**Candidates Name.**.....

**Signature.**.....**Random No.**...../...../...../...../...../.....**Personal No**.....

545/2

**CHEMISTRY**

**Paper 2**

**Aug/Sept.2022**

2 hours

**CHEMISTRY DEPARTMENT**

***Resourceful chemistry pre- UNEB set 2***

**UGANDA CERTIFICATE OF EDUCATION**

**PAPER 2**

**TIME. 2 hours**

**INSTRUCTIONS TO CANDIDATES.**

*Section* **A** *consists of* ***10*** *structured numbers*. *Attempt* **all** *questions in this section. Answers to this section must be written in the spaces provided.*

*Section* **B** *consists of* **4** *semi-structured questions. Attempt only* **2** *questions from this section. Answers to this section must be written in the answer booklets provided. In both sections*, **All** *working must be clearly shown.*

***Where necessary use, (Al = 27, C = 12 , O = 16 , N = 14 , S = 32, Pb = 207 )***

1 mole of a gas occupies ***24 l*** at room temperature.

1 mole of a gas occupies ***22.4 dm3*** at s.t.p

**For Examiners Use Only.**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |

**SECTION A(** 50 marks)

1.Zinc and iron are some of the metal elements from which different alloys can be made when each element is combined with ***one*** other element. Each pure metal element can also be used in different ways other than making of alloys.

(a)Name the alloy that contains, (01 mark)

(i) zinc. .....

(ii) Iron. .....

(b)Name one other element which is contained in the alloy named,

(i) in (a) ( i) above. ( ½ mark)

.....

(ii) in (a) (ii) above. ( ½ mark)

.....

(c)State one use of the alloy named,

(i) in (a) (i) above. ( ½ mark)

.....

(ii) in (a) (ii) above. ( ½ mark)

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(d)(i)Name the gas which is used in the manufacture of the alloy named in (a) (ii) from iron. ( ½ mark)

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(ii)Give one reason why the alloys named in(a) are preferably used instead of pure metals. ( ½ mark)

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(e) State one application of pure zinc in iron industry. ( ½ mark)

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2.(a)Write equation of reaction that takes place when hydrogen peroxide in a beaker is exposed to sunlight. ( 1 ½ mark)

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(b)Write the formula of compound formed when copper reacts with the gaseous product in (a). ( ½ mark)

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(c)A mixture of magnesium and the product in( b) was strongly heated until there was no further change .

(i) State what was observed ( 1 ½ marks)

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(ii)Explain your observations in (d) (i). ( 1½ marks)

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3.Below is part of the periodic table. The letters indicated are not the usual symbols of the elements but use the letters in the table to answer the questions that follow.

| | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|
| **2** | | | | E | | G | M | |
| **3** | A | B | D | | F | L | N | Q |
| **4** | | C | | | | | | |

(a)State which of the elements is the;

(i) most reactive metal. ( ½mark)

.....

(ii)Least reactive non metal. ( ½ mark)

.....

(b)(i) Write the formula of the ion formed by element D. ( ½ mark)

.....

(ii)Write the electronic configuration of the ion formed by element L.

( ½ mark)

.....

(c) Write equation of reaction of element B with water. (1½ mark)

.....

.....

(d)(i)Using outer most energy electrons, show how A forms a compound with G. ( 01 mark)

(ii)State the type of bond that exists in the compound formed between element E and N. ( ½ mark)

.....

4. (a)An organic compound **P** of formula mass 89.99 consists of 26.67% by mass of carbon; 2.22 % by mass of hydrogen and the rest being oxygen .

(i)Calculate the empirical formula of organic compound **P**. ( 02 marks)

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(ii)Determine the molecular formula of organic compound **P**. ( 1 ½ mark)

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(b)Aqueous solution of organic compounds has no effect on red litmus paper but changes blue litmus paper red.

(i) State what would be observed when 0.5 grams of potassium hydrogen carbonate were dropped into aqueous organic compound **P**. ( ½ mark)

.....

.....

(ii)Write ionic equation of reaction that took place. ( 1½ mark)

.....

.....

(5)(a) Gas **W** can be prepared in the laboratory in the laboratory from sodium sulphite and sulphuric acid.

(i)Name gas Is **W**. ( ½ mark)

.....

(ii)State the conditions of reaction between sodium sulphite and sulphuric acid to produce gas **W**. ( 01mark)

.....

.....

(ii)Write equation of reaction that took place leading to the formation of sulphur dioxide from **W**. ( 1½ mark)

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.....

(b)Gas **W** named in (a) was bubbled into acidified potassium dichromate( VI) solution.

