Name:……..**Signature:**……..**Stream:**.....

545/2
CHEMISTRY
Paper 2
Mar./April.2020 **S.3**
2 hours.

THE CHEMISTRY DEPARTMENT

MIDTERM ONE EXAMINATIONS-2020

CHEMISTRY

Paper 2

2 hours 30 minutes

INSTRUCTIONS:

*Section **A** consists of 10 structured questions. Answer **all** questions in this section.*

*Answers to these questions **must** be written in the spaces provided.*

*Section **B** consists of 4 semi-structured questions. Answer any **two** questions from this section. Answers to these questions **must** be written in the answer booklet(s) provided.*

*In both sections **all** working must be clearly shown.*

Where necessary use;
[*H=1; C=12; N=14; O=16; Na=23; S=32; Cl=35.5*]
1 mole of gas occupies 24l at room temperature
1 mole of gas occupies 22.4 l at s.t.p.

For Teachers' Use Only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	**Total**

SECTION A (50 MARKS)

Answer **all** *questions in this section.*

1. (a) Name two liquids that are;

   (i) miscible (01 mark)

   .....

   .....

   (ii) immiscible (01 mark)

   .....

   .....

   (b) State a method, which can be used to separate components of the liquid mixture in;

   (i) a(i) above. (01 mark)

   .....

   (ii) a(ii) above. (01 mark)

   .....

   (c) Name two substances that would form a mixture that can be separated by fractional crystallization. (01 mark)

   .....

   .....

2. A hoe left in the garden for some weeks, was found coated with some brown solid deposits.

   (a) (i) Write the chemical formula of the brown solid. (01 mark)

   .....

   (ii) State the conditions which led to the formation of the solid. (01 mark)

   .....

   (b) (i) State two methods by which formation of the brown solid can be prevented. (02 marks)

   .....

   .....

(ii) Give one reason why formation of the brown solid needs to be prevented. (01 mark)

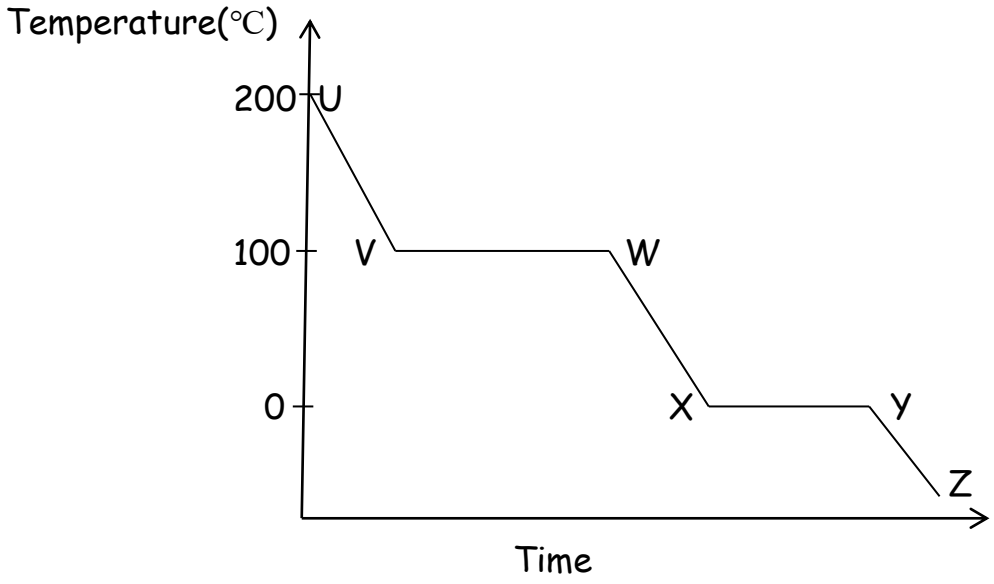
.....

.....

3. (a) State one physical method that can be used to determine the purity of water in the laboratory. (01 mark)

.....

(b) The sketch graph below shows a variation in temperature of water with time.



(i) What does the sketch graph represent? (01 mark)

.....

