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545/2
Chemistry
Paper II
July/August 2023
2 HOURS

KAYUNGA SECONDARY SCHOOLS EXAMINATIONS COMMITTEE (KASSEC)

JOINT MOCK EXAMINATION 2023

Uganda Certificate of Education

CHEMISTRY

PAPER 2

2 HOURS

INSTRUCTIONS:

- *Attempt all questions in section **A** and any **two** questions in section B.*

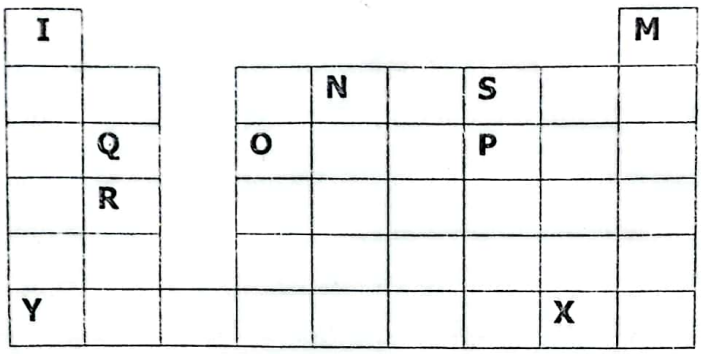
FOR EXAMINER'S USE ONLY

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

Turn Over

SECTION A (50 MARKS)

1. The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.



(a) What name is given to the group of elements to which each of the following elements belongs

(i) **Q** .....**(½ mark)**

(ii) **X** .....**(½ mark)**

(b) Which letter represents the element that is non-reactive? **(½ mark)**

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(c) Name the type of bond formed when **N** and **P** react. **(½ mark)**

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(d) (i) Write the formula of the compound formed when **Q** reacts with **S.(½ mark)**

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(ii) Using atomic structure diagrams show how bonding in the compound in d(i) occurs. **(2 marks)**

2. Lead (II) carbonate was heated in a boiling tube until there was no further change.

(a) State what was observed. **(1 ½ marks)**

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

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(c) Excess dilute nitric acid was added to the residue, followed by dilute hydrochloric acid. The resultant mixture was heated and allowed to cool to room temperature. State what was observed. **(2marks)**

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3. 416g of anhydrous barium chloride was obtained when 488g of the hydrated salt of formula **$BaCl_2.NH_2O$** was heated.

(a) Write equation for the reaction which took place when the hydrated salt was heated. **(1 ½ marks)**

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(b) (i) Calculate the value of n in **$BaCl_2.nH_2O$** **(2 ½ marks)**
(Ba=137,Cl=35.5, H= 1,O=16)

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(ii) How is water of crystallization important in salts? **(1 mark)**

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4. The composition of a compound A is; magnesium 9.8% , sulphur 13%, oxygen 26%, water of crystallization 51.2 % **(Mg=24,S=32,O =16 H_2O=18)**

(a) Calculate the simplest formula of **A.** **(2 ½ marks)**

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(b) To an aqueous solution of A was added barium nitrate solution .

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

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

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5 A gas **CH_4** constitutes the greatest proportion of biogas .

(a) What is its name? **(1 mark)**

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(b) Name two other gases present in biogas in small quantities. **(1mark)**

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(c) The equation for the complete combustion of gas CH_4 in air is

$$CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2HO_{(l)}.$$

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(d) The enthalpy of combustion of CH_4 is 890KJmol^{-1} .Calculate the volume of CH_4 tha burns to produce 3,560KJ of energy at S.t.p. (one mole of a gas at S.T.P occupies 22.4dm^3)

(1 ½ marks)

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6. Hot concentrated sulphuric acid can react with carbon, copper, sulphur and glucose separa

(a) Write equations for the reaction of hot concentrated sulphuric acid with,

(i) carbon **(1 ½ marks)**

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(ii) sulphur **(1 ½ marks)**

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(b) Name one substance from those listed above with which concentrated sulphuric acid reacts as a dehydrating agent. **(½ marks)**

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(c) Write equation for the reaction that takes place in (b) above **(1 ½ marks)**

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7. To an aqueous solution of salt **E** was added silver nitrate solution followed by ammonia Solution. In this reaction, a white precipitate formed dissolved in ammonia solution and form a colourless solution.