(i) State what was observed? ( ½ mark)

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.....

(c)State the practical application of the reaction in ( b) in the laboratory.

( ½ mark)

.....

(d)State one industrial use of gas **W** . ( ½ mark)

.....

(6)During electrolysis; there is flow of electrons through the external circuit from one electrode to another.

(a)Name the type of electrode,

(i) to where electrons flow from the external circuit. ( ½ mark)

.....

(ii) from where electrons flow to the external circuit. ( ½ mark)

.....

(b)A direct current was passed through solid lead(II) iodide using graphite electrodes.

(i)State what was observed at the cathode. ( ½ mark)

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.....

(ii)Explain your observation in (i) (1½ marks)

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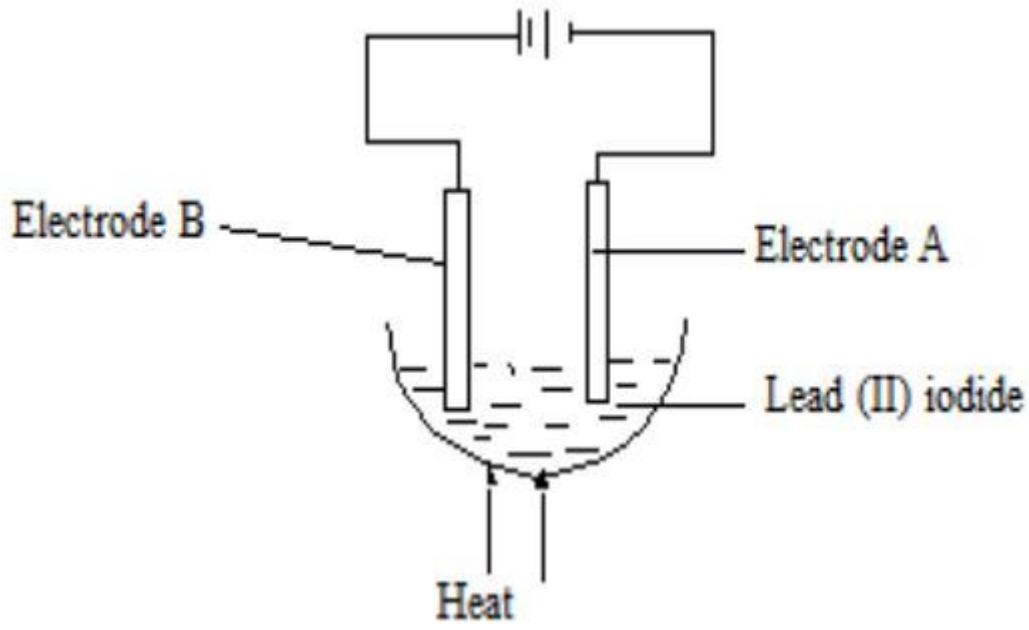
(c)The experiment in (b) was repeated using molten lead(II) iodide as the set up apparatus below using electrodes **A** and **B** made of graphite.




(i)State what was observed at electrode,

**A**. ( ½ mark)

.....

**B**. ( ½ mark)

.....

(ii)Write equation of reaction that took place at electrode **A**. ( 1 mark)

.....

.....

7. When calcium hydroxide was heated together with 1.6 grams of impure ammonium sulphate , 0.34 dm3 of ammonia gas was evolved at s.t.p

(a)Write equation of reaction that took place. ( 1½ marks)

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(b)Calculate the mass of pure ammonium sulphate that completely reacted with calcium hydroxide. ( 2 ½ marks)

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(c)Calculate the percentage impurity of ammonium sulphate. ( 1 mark)

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8. A sample of salt **Z** was treated to the following tests in the table to identify the cation and anion in **Z** .

| Test number | Test | Observation |
|---|---|---|
| 1 | Excess dilute ammonia solution was added to solution of salt **Z** | White precipitate insoluble |
| 2 | 2 drops of sodium chloride was added to solution of salt **Z** | No observable change |
| 3 | Dilute sodium hydroxide solution was added to solution of salt **Z** drop wise until in excess. | White precipitate insoluble . |
| 4 | Few drops of lead(II) nitrate solution followed by dilute nitric acid was added to solution of salt Z; and then heated. | White precipitate, insoluble in the acid; and insoluble on heating. |

(a)Identify the cation and anion in salt **Z**. ( 01 mark)

Cation. .....

Anion.....

(b)Write the ionic equation of reaction that took place in test number;

(i) 3. ( 1½ mark)

.....

(c)Describe briefly how the anion in Salt **Z** can be tested and confirmed in the laboratory. ( 1 mark)

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.....