(ii) Name the process that takes place along; (01 mark)

VW.....

XY.....

(c) Identify the physical state of water at; (02 marks)

(i) YZ.....

(ii) WX.....

4. (a) Oxygen can be prepared in the laboratory at room temperature, by adding a solution of hydrogen peroxide onto manganese(IV) oxide.

(i) Write equation for the reaction that leads to the formation of oxygen. (1 ½ marks)

.....

.....

(ii) State the role of manganese(IV) oxide. (01 mark)

.....

(b) State how the rate of production of oxygen under the conditions stated in (a) above , would compare with its rate of production , if the preparation was carried out;

(i) Using a mixture of manganese(IV) oxide and a more dilute hydrogen peroxide solution. (01 mark)

.....

(ii) At a temperature above room temperature. (01 mark)

.....

(iii) Without using manganese(IV) oxide. (01 mark)

.....

5. When element Q, was heated with copper(II) oxide, a brown solid and substance QO was formed. Substance QO was yellow when hot and white when cold.

(a) Identify;

(i) element Q (½ mark)

.....

(ii) the brown solid (½ mark)

.....

(iii) substance QO (½ mark)

.....

(b) Write equation for the reaction that took place when copper(II) oxide was heated with the element you have identified in (a) above. (1 ½ marks)

.....

.....

(c) (i) State what is observed when element Q is dipped into a solution of copper(II) sulphate and allowed to stand for sometime. (01 mark)

.....

.....

.....

(ii) Give a reason for your answer. (01 mark)

.....

.....

6. The figure below shows part of the Periodic Table. The letters are not the usual symbols of the elements used.

I	II	III	IV	V	VI	VII	VIII
					L		Y
		M		H			
X	R		J			D	
Q	Z						

(a) State the general name given to the elements belonging to the group of : (1 ½ marks)

(i) X.....

(ii) Z.....

(iii) D.....

(b) Arrange elements Q, R, M, X and Z in their order of increasing reactivity. (01 mark)

.....

.....

(c) State whether the compound formed between the following pairs of elements conducts or doesnot conduct electricity in solution.

(i) J and D.....

(ii) M and L.....

(01 mark)

(d) Name the conducting particles in;

(i) Element Z.....

(ii) Compound formed between M and L.....

(02 marks)

7. (a) A compound Z contains 14.3% hydrogen by mass, the rest being carbon. Calculate the empirical formula of Z. (02 marks)

($C = 12; H = 1$)

.....

.....

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.....

.....

(b) The relative molecular mass of Z is 28. Determine the molecular formula of Z. (1 ½ marks)

.....

.....

.....

.....

8. Hydrogen gas can be prepared in the laboratory, by reaction between magnesium and sulphuric acid.

(a) (i) Write an ionic equation for the formation of hydrogen from magnesium. (1 ½ marks)

.....

.....

(ii) State the condition(s) for the reaction (01 mark)

.....

(iii) State the method by which the hydrogen is collected after its preparation . (½ mark)

.....

(b) State the reason why the following acids are not suitable for the preparation of hydrogen.

(i) nitric acid. (01 mark)

.....

(ii) ethanoic acid (01 mark)

.....

(c) Write equation for the reaction between hydrogen and copper(II) oxide. (1 ½ marks)

.....

.....

9. (a) Define the term an "oxide". (01 mark)

.....

.....

(b) The following are some oxides of some elements.

Sulphur trioxide, carbon monoxide, aluminium oxide, sodium oxide and carbon dioxide. During an investigation, they were each separately treated with dilute nitric acid and sodium hydroxide solution. State the oxide(s) that reacted with;

(i) nitric acid only (01 mark)

.....

(ii) sodium hydroxide only (01 mark)

.....

(iii) both sodium hydroxide and nitric acid (01 mark)

.....

(iv) neither nitric acid nor sodium hydroxide (01 mark)

.....

.....

10. (a) Name the process by which hydrogen is converted to ammonia on a large scale. (01 mark)

.....