(a) Identify the anion in **E** (1 mark)

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(b) Write an ionic equation for the reaction between the solution of E and silver nitrate solution. **(1 ½ marks)**

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(c) Ammonia solution was separately added drop wise until in excess to aqueous solution of
(i) zinc nitrate
(ii) lead (II)nitrate
State the observations made in (i) and (ii).

(i) .....

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(1 ½ marks)

(ii) .....

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(1 ½ marks)

8. A piece of copper metal was heated strongly in air.

(a) State what was observed. **(1 marks)**

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

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(c) Excess dilute sulphuric acid was added to the product formed, followed by dilute sodium hydroxide. Write ionic equation for the last reaction that took place. **(1 ½ marks)**

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(d) Explain why copper is not used in the preparation of hydrogen gas with dilute sulphuric acic

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(1 ½ marks)

(e) Define the term enthalpy combustion of a substance. **(1 ½ marks)**

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(f) When 0.70g of ethanol, C_2H_5OH was completely burnt in oxygen, the heat evolved raised the temperature of 200g water by 25°C. (C_2H_5OH = 46, specific heat capacity of water = $4.2jg^{-1}{}^{o}C^{-1}$)

Calculate the enthalpy of combustion of ethanol in $kjmol^{-1}$. **(3marks)**

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9. (a) Define the term acid. **(1mark)**

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(b) Give three differences between acid and bases.

Acids	bases

(c) Explain why rain water in industrialised countries is acidic? **(2marks)**

10. (a) Define the term electrolysis **(1marks)**

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(b) Dilute copper(II) sulphate was electrolyzed using graphite electrodes.

(i) State what would be observed at the anode. **(1mark)**

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(ii) Write ionic equations for the reactions that occur at, the cathode.

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Explain why diamond can not be used as an electrode? **(2marks)**

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SECTION B

Attempt any two questions.

State the difference between **fat** and **oil**. **(1 mark)**

) Fat and oils can be used to make soap. **(1 mark)**

(i) Define the term **soap** **(1 mark)**

(ii) Briefly describe how you can make soap in the laboratory. **(10 mark)**

(i) Name two compound, which when present in water cause permanent hardness of water. **(2marks)**

(ii) State one chemical method that can be used to remove permanent hardness of water. **(1mark)**

(iii) Write an ionic equation for the reaction that takes place inc(ii). **(1 ½ marks)**

Describe how a dry sample of ammonia can be prepared in the laboratory.**(6marks)**

(i) Name the reagent that can be used to test for ammonia. **(1 mark)**

(ii) State what would be observed if ammonia is tested with the named reagent in (b)(i). **(1mark)**

(c) Dry ammonia was passed over heated copper (II)oxide.

(i) State what would be observed . **(1 mark)**

(ii) Write an equation for the reaction . **(1 mark)**

(d) (i) Draw a labeled diagram of the apparatus that can be used to show that ammonia can burn in oxygen. **(3marks)**

(ii) Write an equation for the reaction that takes place in d(i) above. **(4marks)**

13. (a) With the aid of diagrams, describe an experiment that you would carry out in the laboratory to show necessary condition(s) for iron to rust. **(7marks)**

(b) (i) State two disadvantages of rusting. **(2marks)**

(ii) State two contributions of rusting to the environment. **(2marks)**

(c) Describe four methods of preventing rusting. **(4marks)**

14. (a) (i) Describe with the aid of labeled diagrams, how you would prepare a dry sample of hydrogen chloride gas in the laboratory. **(5marks)**

(ii) Write an equation for the reaction takes place. **(1marks)**

(iii) State how you test for hydrogen chloride gas **(1mark)**

(b) Explain each of the following observations. **(1 mark)**

(i) When two pieces of cotton one soaked in concentrated hydrochloric acid and the other soaked in a concentrated ammonia are plugged at opposite ends of along glass tube, White fumes are formed near the end with concentrated acid. **(2marks)**

(ii) Dry hydrogen chloride gas does not conduct electricity but forms a fountain with water. **(1mark)**

(c) With the aid of equations, state what would be observed if

(i) A piece of zinc metal was dropped into dilute hydrochloric acid **(2marks)**

(ii) Copper (II) hydroxide solid was added to dilute hydrochloric acid. **(2marks)**

(d) Give two uses hydrochloric acid. **(1 mark)**

END