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Republic of Somaliland

Somaliland National Examination Board

Form Four

CHEMISTRY EXAMINATION

2015 - 2016

TIME 2 HOURS

Plus 10 minutes for reading through the paper

INSTRUCTIONS TO CANDIDATES

This paper consists of 16 printed pages

Count them now. Inform the invigilator if there are any missing

There are two parts:

PART 1:	20 Multiple Choice Questions	20 Marks
PART 2:	8 Structured Questions	80 Marks
TOTAL		100 Marks

- Answer all questions in part 1 and 2.
- No extra paper is allowed

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PART 1: Multiple Choice Questions:

(20 Marks)

1. The chemical symbol for Mercury is
 - a) Mg
 - b) Hg
 - c) Ag
 - d) Si
2. The chemical symbol for calcium is Ca and the chemical formula for phosphate ion is PO_4^{3-} , the chemical formula for calcium phosphate is
 - a) CaPO_4
 - b) $\text{Ca}_2(\text{PO}_4)_3$
 - c) $\text{Ca}(\text{PO}_4)_2$
 - d) $\text{Ca}_3(\text{PO}_4)_2$
3. Ionic bond is the electrostatic force of attraction between :
 - a) Two metal ions
 - b) Two non-metal ions
 - c) Metal and non-metal ions
 - d) Two gases
4. In which period and group does the element with the electronic, arrangement below belong $1s^2 2s^2 2p^6 3s^1$ or 2, 8, 1
 - a) Period 2, group 2
 - b) Period 1, group 1
 - c) Period 3, group 1
 - d) Period 3, group 2
5. Reduction is
 - a) Gain of electrons
 - b) Loss of electrons
 - c) Sharing of electrons
 - d) Transfer of electrons

6. Temporary hardness of water is caused by
- Calcium sulphate
 - Sodium hydrogen carbonate
 - Calcium chloride
 - Sodium chloride
7. Which property of the period table increases with increasing atomic number for both the alkali metals and the halogens
- Ionization energies
 - Melting points
 - Electro negativities
 - Atomic radii
8. How many different isomers of C_5H_{12} exist
- 1
 - 2
 - 3
 - 4
9. A solution with Ph of 8.5 is
- Acidic
 - Basic
 - Neutral
 - Salt
10. Sublimation is a change of state from
- Liquid to solid
 - Solid to liquid
 - Liquid to gas
 - Solid to gas
11. The ions present in the electrolysis of aqueous solution of Lithium bromide are
- Li^+ , Br^- , OH^- , OH^-
 - Li^+ , Br^- , H^+ , OH^-
 - Li^+ , Cl^- , OH^- , O^-
 - Na^+ , Br^- , H^+ , OH^-

12. Ethane is a member of the homologous series of

- a) Alcohols
- b) Alkyne
- c) Alkane
- d) Alkene

13. The reactivity of the following metals increases in the order of

- a) Mg, Ca, Al, Zn
- b) Ca, Al, Mg, Zn
- c) Zn, Al, Ca, Mg
- d) Al, Ca, Zn, Mg

14. An alloy is a

- a) Mixture of plastics
- b) Mixture of metals
- c) Aqueous solution of compounds
- d) Compound

15. Hygroscopic substances are

- a) lose water to the atmosphere
- b) absorb water from the atmosphere
- c) Salts that dissolve
- d) Salts that do not dissolve

16. The nucleus of an atom contains

- a) Protons and electrons
- b) Electrons and neutrons
- c) Protons and neutrons
- d) Protons only

17. The correct name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ is

- a) Pentane
- b) Octane
- c) Butane
- d) Methane

18. The reaction below is an example of $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

- a) Combination / synthesis
- b) Precipitation
- c) Neutralization
- d) Decomposition

19. The process of manufacturing sulphuric acid in large scale is called

- a) Haber process
- b) Contact process
- c) Frasch process
- d) Partition process

20. One mole of any gas at room temp- and pressure contains

- a) 24 cm^3
- b) 22.4 cm^3
- c) 24 dm^3
- d) 22.4 dm^3

PART 2: 8 STRUCTURED QUESTIONS.

