PHYSICAL SCIENCES PRE JUNE PAPER 2 GRADE 10   DATE 2016 MARKS 150 DURATION: 2Hrs

QUESTION 1 (MULTIPLE CHOICE QUESTIONS)Four possible options are provided as answers to the following questions. Each question has only **ONE** correct answer. Choose the answer, which in your opinion, is the correct or best one.

1.1   A mixture that has distinguishable phases is called….

A. Homogeneous mixture   C. heterogeneous mixture

B. solution   D. solvent

1.2   Which one of the following methods can be easily used to separate mud from muddy water?

A distillation   C hand sorting

B evaporation   D filtration

1.3   The outer electron structure of a magnesium ion (Mg^{2+}) is exactly the same as :

A. Calcium   C. Argon
B. Oxygen   D. Magnesium atom

1.4   Which one of the following is NOT a chemical change?

A. Digestion of food   C. Separating nitrogen from air

B. Ripening of tomato   D. Souring of milk

1.5   The process whereby solid substances change directly to gaseous phase is called…

A. Evaporation   C. Condensation

B. Sublimation   D. Melting

1.6   A compound consists of the ions M^{2+} and R^{2-} A possible formula for the compound could be:

A M_2R_2 B MR

C 2MR   D $2M_2R$

1.7   Isotopes of an element have different ……….

A atomic numbers   B number of protons

C number of electrons   D number of neutrons

1.8　When atom X of an element in Group 1 ionize to become X⁺, the ………

A mass number of X increases   C change of the nucleus increases

B atomic number of X decreases   D number of occupied energy levels decreases

1.9　Which of the following is true for metal?

	Electrical conductivity	Thermal conductivity
A	Good	Good
B	Good	Poor
C	Poor	Good
D	poor	poor

1.10　Pure silicon is considered as a METALLOID because it….

A　is malleable and ductile

B　exhibits metallic bonding

C　Exhibits metallic and non- metallic properties

D　Is an excellent conductor of both heat and electricity

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QUESTION 2

Grade 10 learners were given the substance in the table below.

Brass	Sand	Oxygen gas	Sugar	Carbon dioxide
copper	Pure air	Salt solution	Table salt	Magnesium oxide

2.1　From the above table, write down:

2.1.1 An element   (1)

2.1.2 A homogeneous mixture   (1)

2.1.3 A diatomic gas   (1)

2.1.4 A compound which is a solid at 25ºC   (1)

2.1.5 A heterogeneous mixture   (1)

2.2　A group of learners performed an experiment to separate a mixture of sand and sugar. The experiment is done in three steps, as shown in the diagram below:

Step 1   Step 2   Step 3
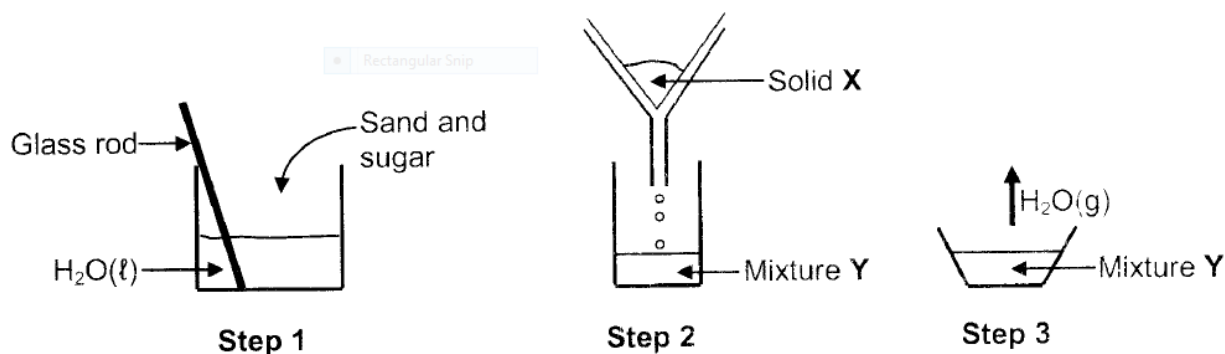
2.2.1   Write down the name of:

       (a)   The process illustrated in **step 2**   (1)

       (b)   The process illustrated in **step 3**   (1)

       (c)   Solid **X**   (1)

       (d)   Mixture **Y**   (1)

2.2.2   Is **step 3** a CHEMICAL or PHYSICAL process? Give a reason for the   (2)
            answer.

2.3   Classify the following substances as an element, a compound or a mixture:
       (a) Milk   (1)

       (b) Blood   (1)

       (c) nine carat gold earring   (1)

       (d) Table salt   (1)

       (e) Oxygen   (1)

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QUESTION 3

3.1 The table below shows the boiling and melting points of a substance A to D

SUBSTANCE	BOILING POINT (^{o}C)	MELTING POINT (^{o}C)
A	78	-117
B	444	133
C	-188	-220
D	184	90

3.1.1   Define the term boiling point.   (2)

3.1.2   From the above table, write down THE LETTER (A-D) that represents the
         substance having the following descriptions:
         (a) Liquid at 100⁰C   (1)
         (b) Solid at 100⁰C   (1)
         (c) Gas at 25⁰C   (1)

    3.1.3 Which ONE of the following diagram represents the PARTICLE ARRANGEMENT of
    substance A at   -120⁰C? Write down only I, II, or III   (1)

        I   II   III
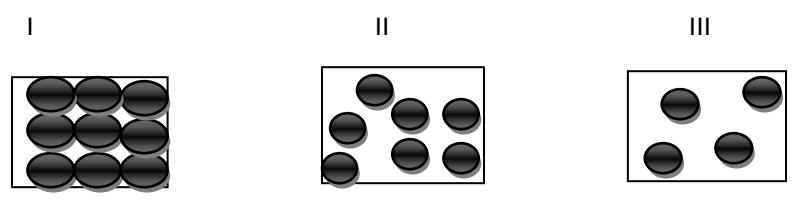
    3.2 The heating curve of a substance is shown below.
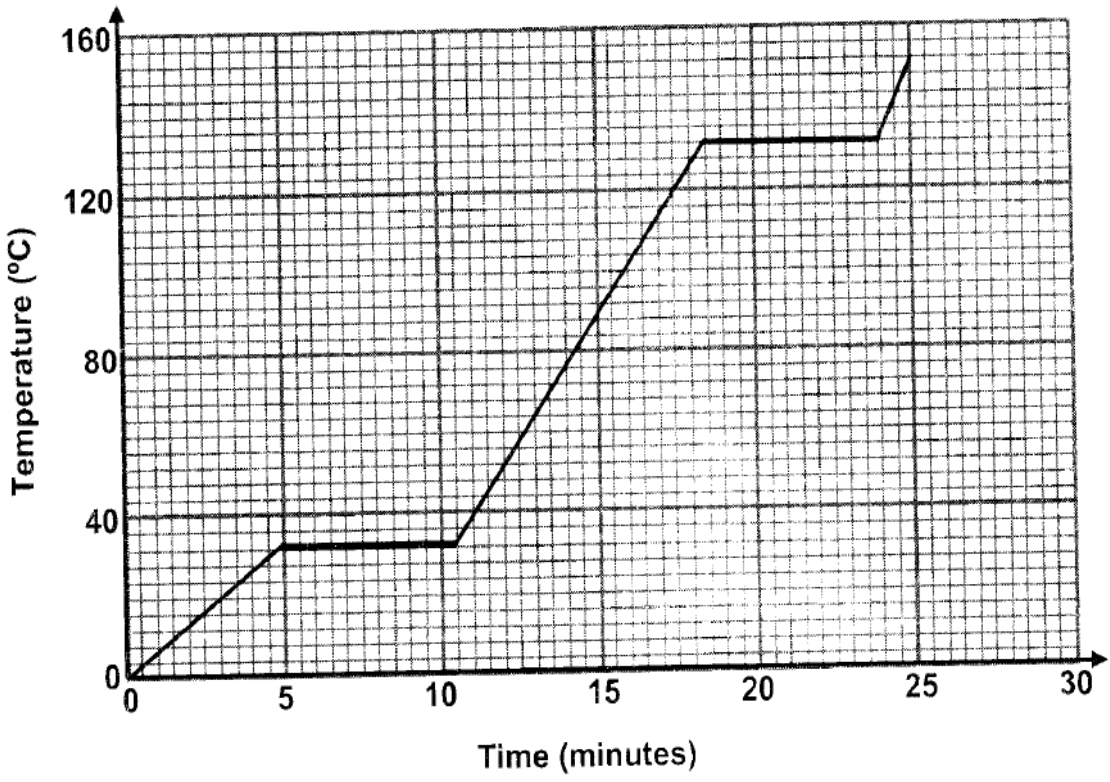
3.2.1   Write down the physical state of the substance at t=15 minutes.   (1)
3.2.2   What is the boiling point of the substance?   (1)
3.2.3   How will the average kinetic energy of the particles of the substance are affected between:
        (Write down only INCREASES, DECREASES Or REMAIN THE SAME.)

