



**EASTERN CAPE**  
**PROVINCE**

**GRADE 10**

**JUNE 2016**

**PHYSICAL SCIENCES PAPER 2**

**TIME: 1:30 HRS**

**MARKS: 100**

**This paper consists of 6 pages**

## INSTRUCTIONS

1. Answer ALL questions.
2. Number the questions according to the numbering system used in the question paper.
3. Non-programmable calculators may be used.
4. Write neatly and do your calculations as accurately as possible.
5. Data sheet is provided for your use.

## QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A-D) next to the question (1.1 -1.7).

1.1  $\text{PbO}_2$  is the chemical formula for

- |   |                 |   |                  |
|---|-----------------|---|------------------|
| A | Lead (II) Oxide | B | Lead (IV) Oxide  |
| C | Lead (I)        | D | Lead (III) Oxide |
- (2)

1.2 Which one of the following formulae for compounds of an alkaline earth metal 'M' is not correct.

- |   |                           |   |                             |
|---|---------------------------|---|-----------------------------|
| A | MOH                       | B | $\text{M}_3(\text{PO}_4)_2$ |
| C | $\text{M}(\text{NO}_3)_2$ | D | MO                          |
- (2)

1.3 Which statement(s) below is/are true regarding the following two ions?



- (i) Each atom has twice as many neutrons as protons.
- (ii) They both have same number of electrons.
- (iii) Elements A & B are both in the same group on the periodic table.

- |   |              |   |                |
|---|--------------|---|----------------|
| A | (i) and (ii) | B | (ii) and (iii) |
| C | only (i)     | D | only (ii)      |
- (2)

1.4 A "sea of delocalized free electrons" is found in

- |   |          |   |        |
|---|----------|---|--------|
| A | Sulphur  | B | Copper |
| C | Chlorine | D | Neon   |
- (2)

1.5 The mass of a hydrogen atom is 0,000 000 000 000 000 000 000 0017kg. In scientific notation this would be written as

- |   |                               |   |                               |
|---|-------------------------------|---|-------------------------------|
| A | $1,7 \times 10^{-24}\text{g}$ | B | $1,7 \times 10^{-27}\text{g}$ |
| C | $1,7 \times 10^{-26}\text{g}$ | D | $1,7 \times 10^{27}\text{g}$  |
- (2)

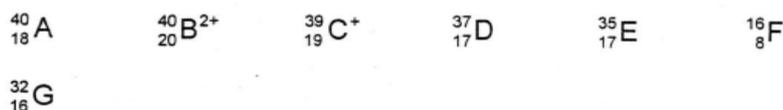
- 1.6 Which of the following compounds is not ionic in nature?
- |   |                          |   |               |     |
|---|--------------------------|---|---------------|-----|
| A | $\text{SiO}_2$           | B | $\text{NaCl}$ |     |
| C | $\text{Na}_2\text{SO}_4$ | D | $\text{KCl}$  | (2) |

- 1.7 A tight metal lid on a jar of jam may loosen when it is held in hot water. This is because the hot water causes\_\_\_\_\_.
- A the glass jar to contract  
B the metal to contract  
C the glass jar to expand more than the metal lid  
D the metal lid to expand more than the glass jar (2)

**[14]**

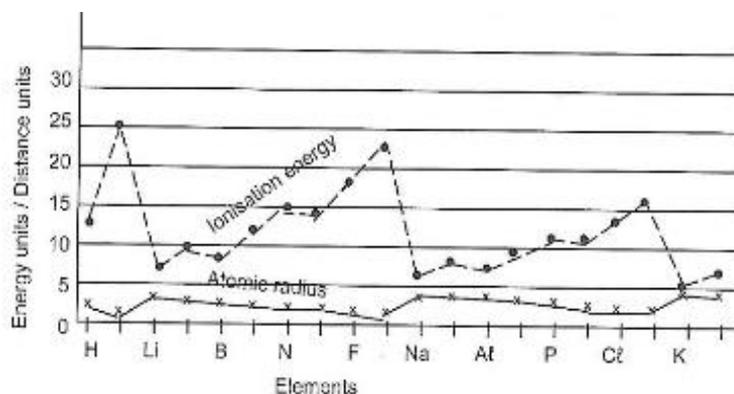
## QUESTION 2

- 2.1 Consider the following atoms/ions: (the letters do not represent real elements)



