the following phases:

COLUMN A	COLUMN B
3.1.1 Gas phase	A : 1
3.1.2 Solid phase	B : 2
3.1.3 Liquid phase	C : 3
	D : 4
	E : 5

(3)

3.2 The following table represents the results of the temperature that was taken every 5 minutes for an hour.

Time (min)	0	5	10	15	20	25	30	35	40	45	50	55	60
Temp (°C)	-5	-2	0	0	1	4	8	12	12	16	20	23	26

Use the information in the table to plot a graph of the data obtained. Use the GRAPH PAPER on page 12.

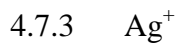
(5)  
[8]

#### QUESTION 4

There are 118 elements known to man which are tabulated in the Periodic Table. The manner in which they are tabulated is very specific. In your answer book, answer the following questions:

- 4.1 What do we call the elements that are in Group 1? (1)
- 4.2 Explain what the numbers 1 to 103 on the Periodic Table, represents? (2)
- 4.3 Calculate the molar mass of  $\text{Ca}(\text{OH})_2$ . (4)
- 4.4 Draw the Aufbau diagram as well as the electron configuration for Sodium. (3)
- 4.5 Draw the Lewis structure for Sodium Chloride. (2)
- 4.6 Name the type of bonding that will take place between Sodium and Chloride. (1)

4.7 Give the name for the following symbols / formulae:



(5)  
[18]

### QUESTION 5

5.1 – 5.8 Complete the following table using the Periodic Table. Write only the question number and the answer in your answer book.

(8)

Element	Atomic number	Mass number	Number neutrons
${}_{11}\text{Na}$	<b>5.1</b>	23	<b>5.2</b>
${}^{14}\text{C}$	<b>5.3</b>	<b>5.4</b>	8
Ar	<b>5.5</b>	37	<b>5.6</b>
${}^{19}\text{F}$	9	<b>5.7</b>	<b>5.8</b>

5.9 Which element is a noble gas?

(1)

5.10 Which element is a halogen?

(1)

5.11 Which element is an alkali metal?

(1)

5.12 Which element will form a negative ion?

(1)

[12]



### QUESTION 6

Carbon forms the basis of life on Earth. The Carbon bonds form the basis of Organic Chemistry

- 6.1 Explain the bonds formed if carbon reacts with hydrogen atoms. Refer to the type and amount of bonds. (4)
- 6.2 Explain why a person would receive an electrical shock if a HB pencil is put into a plug socket. (2)
- 6.3 Name the most valuable allotrope of carbon. (1)
- 6.4 We use isotopes of carbon to determine the age of fossils. By using carbon, explain what an isotope is. (3)
- [10]**

### QUESTION 7

A science teacher decides to bake a cake in class to demonstrate chemical change.

- 7.1 Identify two characteristics that would indicate that a chemical change took place during a chemical reaction. (2)
- 7.2 Differentiate between a **physical** and **chemical** change. (1)
- 7.3 State the Law of Constant Composition. (2)
- 7.4 Differentiate between a decomposition reaction and a synthesis reaction. (2)
- [7]**

