NAME:..... INDEX NO:.....

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545/2
CHEMISTRY
PAPER 2
2023
2 HOURS

ERETA EDUCATION CONSULTS

JOINT MOCK EXAMINATIONS 2023

Uganda Certificate of Education

CHEMISTRY

PAPER 2

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 the section must be written in the answer booklets provided. In both sections, all working must be shown clearly.*

FOR EXAMINER'S USE ONLY														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	**Total**

SECTION A

1. a) Define the term rusting. (1mark)

.....

.....

b) State **one** word, which means;

i) a method of preventing rusting by covering iron with zinc. (1mark)

.....

ii) iron sheet coated with tin. (1mark)

.....

c) Iron sheet coated with zinc is more superior to the one coated with tin. Give a reason. (1mark)

.....

.....

d) State **one** reason why it is important to prevent rusting. (1mark)

.....

2. Diamond and graphite are crystalline allotropes of carbon.

a) State;

i) What is meant by the term **"allotrope."** (1mark)

.....

.....

ii) **one** difference between diamond and graphite. (1mark)

.....

iii) **one** use of diamond (1mark)

.....

iv) **one** use of graphite (1mark)

.....

b) i) Name **one** amorphous allotrope of carbon. (½ mark)

.....

ii) State **one** use of the amorphous allotrope of carbon you have named in b(i) (½ mark)

.....

3. a) Name;

i) the fundamental particle of an atom which is;

* positively charged (½ mark)

.....

* negatively charged (½ mark)

.....

* not charged (½ mark)

.....

ii) The particle, which is involved when an atom reacts with another atom. (½ mark)

.....

iii) The particle(s) which determine(s) the mass of an atom. (1mark)

.....

b) State what a charged atom is called, when it bears;

i) a negative charge (1mark)

.....

ii) a positive charge (1mark)

.....

4. a) State the condition(s) under which sodium can react with oxygen to form sodium peroxide. (1mark)

.....

b) Write equation for the reaction;

i) leading to the formation of sodium peroxide under the condition(s) which you have stated in (a). (1 ½ marks)

.....

.....

ii) between sodium peroxide and water. (1 ½ marks)

.....

c) State the practical application of the reaction in b(ii) (1mark)

.....

5. a) State **one** difference between iron(II) sulphide and a mixture of iron and sulphur other than their reactions with acids. (1mark)

.....

b) Write equation to show the reaction of dilute sulphuric acid with;

i) a mixture of iron and sulphur. (1½ marks)

.....

ii) iron(II) sulphide (1½ marks)

.....

c) i) Indicate which **one** of the reactions in (b) should NOT be carried out in the open. (½ mark)

.....

ii) Suggest **one** reason why the reaction you have indicated in c(i) should **not** be carried in the open. (½ mark)

.....

6. a) In the laboratory preparation of hydrogen, copper(II) sulphate solution was added to the reaction mixture.

i) Identify the components of the reaction mixture. (1mark)

.....

ii) State why copper (II) sulphate solution was added to the reaction mixture. (½ mark)

.....

b) i) Write equation for the combustion of hydrogen. (1mark)

.....

ii) State **one** way by which purity of the product of the reaction in b(i) can be ascertained. (½ mark)

.....

c) Dry hydrogen was passed over strongly heated lead(II) oxide.

i) State what was observed. (1½ mark)

.....

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

.....

7. a) Chlorine was bubbled into aqueous iron(II) chloride.

i) State what was observed. (1mark)

.....

.....

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

.....

.....

.....

b) i) Name **one** reagent that can be used to distinguish iron(II) chloride from the product of the reaction in a(ii) (½ mark)

.....

.....

ii) State what would be observed, if iron(II) chloride and the product of the reaction in a(ii) were treated separately with the reagent which you have named in b(i). (2marks)

.....

.....

8. a) Both copper and lead(II) bromide are good conductors of electricity. Name the particles by means of which electricity is conducted by;

i) lead(II) bromide. (½ mark)

.....

.....

ii) a copper strip (½ mark)

.....

.....

b) i) State the condition(s) under which lead(II) bromide can conduct electricity. (½ mark)

.....

.....

ii) Briefly explain your answer in b(i) (1 ½ mark)

.....

.....

c) Lead(II) bromide was electrolyzed between two carbon rods. Write equation for the reaction that took place at the anode. (1mark)

.....