80 MARKS

1. Define:

a) i) Element (2 Marks)

ii) Compound (2 Marks)

iii) Mixture (2 Marks)

b) Copy and complete the table below that compares a mixture and a compound by filling in the spaces provided in (i) ----> (iii) correctly.

(3 Marks)

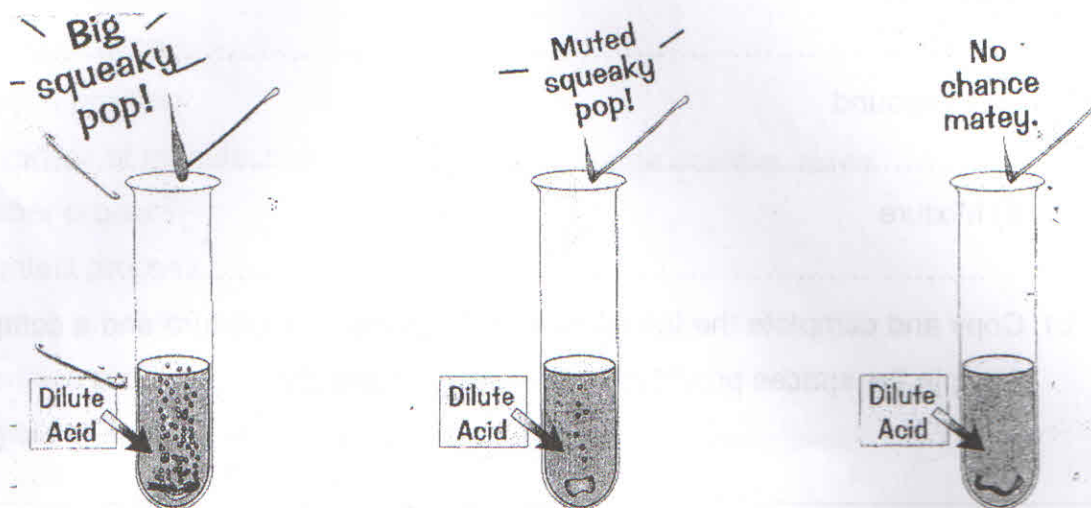
Mixture	Compound
a) Separation can be done by physical method	Separation cannot be done by physical method
b) The substances combine in any proportion	i)
c) There is no heat changes involved	ii)
d) Substances do not form new substances	iii)

c) Write a word equation for the reaction between Iron and

i) Sulphur (1 Mark)

ii) Hydrochloric acid (1 Mark)

2. The diagram below shows the reactivity of three different metals with dilute acids



Using the information in the above diagram answer the following questions:

a) i) Which metal gives most bubbles?

(1Mark)

.....

ii) Which metal gives least bubbles?

(1mark)

.....

b) Arrange the metals in order of reactivity the most reactive ----->least reactive?

(2 Marks)

.....

c) Complete the missing spaces with the appropriate answers for the following equation:

(3 Marks)



d) How do you test a hydrogen gas?

(1Mark)

.....

.....

3.

Li						
Na					Cl	Ar
Ca						

-

-

-

-



c) Calcium is in group two of the periodic table

i) Write the electronic arrangement of Ca.

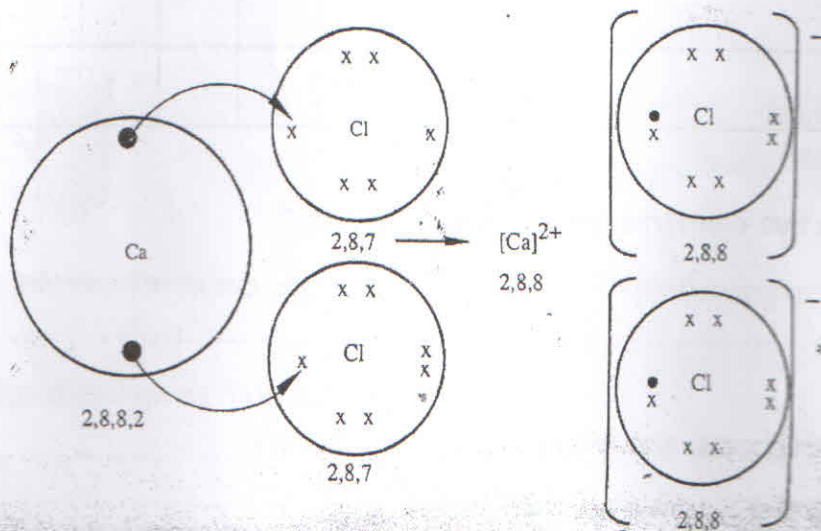
(1mark)