        (a) T=0 minutes and t=5 minutes   (1)
        (b) T=5minutes and t=10 minutes   (1)
3.2.4   Refer to the kinetic molecular theory to fully explain the answer to QUESTION 3.2.3(b)   (3)

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QUESTION 4

Chlorine is a non-metallic element with an atomic number of 17 and can exist as isotopes.

4.1 Define the following:
4.1.1 Atomic number   (2)
4.1.2 Isotope   (2)
4.2   Natural chlorine consists of Cl-35 and Cl-37.
        4.2.1 Write down the sp-notation for Cl-37   (2)
        4.2.2 The relative atomic mass of chlorine is 35.5. Calculate the percentage of Cl-35 in   (4)
              natural chlorine
4.3   Write down the:
        4.3.1 Number of valence electrons in a chlorine atom   (1)
        4.3.2 Type of bonding in chlorine molecule   (1)
        4.3.3 Lewis structure for the chlorine molecule   (2)
4.4   Calcium reacts with chlorine to form calcium chloride
        4.4.1 Draw the Aufbau diagram for a calcium ion.   (3)
        4.4.2 Write down the chemical symbols of the particles found in the calcium chloride   (2)
              crystal (lattice).
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QUESTION 5

5.1 An atom of element X has an atomic number of 11 and mass number of 23.

(a) How many protons, electrons and neutrons are in this atom?   (3)

(b) A different atom of X has an atomic number of 11, but a mass number of 24. Give a name for these two forms of X .   (2)

(C) Would these two atoms have similar chemical properties? Give a reason for your answer. (2)

Element Y is in the same group as X, but in the period below X.

(d) Give the chemical name for the element Y.   (1)

(e) Compare the ionization energy of these two atoms which would have the largest value? Give a reason for your answer.   (2)

(f) Give the chemical formula of the compound that is formed when element Y combines with chlorine.   (2)

(g) Draw the Lewis structure to show the formation of the bond that has occurred in this compound.   (2)

5.2 James picks up a brittle black solid that he calls element Z. He notes that it can conduct electricity and heat and that it is often used to make fires for cooking or heating. It can also be found in another form, a clear solid that is very hard. This form of Z is often used in fine jewellery. It does not react with acids. The element is found between group 13 and 15.

