Name:……..Index No…….

P545/2

Chemistry

Paper 2

2 Hours

PEAS NETWORK POST MOCK EXAMINATION 2023

UGANDA CERTIFICATE OF EDUCATION

CHEMISTRY
PAPER 2
Time: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- *Section A consists of 10 structured questions. Attempt all questions in this section.*
- *Answers to these questions must be written in the spaces provided.*
- *Section B consists of 4 semi-structured questions. Attempt any two questions from this section. Answers to these questions must be written in the answer booklets provided.*
- *[C=1, H=1, O=16, Fe=56] 1 mole of a gas occupies 22.4dm^3 at s.t.p.*

For Examiner's Use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A

1. Diamond and coke are some of the allotropes of element D.

   (a) State

   (i) What the term allotropy means. (01mark)

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   (ii) Identity of element D ($^1/_2$ mark)

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   (iii) One physical property of diamond. ($^1/_2$ mark)

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   (iv) One other allotrope of carbon which is a different category from the ones mentioned above. ($^1/_2$ mark)

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   …….

   (b) An oxide of element D can react with purified magnetite.

   (i) Name this oxide of element D. ($^1/_2$ mark)

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   (ii) State the role of this oxide in this reaction. ($^1/_2$ mark)

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(iii) Write equation of reaction that took place. ($1^1/_2$ marks)

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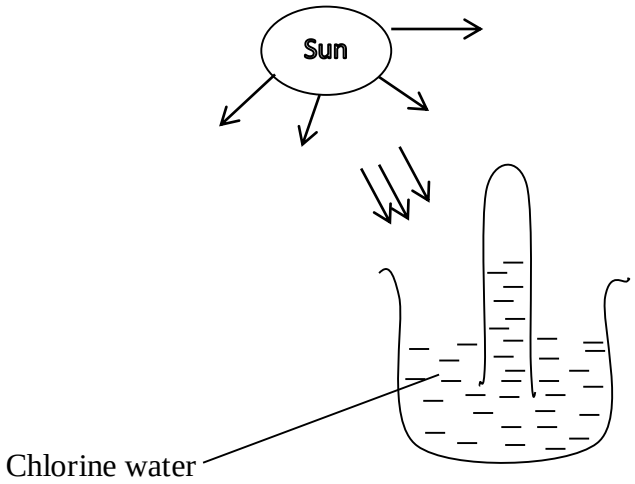
2. A boiling tube was filled with chlorine water and then inverted over a beaker containing a similar solution. The set up was then exposed to sunlight as shown below.



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

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(ii) Write equation for the reaction that took place in the boiling tube. ($1^1/_2$ marks)

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(b) The resultant solution in (a) was added to a beaker containing marble chips.

(i) State what was observed in the beaker. (01mark)

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(ii) Write ionic equation for the reaction that took place. ($1^1/_2$ marks)

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3. (a) Water was added into a mixture containing sulphur and sodium nitrate and the mixture shaken. State

(i) What was observed (01mark)

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(ii) The method that was used to recover sulphur. ($^1/_2$ mark)

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(b) Write equation to show how sulphuric acid can react with

(i) Sulphur ($^1/_2$ mark)

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(ii) Sodium nitrate ($1^1/_2$ marks)

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(c) Name the process by which rubber is made hard and strong when treated with sulphur. ($^1/_2$ mark)

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4. The numbers of protons, neutrons and orbital electrons in particles of un known elements are given in the following table.

Particle	Protons	Neutrons	Electrons
L	18	22	18
M	14	14	14
N	13	14	10
E	11	12	11
F	8	10	8
G	8	8	10

(a) Choose from the table the letter(s) that represent the following descriptions. (3marks)

(i) It is a soft metal with a low density.

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(ii) It is an anion.

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(iii) It is a diatomic gas with molecules of the type Y_2

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(iv) It has a giant covalent structure similar to diamond.

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(v) It has an atom of rare gas.

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(vi) It is a cation.

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(b) Write the electronic configurations of elements

(i) L ($^1/_2$ mark)

……..

(ii) G ($^1/_2$ mark)

……..

(c) Write the formula of the compound formed between elements;

(i) F and E ($^1/_2$ mark)

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……..