(d) Write ionic equation of reaction that would take place in (c) above.

( 1½ marks)

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9.(a) Write equation of reaction leading to the formation of chlorine gas from pottasium manganate (VII) ( 1 ½ marks)

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.....

(b)State what would be observed and write equation of reaction that took place when chlorine gas is passed into;

(i) cold dilute sodium hydroxide solution

Observation. ( 01 mark)

.....

.....

Equation. ( 1½ marks)

.....

.....

(ii) a gas jar containing moist red flower.

Observation. ( ½ mark)

.....

.....

Equation ( 1½ marks)

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.....

(c)State one industrial use of chlorine gas basing on the reaction in (b) (ii).

( ½ mark)

.....

10.(a)Define enthalpy of combustion? (01 mark)

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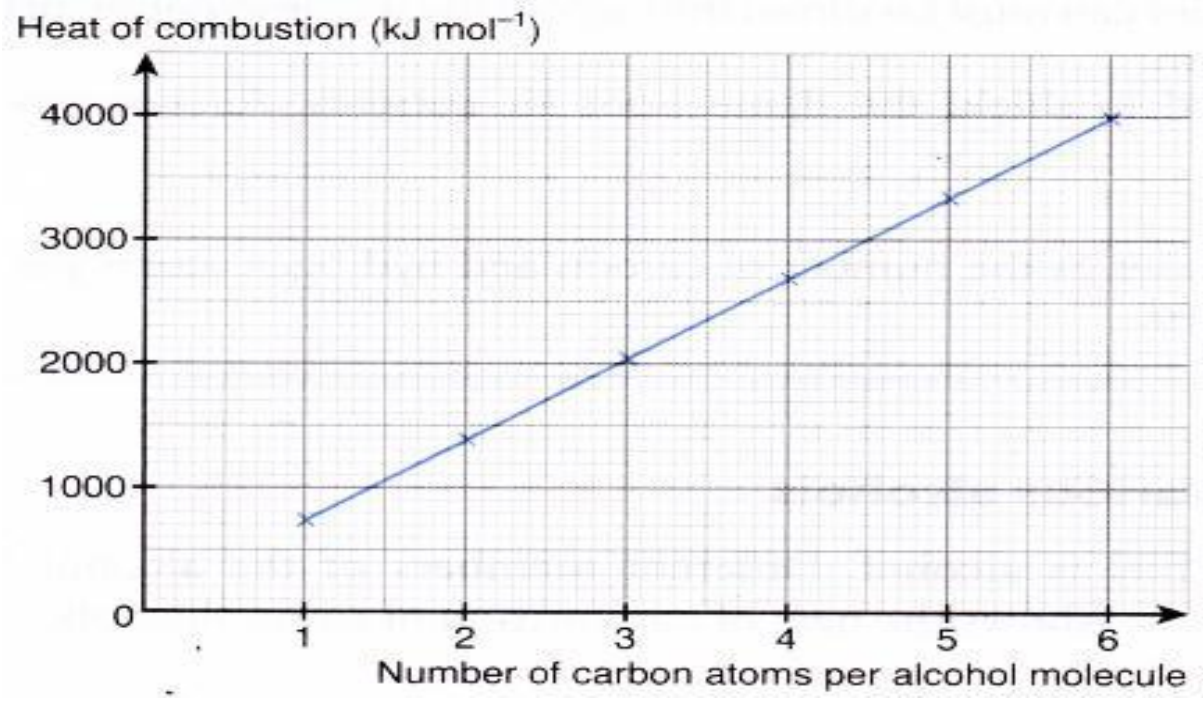
(b)Below is a graph showing the variation of molar heat of combustion of the first six members of alcohols with the number of carbon atoms per alcohol molecule.. Study it and answer the questions that follow




(i) From the graph; deduce how the molar heat of combustion of the first six members of alcohol vary with the number of carbon atoms per alcohol molecule. ( ½ mark)

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(ii) From the graph; determine the molar heat of combustion of propanol. ( ½ mark)

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(iii) Using the answer in (ii) , Calculate the mass of propanol that must be burnt in excess oxygen gas to liberate 550,000 **J** of heat. (2 marks)

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## SECTION B

*Attempt any two questions in this section*

11.(a)Define the term *allotropes of carbon ?* *(01 mark)*

(b) One of the crystalline and non crystalline forms of carbon is graphite and animal charcoal respectively.

