Candidates Name...

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

545/2

CHEMISTRY

  Paper 2

  Sept.2022

  2 hours

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CHEMISTRY DEPARTMENT

Resourceful chemistry pre- UNEB set 1

UGANDA CERTIFICATE OF EDUCATION

PAPER 2

TIME. 2 hours

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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

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For Examiners Use Only.

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

SECTION A. (50 marks)

Attempt all questions in this section.

1. Below is a set up apparatus used in the laboratory to investigate one of processes which provide evidence for the existence of particles of matter. Study it and answer the questions that follow.
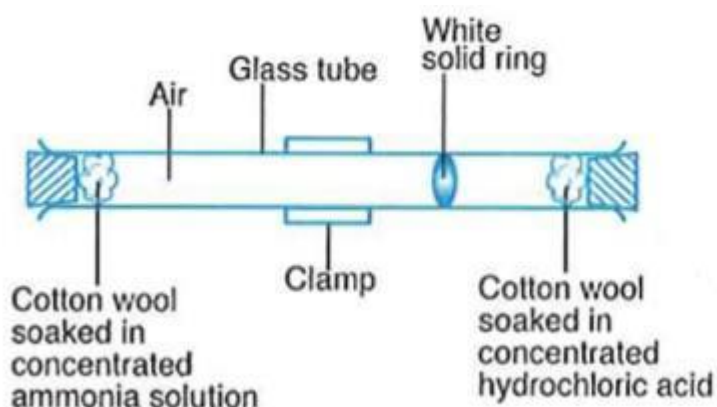
(a).Name the process investigated above.   (½ mark)

....

(b).Name the white solid ring that forms inside the glass tube.   (01 mark)

....

(c)Explain why the white solid ring named in (b) is formed at that position as shown in the set up apparatus above .   (02 marks)

....

....

....

(d)Write equation of reaction that took place leading to the formation of the white solid ring named in (b) inside the glass tube.   (1 ½ marks)

....

(e)At the end of the investigation, the white solid ring formed in glass was heated. Name the process that took place when solid was heated.   (½ mark)

....

2.(a)Crude oil is a *mixture* from which different liquid components can be obtained useful in life at domestic and industrial levels; of which kerosene is among.

   (i). Give a reason why crude oil is a *mixture?*   (½ mark)

....

....

   (ii)Name any one liquid component obtained from crude oil apart from kerosene   (½ mark)

....

   (iii)Give one use of the any one liquid components you have named in (ii)

                                                                        (½ mark)

....

   (iv)State the large scale method which is used to obtain different pure liquid components   from crude oil; and give the reason for the mode of separation stated.

      Method of separation.   (½ mark)

....

      Reason for the method of separation used.   (½ mark)

....

(b) (i)State the suitable method that can used in the laboratory to separate a mixture of zinc nitrate and,

   •zinc sulphate.   (½ mark)

....

   •Zinc carbonate.   (½ mark)

....

(ii)State what would be observed and write ionic equation of reaction that would take place if few drops of lead(II) nitrate solution were added to aqueous mixture of zinc nitrate and zinc sulphate.

   Observation.   (½ mark)

....

Ionic equation.   (1 ½ marks)

....

3.(a)Write the formula of the oxide formed when each of the given elements burns completely in oxygen gas.

   (i) Iron.   (½ mark)

....

   (ii)Coke.   (½ mark)

....

   (iii)Magnesium.   (½ mark)

....

  (b)(i)State which of the oxides in (a) reacts with dilute sodium hydroxide solution, and give a reason for your answer.   (½ mark)

....

....

   (ii)Write equation of reaction that would take place when the oxide stated in (b) (i) reacts with dilute sodium hydroxide solution.   (1 ½ marks)

....

....

  (c)Excess dry hydrogen gas was passed over strongly heated oxide of iron in (a)

   (i) State what was observed.   (1mark)

....

....

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

....

4.The numbers of protons; neutrons and electrons of different particles **T**, **V**; **W**, **X** , **Y** and **Z** are given in the table below.

Particle	Protons	Neutrons	Electrons
T	20	20	18
V	17	18	17
W	6	6	6
X	7	7	10
Y	17	19	17
Z	19	20	19

(a)Identify which of the Particles in the table is;

(i)a cation. (½ mark)

....

(ii)an anion. (½ mark)

....

(b)Write the

(i) electronic structure of the cation in (a). (½ mark)

....

(ii) formula of the anion in (a) (½ mark)

....

(b)(i)Identify the two particles belonging to the same element; (½ mark)

....