(ii) F and M ($^1/_2$ mark)

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5. (a) The table below shows the results of the tests that were carried out on solutions of salts containing Zn^{2+} and Al^{3+} ions. Use the table to answer the questions that follow. (02marks)

Test	**Observation**
(i) To the solution containing Al^{3+} ions, add sodium hydroxide solution drop wise until in excess.	

(ii) To the solution containing Zn^{2+} ions, add aqueous ammonia drop wise until in excess.	

(b) Write equation(s) for the reaction(s) that takes place in a (ii) above. (03marks)

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6. In the laboratory preparation of hydrogen gas, zinc granules were reacted with dilute sulphuric acid.

(a) Write the equation for the reaction that took place. ($1^1/_2$ marks)

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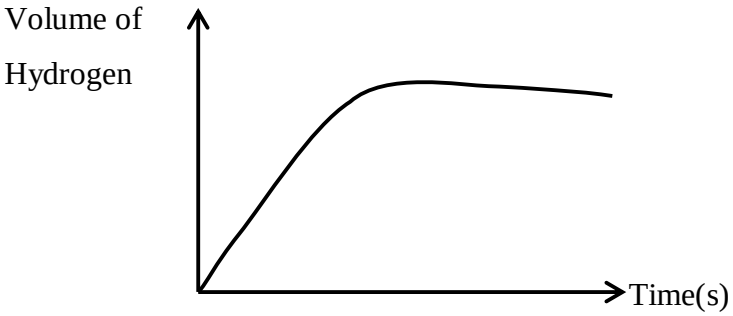
(b) The sketch graph below shows the variations of volume of hydrogen evolved with time, when a certain volume of dilute sulphuric acid was added to a known mass of zinc granules at room temperature.



(i) Draw on the same axes, the sketch graph for the reaction that would be expected to occur if the experiment was repeated using a fresh, but same volume of sulphuric acid added to the same quantity of zinc granules that had been mixed with copper (II) sulphate solution. ($^1/_2$ mark)

(ii) State three ways by which reactions with sketch graphs almost similar to the one you have drawn could be obtained. (03marks)

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7. A compound M of molecular formula A*x*By. nH_2O consists of 16.95% of A, 52.54% and 30.51% of water.

   (a) Determine the values of *x*, y and n.(H=1, O=16, A=40, B=62) (02marks)

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   (b) What does the value for n represent in the formula of compound M. ($^1/_2$ mark)

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   (c) A nitrate of element A was heated strongly in a dry test tube until there was no further change.

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

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      (ii) Write equation for the reaction that took place in (c) above. ($1^1/_2$ marks)

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8. (a) Write equation for the complete combustion of ethanol. ($1^1/_2$ marks)

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(b) When 0.5g of ethanol was burnt, the heat released raised the temperature of 200cm^3 of water by 17.6^{0}C. Calculate the experimental value of enthalpy of combustion of ethanol. (H=1, C=12, O=16; specific heat capacity of water =4.2Jg^{-1} $^0C^{-1}$, density of water=1gcm^{-3}).

($3^1/_2$ marks)

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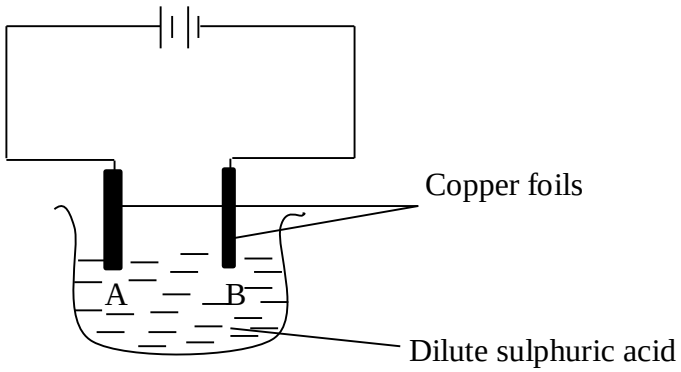
9. The diagram below shows a setup of apparatus for the electrolysis of dilute sulphuric acid.



(a) State what was observed after 5 minutes at A. ($^1/_2$ mark)

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(b) Write the equation of reaction taking place at;

(i) A ($1^1/_2$ marks)

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(ii) B ($1^1/_2$ marks)

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(c) Write the overall equation taking place. ($1^1/_2$ marks)

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10. When Xg of ammonium nitrate were dissolved in water as shown by the equation below, 3.40g of ammonium hydroxide were obtained.