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d) Calcium reacts with chlorine to form calcium chloride



i) Explain in terms of electron transfer, how bonding between calcium and chlorine are formed?

(2Marks)

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4. The table below gives some information about some of the halogen elements in group 7 of the periodic table

Element	Atomic number	Melting point $^{\circ}\text{C}$	Boiling points $^{\circ}\text{C}$	Atomic radius	Colour	Electron arrangement
Fluorine	9	-220	-188	0.071	Colourless	
	17	-101	-34	0.099	Greenish Yellow	
Bromine	35	- 7	58	0.114	Orange	2,8,18,7
Iodine	53	114	183	0.133	Black	2,8,18,58,7

Using the information in the table above answer the following questions:

- a) i) Fill the missing spaces in the table with the appropriate answers. (3Marks)
b) i) Which halogen is liquid at room temperature? (1Mark)

.....

- ii) Which halogen is solid at room temp? (1Mark)

.....

- iii) Which halogen is a gas at room temp? (1Mark)

.....

- c) Bromine has an electronic configuration of 2, 8, 18, 7

- i) State the period and group of bromine in the period table? (2Marks)

.....

.....

- d) i) How does the atomic radius of the elements change as you go down the group? (2 Marks)

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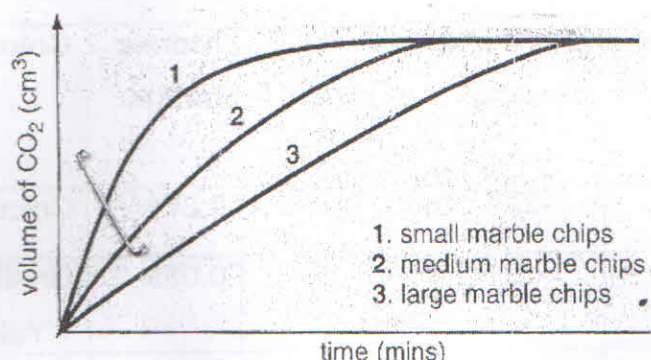
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- ii) How do the melting points of the elements change as you go down the group?

..... (2 Marks)

.....

5. A group of Farah Omar students investigates the effect of surface area on the rate of reaction.



They performed three experiments using small marble chips, medium marble chips and large marble chips as shown in the graph of the above diagram.

Using the information in the graphs of the above diagram and answer the following question.

- a) i) Which graph shows the fastest reaction? (2Marks)

Give a reason to your answer?

.....

.....

.....

- ii) Which graph shows the slowest reaction? (2Marks)

Give a reason to your answer?

.....

.....

.....

- b) i) State the factors that affects the speed of the reaction? (2Marks)

.....

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- c) The contact process for the manufacture of sulphuric acid is represented as follows: $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ $\Delta H = -197 -1 \text{ KJmol}$

- i) What does the symbol \rightleftharpoons represents? (1Mark)

.....

ii) What does the symbol $\Delta H = -197 \text{ kJmol}$ tells? (1Mark)

.....

.....

d) How does the rate of production of SO_2 is effected by :

- Using a catalyst (2Marks)

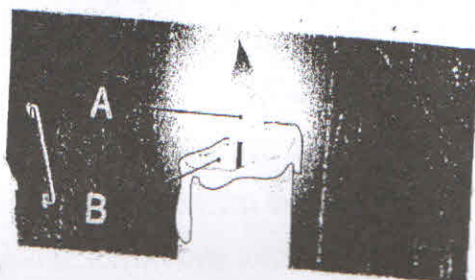
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6. The diagram below is a setup to investigate the products of a burning candle.



a) i)What are the products of a burning a candle ? (1Mark)

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ii) Which label (A or B) shows a chemical change and which show a physical change? (1Mark)

.....