(ii)Give a reason for your answer in (b)(i) (½ mark)

....

....

(c)Particle V separately reacts with particles Z and W forming compounds **M** and **N** respectively.

(i)State the type of bond that exists in compound **N**. (½ mark)

....

(ii)using outer most electrons; show how compound **M** is formed from its particles. (02 marks)

(iii) State any physical property of compound **M**.   (½ mark)

....

5. A hydrocarbon **Q** consists of 88.89 % by mass of carbon. 8.39 g of hydrocarbon **Q** occupies 3. 48 dm3 at s.t.p

(a) Calculate the empirical formula of hydrocarbon **Q**.   (2 ½ marks)

....

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(b)Determine the molecular formula of hydrocarbon **Q**.   (02 marks)

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....

(c)Incomplete combustion of hydrocarbon **Q** produced a colourless gas.

Write equation of reaction between heated lead(II) oxide and the dried gas produced from incomplete combustion of **Q**.   (1 ½ marks)

....

....

6. A sample of hard water **R** does not readily form lather with ordinary soap unless when boiled. When few drops of aqueous sodium sulphate was added to sample of hard water **R**, white precipitate was formed.

(a)Name the ions present in water sample **R** which causes hardness.(½ mark)

....

(b)Write ionic equation of reaction that takes place when aqueous sodium sulphate was were added to a sample of water.   (1½ marks)

....

....

(c)Name one ,

  (i) one other physical method apart from boiling that can be used remove the type of hardness in sample of hard water **R.**   (½ mark)

....

(ii)compound that can be added to the sample of hard water so as it readily forms lather with soap if water is not subjected to boiling.   (½ mark)

....

(d)State how the compound named in (c)(ii) removes the type of hardness from water.   (01 mark)

....

....

(e)State why sample of water **R** is preferred in poultry than other kind of water

(½ mark)

....

....

7.(a)Name the type of electrode at which particular;

(i)ions lose electrons during during electrolysis   (½ mark)

....

(ii) ions gain electrons during electrolysis.   (½ mark)

....

(b).Both copper(II) chloride and copper rod conduct electric current. State how the conduction of current in copper(II) chloride differs from that of copper rod.   (01 mark)

....

....

(c)Aqueous copper(II) chloride was electrolyzed between copper anode and graphite cathode.

(i) state what was observed at the anode.   (½ mark)

....

(ii)Write equation of reaction that took place at the cathode   (01 mark)

....

....

(d).Electrolysis in (c) was repeated using graphite anode and copper cathode.

(i) State what was observed anode.   (½ mark)

....

(ii) Write equation of reaction for your observation at the anode. (01 mark)

....

....

8.(a) Define soap.   (01 mark)

....

....

(b)During the laboratory preparation of a sample of soap, vegetable oil was reacted with sodium hydroxide solution forming soap solution, to which substance **K** was added. Soap obtained was washed with little amount of distilled water; and allowed to cool which then set as a hard cake on cooling.

(i)Name the process leading to the formation of soap solution.   (½ mar)

....

(ii)State the conditions of reaction for the process in (i)   (01 mark)

....

....

(iii)Name substance **K**.   (½ mark)

....

(iv)State the purpose of adding substance **K** to soap solution during laboratory preparation of soap.   (½ mark)

....

(v)State two sources of vegetable oil used in preparation of sample of soap.

(01 mark)

....

....

(vi)Name another substance that can be reacted with a vegetable oil instead of sodium hydroxide solution.   (01 mark)

....

(c)Give a reason why detergents are preferred in laundry other than ordinary .

(½ mark)

....

....

9.(a)State the condition(s) under which nitric acid reacts with each of the given substances and in each case, write the equation of reaction that would take place.

(i) Sulphur.

Condition(s)   (½ mark)

....

....

Equation.   (1 ½ marks)

....

....

(ii) lead(II) oxide

Condition(s)   (½ mark)

....

....

Equation   (1 ½ marks)

....

....

(b)State one industrial use of nitric acid.   (½ mark)

....

10.(a) Define *molar enthalpy of displacement* .   (01 mark)

....

....

....

(b)When excess magnesium powder was added to 200cm3 of 0.5M copper(II) chloride solution in plastic bottle, the temperature of the solution rose from 22 o C to 86 o C .

(i)Give a reason for the temperature rise.   (½ mark)

....

....

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

....

....

(iii)Calculate the molar enthalpy of displacement in Kilojoules between magnesium and copper(II) chloride solution   (03 marks)

(Density of water = 1g cm -3 ,Specific heat capacity of water,C= 4.2 J g -1 oC -1)

....