- 2.1.1 Define the term atomic number. (2)
- 2.1.2 Explain how it is possible for A and B to have the same mass number (2)
- 2.1.3 In what way do B and C correspond? (1)
- 2.1.4 Which of the above atoms/ions have an electron arrangement which is the same as that of a noble gas? List them all. (3)
- 2.1.5 Which pair will not be electrically neutral? (2)
- 2.1.6 Draw the Aufbau diagram for F. (2)
- 2.1.7 To which group of the periodic table does G belong? (2)
- 2.2 2.2.1 Define the term isotope. (2)
- 2.2.2 The pair D and E represents isotopes, they are present in the ratio 25% 75% respectively. Calculate relative atomic mass of the element. (3)
- 2.2.3 Would this pair have the same chemical properties? Give a reason for your answer. (3)

- 2.3 A group of learners investigated the relationship between atomic radius and ionisation energy for ten elements. The graph was obtained from the data collected during the investigation.

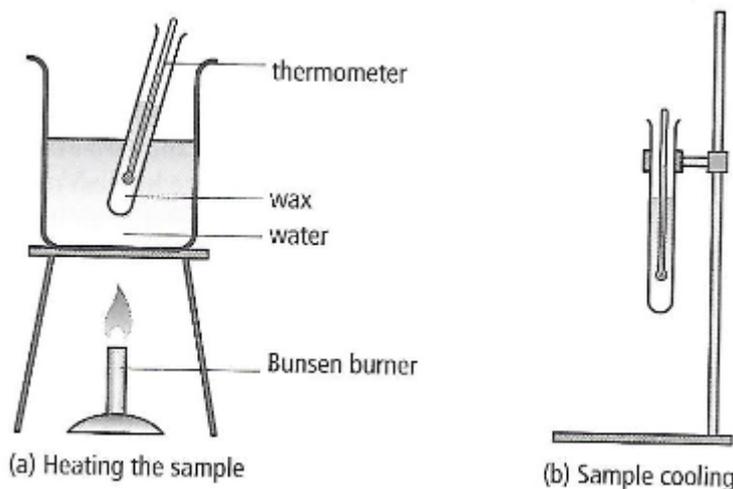


- 2.3.1 Examine the graph and describe 2 general trends in the atomic radius. (2)
- 2.3.2 From the graph describe the relationship between atomic radius and ionisation energy. (3)
- 2.3.3 Apply the trends observed in this graph and predict which one of
- Rb or Sr atoms will be the smallest. (1)
  - Rb or Cs atoms will lose an electron in the gaseous phase the easiest. (1)

[29]

### QUESTION 3

- 3.1 Jenny wants to measure the melting point of wax. She uses the apparatus shown in the diagram



- 3.1.1 Write an investigative question for her experiment. (2)
- 3.1.2 Look at the diagrams of her experiment and write a point-by-point method. (3)

3.1.3 Why do you think she used a water bath to heat the wax? (2)

3.2 Jenny recorded the following results:

Time (min)	0	1	2	3	4	5	6	7	8	9	10
Temperature	70	65	60	55	55	55	55	52	50	47	44

3.2.1 Which is the independent variable? (2)

3.2.2 Which is the dependent variable? (2)

3.2.3 Plot the cooling curve for wax; place the independent variable on the x-axis. Label the parts of the graph where the wax is a solid, a liquid and where it is at its melting point. (5)

3.3 The table below shows the melting and boiling points of five substances.

	Water	Ethanol	Chlorine	Bromine	Phosphorus
Melting point	0	-114	-102	-7	44
Boiling point	100	78	-34	59	280