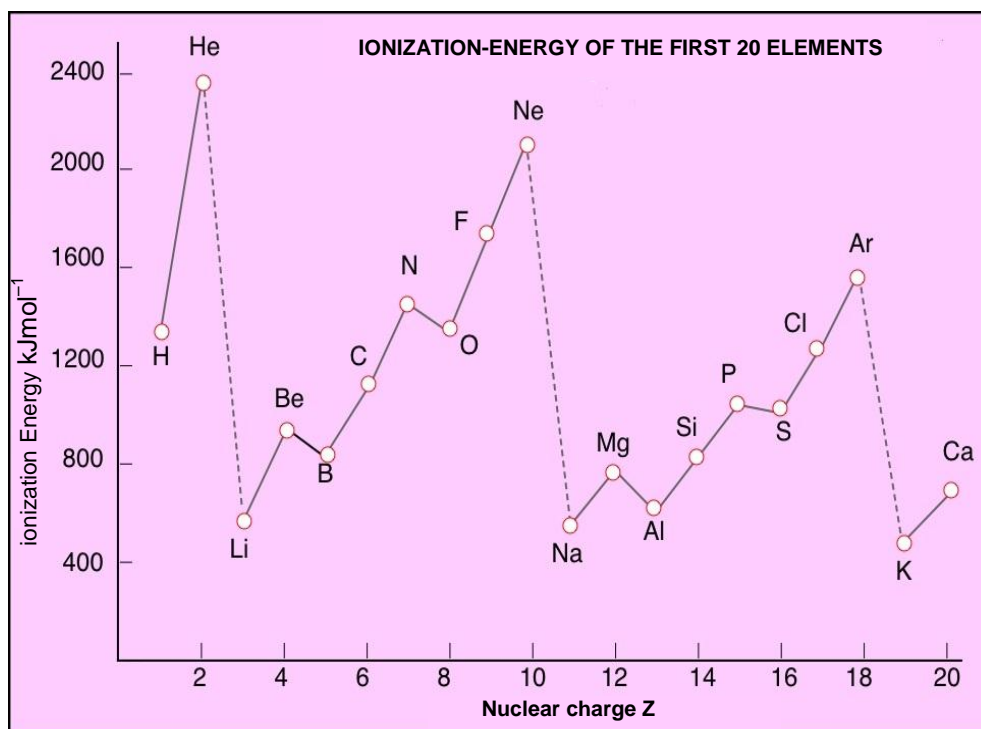
**QUESTION 8**

8.1 Give the chemical formula for aluminium sulphate (2)

8.2 Write down the balanced chemical equation for the reaction between Iron and Oxygen which causes rust.



Consider the graph below showing the ionization energy of the first 20 elements:



8.3.1 What is the first ionization energy for Silicon? (1)

8.3.2 Why is the activation energy lower for Aluminium than for Chlorine even though they are both in the same period on the Periodic Table? (2)

8.3.3 From the graph, what is the trend in ionization energies as you move down a group? (2)

8.3.4 Why do Helium, Neon and Argon have such high ionization values? (2)

[12]

**TOTAL FOR SECTION B: 80**

**TOTAL: 100**

**END**

**THE PERIODIC TABLE OF ELEMENTS  
DIE PERIODIEKETABEL VAN ELEMENTE**

1 (I)		SLEUTEL / KEY										13 (III)					14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)								
		Atoomgetal Atomic number																											
		Elektronegatiwiteit Electronegativity										29	Cu	Simbool Symbol															
		Benaderde relatiewe atoommassa Approximate relative atomic mass											63,5																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18												
1 H 1	2 He 4											5 B 11	6 C 12	7 N 14	8 O 16	9 F 19	10 Ne 20												
3 Li 7	4 Be 9											13 Al 27	14 Si 28	15 P 31	16 S 32	17 Cl 35,5	18 Ar 40												
11 Na 23	12 Mg 24											19 K 39	20 Ca 40	21 Sc 45	22 Ti 48	23 V 51	24 Cr 52	25 Mn 55	26 Fe 56	27 Co 59	28 Ni 59	29 Cu 63,5	30 Zn 65	31 Ga 70	32 Ge 73	33 As 75	34 Se 79	35 Br 80	36 Kr 84
37 Rb 86	38 Sr 88	39 Y 89	40 Zr 91	41 Nb 92	42 Mo 96	43 Tc 98	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131												
55 Cs 133	56 Ba 137	57 La 139	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm 146	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175													
87 Fr 226	88 Ra 226	89 Ac	90 Th 232	91 Pa 231	92 U 238	93 Np 237	94 Pu 244	95 Am 243	96 Cm 247	97 Bk 247	98 Cf 251	99 Es 252	100 Fm 257	101 Md 258	102 No 259	103 Lr 262													

**QUESTION 3.2**

**NAME:** \_\_\_\_\_