$NH_4NO_3(s) + H_2O\ (l) \longrightarrow NH_4OH\ (aq) + HNO_3\ (aq)$

(a) State what was observed when the resultant solution was tested with litmus paper.

($^1/_2$ mark)

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(b) Briefly explain your answer in (a) ($2^1/_2$ marks)

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(c) Determine the values of X. (N=14, H=1, O=16). (02marks)

SECTION B

Attempt any two questions from this section

11. (a) Name one ore of iron and write its formula. (01 mark)

(b) During the extraction of iron, limestone and coke are added into a blast furnace. Explain the role of

(i) Coke (4 marks)

(ii) Limestone (06marks)

(c) Hydrochloric acid was added to Iron (II) carbonate powder in a dry test tube.

(i) State what was observed and write equation of reaction that took place. (3 marks)

(ii) Calculate the volume of carbondioxide produced at s.t.p when 5.6g of iron (II) carbonate reacts with hydrochloric acid. (01mark)

12. (a) Starting from Lead (II) oxide, describe how a dry sample of lead (II)nitrate can be prepared. ($4^1/_2$ marks)

(b) Describe what happens when lead (II) nitrate crystals are heated. (03marks)

(c) What would be observed and write equation for the reaction in each case when the following are heated.

(i) Potassium nitrate. ($2^1/_2$ marks)

(ii) Silver nitrate ($2^1/_2$ marks)

(iii) Zinc nitrate ($2^1/_2$ marks)

13. Sodium thiosuphate reacts with dilute acids according to the following equation.

$S_2O_3^{-2}(aq) + 2H^+(aq) \longrightarrow H_2O(l) + SO_2(g) + S(s)$

The time taken for the formation of Sulphur seen as a yellow precipitate indicates the rate of reaction.

(a) Name one reagent that would be used to confirm the presence of sulphurdioxide, and state what would be observed if the reagent you have named was treated with sulphurdioxide. ($1^1/_2$ marks)

(b) Define the term rate of a chemical reaction. (01mark)

(c) The table of results below shows the time taken for sulphur to form when various concentration of sodium thiosulphate were reacted with a fixed volume of 2M hydrochloric acid.

Concentration of thiosulphate (M)	0.2	0.6	0.8	1.2	1.6
Time for sulphur to form, t(s)	60	20	15	10	7.5

$^1/_t(s^{-1})$					

(i) Determine the values for $^1/_t$, copy the table and enter your answers in the spaces provided in the table. ($2^1/_2$ marks)

(ii) Plot a graph of $^1/_t$ against concentration of thiosulphate. ($4^1/_2$ marks)

(iii) State the relationship between a rate of the reaction and $^1/_t$, (01mark)

(iv) Using your graph, deduce how the rate of reaction varies with the concentration of thiosulphate. (01mark)

(v) Determine the slope of the graph. ($3^1/_2$ marks)

14. Ethanol can be converted to ethene by dehydration.

(a) (i) State the conditions under which the reaction takes place. (01mark)

(ii) Write equation for the reaction leading to the formation of ethene from ethanol. ($1^1/_2$ marks)

(iii) State how ethene can be identified. (01mark)

(b) Under suitable conditions, ethene can be converted to a compound, W with the following general formula $\left(H_2C - CH_2 \right)_n$

(i) State what n stands for in the formula? ($^1/_2$ mark)

(ii) What is the change from ethane to W called? ($^1/_2$ mark)

(iii) Name compound W. (01mark)

(iv) Write equation for the reaction leading to formation of W. ($1^1/_2$ marks)

(v) State one use and one disadvantage of W. (02marks)

(c) Name one other compound of the category of W which is not man-made. ($^1/_2$ mark)

(d) State/ one;

(i) Use of the compound you have named in (c)(i). ($^1/_2$ mark)

(ii) Advantages of compound you have named in (c)(i) over W. ($^1/_2$ mark)

(e) Write equation to show the reaction of ethene leading to formation of

(i) 1, 2-dibromoethane. ($1^1/_2$ marks)

(ii) Water and carbondioxide. ($1^1/_2$ marks)

(f) State one use of ethanol other than preparation of ethene. (01mark)

END