3.3.1 Which substance has the lowest boiling point? (1)

3.3.2 What is the melting point of ethanol? (1)

3.3.3 Which of these substances are solid at room temperature (about 25°C)? (2)

3.3.4 Which substances are liquid at room temperature? (3)

3.3.5 Which substance is/are gaseous at room temperature? (2)

3.3.6 Which substance is a liquid over the smallest temperature range? (2)

**[27]**

#### QUESTION 4

4.1 Consider the following equation:



4.1.1 Why is the above reaction described as a chemical change? (2)

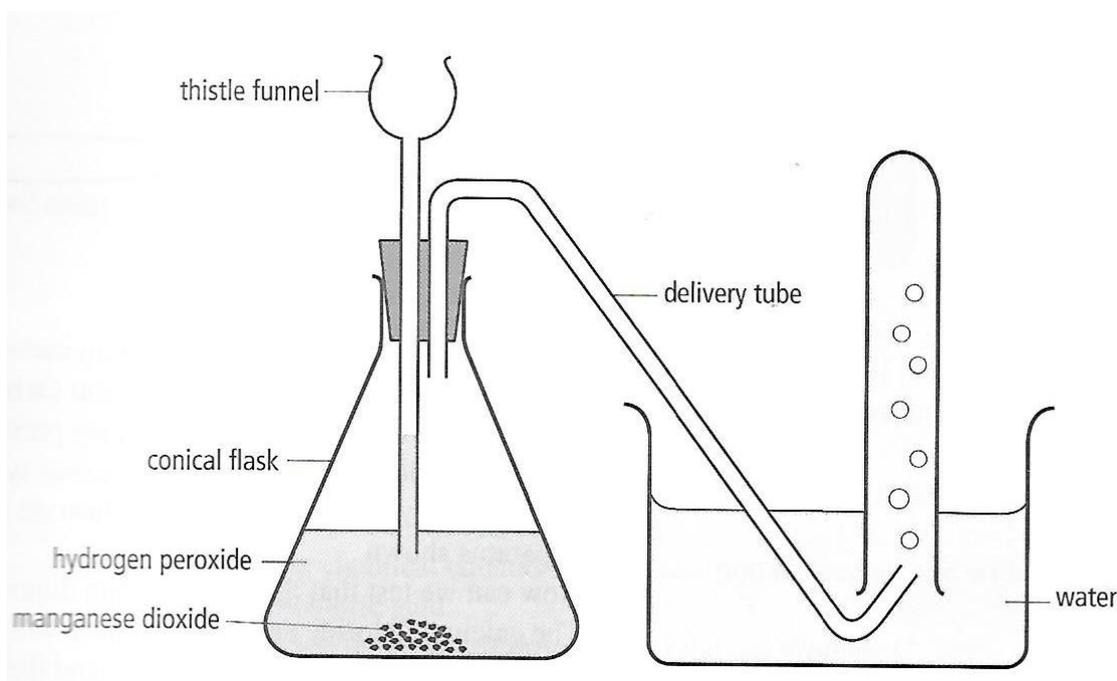
4.1.2 Write the formula name for  $\text{Pb}(\text{NO}_3)_2$  and  $\text{NaI}$  (4)

4.1.3 Balance the chemical equation. (2)

4.1.4 State the law of conservation of mass. (2)

4.1.5 Show that the mass is conserved in the reaction. (5)

4.2 The following apparatus was set up to investigate the decomposition of hydrogen peroxide. Study the diagrams carefully and then answer the questions that follow.



- 4.2.1 What is the chemical formula for hydrogen peroxide? (2)
- 4.2.2 Name / give the chemical formula of the products that are formed? (4)
- 4.2.3 What observation in the test tube indicates that a gas has formed? (2)
- 4.2.4 Suggest a method to test for the gas that formed in the test tube. (2)
- 4.2.5 State 2 physical properties of the gas formed. (2)
- 4.2.6 A molecule of gas that formed combines with an oxygen atom to form ozone. what is the chemical formula of ozone? (1)
- 4.2.7 After the reaction manganese dioxide was not used up but still present in the conical flask. What is the role of manganese dioxide? (2)

**[30]**

**TOTAL: 100**