.....

b) candle wax is a hydrocarbon :

i)Define the term hydrocarbon ? (1Mark)

.....

.....

ii) State the general formula of alkynes? (1Mark)

.....

.....

iii) Give the names of the first two members of alcohols. (2Marks)

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c) Heat from a burning compound was used to heat 100 cm^3 of water in a beaker.
The following results were obtained

Initial temperature of water	= 21°C
Final temperature of water	= 46°C
Mass of compound burnt	= 0.4g
Specific heat capacity of water	= 4.2 kJmol^{-1}
Density of water	= 1g cm^3
Relative molecular mass of compound	= 46 g

i) Calculate the rise in temperature ? (1Mark)

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.....

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ii) Calculate the amount of heat produced by the compound? (2Marks)

.....

.....

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iii) Calculate the molar heat of combustion of the compound? (2Marks)

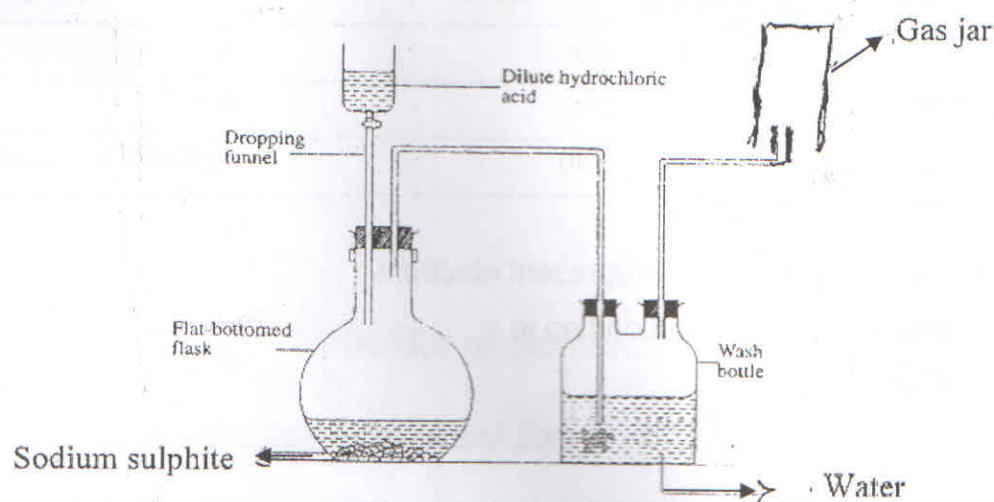
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7. Sulphur dioxide is denser than air and is soluble in water. Sulphur dioxide is formed when dilute hydrochloric acid is added to solid sodium sulphite

Use the diagram below to answer the following questions.



- Suggest any two mistakes in the construction of the apparatus in the experiment. Using the above information (2Maks)
.....
.....
- Write a balanced chemical equation for the reaction of sodium sulphite and hydrochloric acid. (2Marks)
.....
.....
- State two uses of sulphur dioxide (2Marks)
.....
.....
- Explain why sulphur dioxide should not be allowed to escape into the atmosphere for environmental reasons? (3marks)
.....
.....
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.....

8. a) For each of the substances given, complete the table by giving the type of bond and structure required (5 Marks)

	Substance	Type of bond	Structure
A	Carbon dioxide	Covalent	Molecular (simple)
B	Water	i)	v)
C	Carbon (diamond)	ii)	iv)
D	Sodium chloride	iii)	vi) Giant ionic compound

- b) Using dot (.) and cross (x) to represent electrons

Draw a diagram to show the bonding in

- i) Methane (1 Mark)

.....
.....

- ii) Water (1 Mark)

.....
.....

- c) We know aqueous solution of salts have free ions because they conduct electricity. Classify the substances listed below as electrolytes or non-electrolytes.

- i) Molten salt (1 Mark)
 ii) Insoluble solids (precipitates) (1 Mark)
 iii) Gases (N_2 , O_2 , SO_2) (1 Mark)
 iv) Soluble bases ($NaOH$, KOH) (1 Mark)

END