....

....

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....

....

....

....

....

(c)State one assumption you have made in your calculations in (b)(iii) (½ mark)

....

....

SECTION B

Attempt only two questions in this section.

11.(a)sulphur dioxide gas can be prepared in the laboratory using hydrochloric acid.

 (i)Name the substance that is reacted together with hydrochloric acid to prepare sulphur dioxide gas.   (½ mark)

 (ii)State the condition(s) under which hydrochloric acid reacts with the substance named in (i) to produce sulphur dioxide gas.   (01 mark)

 (iii)Write ionic equation of reaction leading to the formation of sulphur dioxide in the laboratory .   (1½ mark)

(b)(i)Explain how sulphur dioxide gas produced by the reaction in (a) is dried and collected in the laboratory.   (02 marks)

(ii)State how sulphur dioxide can be identified in the laboratory.   (01 mark)

(c)Excess sulphur dioxide gas was bubbled into concentrated nitric acid.

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

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

(d)The product left in (c) was diluted with an equal volume of water. Describe how the anion in the resultant solution can be tested and confirmed in the laboratory.   (2½ marks)

 (e)State how sulphur dioxide reacts with magnesium. Include equation of reaction.   (03 marks)

 (f)State one industrial use of sulphur dioxide gas.   (½ mark)

12 (a)Starting from either *iron powder or iron(II) carbonate,* describe briefly how a pure dry sample of iron(II) sulphate crystals can be prepared in the laboratory. Include equation of reaction   (5 ½ marks)

 (b) Iron(II) sulphate- 7 H2O crystals were gently heated, and then strongly heated until there was no further change.

 (i)State what was observed on gentle heating.   (1 ½ mark)

(ii)Write equation of reaction that took place on stronger heating.(1½ marks)

(c) Iron(II) sulphate-7H2O crystals were dissolved in water; and the resultant solution was divided into two equal portions.

(i) To the first portion of the solution was added dilute sodium hydroxide solution drop-wise until in excess. State what was observed; and write ionic equation of reaction that took place.   (2½ marks)

(ii)Chlorine gas was bubbled into the second portion of the solution, state what was observed and write the equation that took place.   (2½ marks)

(d)The product formed in (i) was exposed to air for about 30 minutes.

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

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

13. (a) (i)Draw a well labelled diagram to show how a dry sample of ammonia gas can be prepared in the laboratory from calcium hydroxide and ammonium sulphate.   (3½ marks)

(ii)Write equation of reaction that took place leading to the formation of ammonia gas in (a) (i)   (1½ mark)

(b)(i)Name the reagent that is used in the laboratory to test for ammonia gas.

(½mark)

(ii)State what would be observed and write equation of reaction that would take place when the ammonia gas is treated with the reagent in (i). (2 marks)

(c) (i)State the conditions of reaction between ammonia gas and copper(II) oxide.   (1½ mark)

(ii)Explain the changes that take place when ammonia gas reacts with copper(II) oxide under the conditions stated in c (i). Include equation of reaction   (4 marks)

(d)Excess ammonia gas was passed into freshly prepared aqueous iron(II) sulphate.

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

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

(e)State one industrial use of ammonia gas.   (½ mark)

(14)(a) State what is meant by the term *ore?*   (01 mark)

   (b)Iron can be extracted from one of its ores ; *spathic iron ore.*

      (i) Write the formula of *spathic iron ore.*   (½ mark)

      (ii)Name any other ore from which iron can be extracted and write its formula.   (01 mrk)

      (c)Spathic iron ore is first roasted In air before introduced together with other two raw materials into the blast furnace from the top.

      (i) Give a reason why the ore is first roasted?   (½ mark)

      (ii)Write equation of reaction that takes place during the roasting of the ore in air.   (1½ marks)

      (iii)Name the two raw materials that are introduced together with the roasted into the blast furnace from top.   (01 mark)

      (d) (i)Describe the reactions that takes place leading to the formation of iron from roasted spathic iron ore.   Include equations   (4½marks)

      (ii)Name the major impurity in iron ore.   (½ mark)

      (iii)Explain how the impurity is removed from the ore. No equation is required.   (1½ marks)

   (e)Describe the reaction of iron with chlorine gas.   (2 ½ marks)

   (f)State one use of iron.   (½ mark)

END.

@Ssemogerere ha'sem's Ramkapul.

   + 256759985315

 Chemistry Department