(a) Is element Z a METAL or NON METAL.? Give a reason for your answer.   (2)

(b) Identify element Z.   (2)

(c) Explain why element Z can be found as a brittle black solid, and a colourless hard solid if it is the same element.   (3)

                                                                                    [21]

QUESTION 6

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

ELEMENT	FIRST IONISATION ENERGY (kj.mol^{-1})	ELECTRON AFFINITY (KJ.MOL^{-1})
Sodium	496	53
Magnesium	738	0
Aluminium	578	44
Silicon	786	134
Phosphorus	1012	72
Sulphur	1000	200
Chlorine	1251	349
Argon	1521	0

6.1.1 Explain the difference between ionization energy and electron affinity.   (2)

6.1.2 Give a reason for the trend in the ionization energy as shown in the table.   (1)

6.1.3 How will the SECOND ionization energy of sodium compare to that of magnesium? Write down only HIGHER THAN, LOWER THAN or EQUALS TO. Explain the answer.   (3)

6.1.4 Which ONE of the above elements has the greatest tendency to form negative ions? Refer to the data in the table to give a reason for the answer.   (2)

6.2 Study the substances (A-E) in the table below and answer the question that follow.

	SUBSTANCE
A	Sulphur powder
B	Sodium chloride crystals
C	Copper wire
D	CO$_2$(S) [DRY ICE]
E	A diamond

6.2.1 Write down the LETTER(S) that represent(s):
(a) A substance with a giant atomic lattice   (1)
(b) A substance with a lattice consisting of positive ion and delocalized valance electrons. (1)
(c) TWO substances with intermolecular force between particles.   (2)
6.2.2 Use Lewis structure to show the formation of substance **B**   **(4)**
6.2.3 Substance D undergoes SUBLIMATION .Represent the change with a chemical equation.(2)

6.2.4 Define sublimation.   (2)

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QUESTION 7

Magnesium ribbon burns in oxygen with a bright white flame to produce a white solid, magnesium oxide.

7.1 Name   the type of chemical bonding in:

7.1.1 Magnesium ribbon   (1)

7.1.2 Magnesium oxide   (1)

7.2 Is the reaction between magnesium ribbon and oxygen a PHYSICAL or CHEMICAL change? Give a reason for the answer.   (2)

7.3 Write down a balanced equation for the reaction between magnesium and oxygen.   (3)

7.4 Use the law of conservation of mass to show that mass is conserved during the reaction in QUESTION 7.3.   (4)

7.5 Give the NAME of the following compounds:

7.5.1 (a) Na_2Co_3 (2)

(b) $AgNo_3$ (2)

(c) HCl   (2)

7.5.2 Give the chemical formula of the following compounds

(a) Ammonia   (2)

(b) Sulphuric acid   (2)

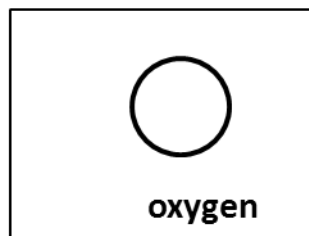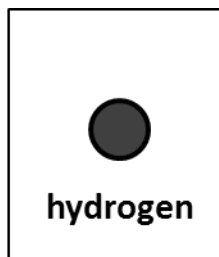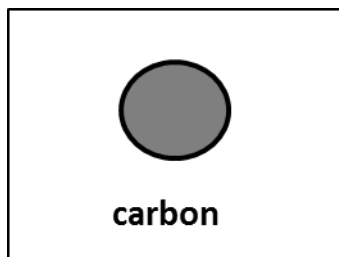(c)Potassium permanganate   (2)

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QUESTION 8

8.1 Copy the following table into your answer book and write the formula of the compounds that are formed from the following pairs of ions. The first one is done for you.

Ions	Cl^-	SO_4^{2-}	NO_3^-
k^+	KCl		
cu^{2+}			
NH_4^+			

(8)

8.2 Use the key below to answer question 8.2 1 to 8.2

carbon   hydrogen   oxygen

8.2.1 Draw diagrams of the following molecules:

(a) Water   (2)

(b) Ethane (C_2H_6)   (2)

8.2.2 Write chemical formula for the following molecules:

(a)   (2)

(b)

                                               (2)

(c) State whether the bond between ethane is water ionic or covalent.   (1)

(d) Name the compound drawn in (b) above   (1)

                                               [18]

GRAND TOTAL: 150