(b) One of the main uses of ammonia is the manufacture of fertilisers. Two such fertilisers are ammonium sulphate, $(NH_4)_2SO_4$ and Urea, $CO(NH_2)_2$. Calculate the percentage of nitrogen in;

(i) ammonium sulphate (1 ½ marks)

.....

.....

.....

.....

(ii) Urea (1 ½ marks)

.....

.....

.....

.....

(d) Which one of the fertilisers in (b) is a better fertilizer? Explain your answer. (01 mark)

.....

.....

SECTION B (30 MARKS)

Answer any **two** *questions from this section.*
Any additional question(s) answered will **not** *be marked.*

11. (a) Name the fundamental particles that make up matter. (02 marks)

(b) Water exists as a liquid, steam or vapour and ice under certain conditions. Name the process by which:

(i) Liquid water changes to ice. (01 mark)

(ii) Steam changes to liquid. (01 mark)

(iii) State the conditions necessary for the process(b)(ii).(02 marks)

(c) (i) State the kinetic theory of matter. (01 mark)

(ii) Using the kinetic theory of matter, describe the nature of ice. (02 marks)

(d) A drop of blue ink was added to water in a beaker at room temperature and the set up allowed to stand for some time.

(i) State what was observed. (01 mark)

(ii) Explain your observation in (d)(i) above. (02 marks)

(e) The water in the beaker was warmed and another drop of blue ink added to the water and left to stand for sometime.

(i) State what was observed. (01 mark)

(ii) Explain your answer in (e)(i) above. (02 marks)

12.(a) The atomic numbers of the elements M, X and Q are 6, 11 and 17 respectively.

(i) Explain what is meant by the term atomic number. (01 mark)

(ii) Write the electronic structures of Q, M and X. (03 marks)

(b) Q and M can each combine with X to form compounds.

(i) Use valency electrons to explain briefly how the atoms M and X, Q and X form compounds. (06 marks)

(ii) Write the structural formula of the compound formed when Q combines with X. (01 mark)

(c) State two properties of the compounds formed between;

(i) M and X (02 marks)

(ii) Q and X (02 marks)

13.(a) (i) State one reason why air is considered a mixture and not a compound. (01 mark)

(ii) Name one method by which the components of air can be separated. (01 mark)

(b) Oxygen gas can be prepared in the laboratory by addition of water to substance Q.

(i) Identify Q. (01 mark)

(ii) Write the equation for the reaction between water and Q. (1 ½ marks)

(iii) Draw a well labeled diagram of the set up that can be used to prepare oxygen from substance Q. (2 ½ marks)

(c) A piece of burning Sulphur was lowered into a gas jar of oxygen.

(i) State what was observed. (02 marks)

(ii) Write equation for the reaction that took place. (1 ½ marks)

(d) Water was added to the gaseous product in (c) and to the resultant solution was added blue litmus solution.

(i) State what was observed (01 mark)

(ii) Write equation for the reaction between water and the gaseous product in (c). (1 ½ marks)

(iii) Explain your observation in d(i) above. (02 marks)

14. A sample of dry hydrogen can be prepared in the laboratory using and hydrochloric acid and substance W, in presence of a catalyst.

(a) (i) Identify W (01 mark)

(ii) State the condition(s) for the reaction. (01 mark)

(iii) Name the catalyst used in this reaction. (01 mark)

(iv) Write equation for the reaction leading to formation of hydrogen. (1 ½ marks)

(b) Describe how a dry sample of hydrogen can be prepared from W and hydrochloric acid. (*No diagram is required*) (05 marks)

(c) Excess hydrogen reacts with lead(II) oxide under certain conditions.

(i) State the conditions for the reaction. (01 mark)

(ii) Write equation for the reaction for the reaction. (1 ½ marks)

(iii) Name the type of reaction in c(ii) above. (01 mark)

(d) Hydrogen burns in oxygen to form a compound, X.

(i) Name one substance that can be used to identify X. (01 mark)

(ii) State what would be observed when the reagent you have named in (d)(i) was used to identify the product. (01 mark)

END