(i)Describe briefly the structure of graphite. Include a diagram (05 marks)

(ii)State one use of graphite, and mention the property of graphite that makes it suit for the use given. (01 mark)

(iii)State one use of animal charcoal ( ½ mark)

(c)Name,

(i)other crystalline form of carbon, and one use of the allotrope ( ½ mark)

(ii)one other non crystalline form of carbon. ( ½ mark)

(d)State,

(i)the property of diamond which makes it suit its use you have given in (i)

( ½ mark)

(e)(i)Write equation of the complete combustion of the non-crystalline form of carbon you have named in (c) (1½ mark)

(ii)Explain with the aid of equations the changes that take place when the product in (d)(i) was bubbled into calcium hydroxide solution until there was no further change (05 marks)

(iii) State one industrial use of the product formed in (i) ( ½ mark)

12(a)(i) Define rate of reaction. *( 01 mark)*

(ii) Explain how temperature increase affects the rate of chemical reaction.

*( 02 marks)*

(b) Medium sized calcium carbonate lumps were reacted with 50 cm3 of 1M solution of dilute hydrochloric acid at room temperature. The decrease in mass of the reactants was measured at various time intervals.

(i) Write ionic equation of reaction that took place. ( *½ marks)*

(ii) Draw the diagram of the apparatus that was used in the above experiment. (*2½ marks)*

(iii) Sketch a graph to show the variation of the decrease in mass of reactants with time. Label this graph X. (*01 mark)*

(c) (i) State and explain what would be observed if the same mass of Calcium carbonate powder was used instead of medium sized calcium carbonate.

*(02 marks)*

(ii) On the same graph in ( b) (iii), sketch a graph to show the variation of the decrease in mass of reactants when the same mass of powdered calcium carbonate is used with 50cm3 of 1 M hydrochloric acid. Label this graph Y.

*( 01 marks)*

(d) Calculate the volume of the gaseous product at room temperature in (b).

*( 1½ marks)*

13 (a) (i) Name the process leading to the formation of crude ethanol from banana fruits. ( *½ mark)*

(ii)Outline how **pure concentrated** ethanol can be prepared from banana fruits. Include the equation for the reaction leading to the formation of ethanol. ( 07 *marks*)

(b) Ethanol obtained from (a) can be converted to ethene.

(i) Name that reagent that can be reacted with ethanol to produce ethene.

*( ½ mark)*

(ii) State the conditions of the reaction leading to the formation of ethene from ethanol and the reagent named in (b) (i) above. ( *01 mark)*

(iii) State the role served by the reagent named in (a) (i) in the formation of ethene. ( *½ mark)*

(iv)Write equation of the reaction for formation of ethene from ethanol.

*( 01 mark)*

(c) State what would be observed and write equation for the reaction that would take place when ethene is bubbled into bromine liquid.

*( 02 marks)*

(d) Under high pressures and temperatures, many ethene molecules can be Joined to form one large complex compound Q of a high molecular mass.

(i) Name Q *( ½ mark)*

(ii) Name the process by which Q is formed from ethene.

*( ½ mark)*

(iii) Write the equation for the reaction leading to the formation of Q . ( *01 mark)*

(iv) Suggest one use of Q. *( ½ mark)*

14 (a) (i) Draw a well labelled diagram of the set-up of apparatus that can be used to prepare a dry sample of hydrogen gas from zinc granules.

( *3 marks)*

(ii) write equation for the reaction leading to the formation of hydrogen gas. ( *1½ marks)*

(iii) Name the substance that can be used to speed up the rate of formation hydrogen gas in the reaction above. ( *½ mark)*

(iv)State how hydrogen gas can be identified in the laboratory.

( *01 mark)*

(b) (i) State the conditions of the reaction between hydrogen gas and lead(II) oxide *(01 mark)*

(ii)State what would be observed when hydrogen gas is reacted with lead(II) oxide (*1½ marks)*

(iii)Write equation for the reaction that would take place. *( 1½ marks)*

(iv) state the role of hydrogen gas when it reacts with lead( II) oxide under the conditions stated in (a) *( ½ marks)*

(v) Name any other metal whose oxide can react with hydrogen gas in a similar way like lead(II) oxide. *( ½ mark)*

(c)(i) Write equation for the complete combustion of hydrogen gas in air.

*( 1½ marks)*

(ii)Calculate the volume of oxygen gas at s.t.p that would be required for complete combustion of hydrogen gas to produce 71.07 Kj of heat.

( *Molar enthalpy of combustion of hydrogen gas = -286 Kj mol -1 and 1 mole of a gas occupies 22.4 dm3 at s.t.p )* *( 02 marks)*

(d) State one large scale use of hydrogen gas. *( ½ mark)*

**End**

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