.....

9. a) Ethanol C_2H_5OH, undergoes dehydration forming a gas G.

i) Name **one** common laboratory reagent that can cause dehydration of ethanol. (½ mark)

.....

.....

ii) Write equation to show the formation of G. (1mark)

.....

.....

b) A liquid, L was produced when bromine solution in tetrachloromethane was added to G.

i) Name L (1mark)

.....

.....

ii) State the appearance of L. (1mark)

.....

.....

c) Write equation for the complete combustion of G. (1½ marks)

.....

.....

10. When magnesium sulphate solution was added to a solution of a sodium salt, X, no apparent change took place in the cold; but on heating the resultant mixture, a white precipitate appeared.

a) Identify X. (1mark)

.....

.....

b) Write ionic equation for the reaction that took place; if any, when

i) magnesiumsulphate solution was added to cold solution of X.

(1½ marks)

.....

.....

ii) the resultant mixture in b(i) was heated. (1 ½ marks)

.....

.....

c) State;

i) **one** practical application of the procedures described in b(i) and (ii).

(½ mark)

.....

.....

ii) the industrial application of the reaction in b(ii) (½ mark)

.....

.....

SECTION B

Answer any **two** questions only in this Section. Extra questions answered will **NOT** be marked.

11. A pure dry sample of hydrogen chloride was prepared in the laboratory by adding concentrated sulphuric acid onto a crystalline solid, Q, in a flask and then warming the mixture. The gas evolved was passed through a liquid, Z, before it was collected;

i) Identify Q (½ mark)

ii) Name **one** suitable piece of apparatus by means of which concentrated sulphuric acid was added onto Q. (½ mark)

iii) Name Z, and state its role. (1mark)

iv) Give a reason why Z was preferred for its role, which you have stated in (iii) (1mark)

v) State the method by which hydrogen chloride was collected; and give a reason. (1mark)

vi) Write equation for the reaction, which led to the formation of hydrogen chloride. (1½ marks)

b) State;

i) What an aqueous hydrogen chloride is called. (½ mark)

ii) A suitable procedure for preparing a sample of aqueous hydrogen chloride in the laboratory. (1 ½ marks)

c) **Two** equal masses of magnesium powder were added separately to solutions of hydrogen chloride in water and methylbenzene, respectively. State what was observed in each case; and give a reason for each observation that you have stated. (4marks)

d) Dry hydrogen chloride was bubbled into silver nitrate solution that was acidified with nitric acid. Write ionic equation for the reaction that took place. (1 ½ marks)

e) A mixture of manganese(IV) oxide and a concentrated hydrogen chloride solution as heated.

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

ii) State the practical application of the reaction in e(i). (½ mark)

12. a) A crystalline carbonate of sodium, formula, $Na_2CO_3.nH_2O$, decomposed into a white Powderly residue , Y, when it was heated to constant mass. Write the name and formula of Y. (1mark)

b) When 6.7g of a sample of the crystalline sodium carbonate in (a) was heated to constant mass, 2.7g of Y was collected.

i) Calculate the value of n in the formula $Na_2CO_3.nH_2O$. (5marks)

(H=1, C=12, O=16, Na=23)

ii) Write the correct name of the crystalline sodium carbonate. (1mark)

c) i) Name **two** substances, which when reacted together would be most suitable for preparing a non-basic zinc carbonate. (1mark)

ii) Write equation for the reaction that would lead to formation of the zinc carbonate in c(i). (1 ½ marks)

d) State what would be observed, and write equation for the reaction that would take place, if zinc carbonate was heated strongly; then allowed to cool down afterwards. (3marks)

e) i) Name one reagent that can be used to differentiate between zinc ions and lead(ii) ions in solution. (½ mark)

ii) state what would be observed in each case, if zinc ion and lead(II) ion were treated separately with the reagent you have named in e(i) (2marks)

13. a) During a laboratory preparation of ammonia, ammonium chloride was treated with a Powderly solid R. Write;

i) the name of R. (½ mark)

ii) equation for the reaction that led to the formation of ammonia and state the condition(s) for the reaction. (2marks)

b) Concentrated sulphuric acid, fused calcium chloride and calcium oxide are compounds commonly used as drying agents in the laboratory.

i) State which one of the compounds is used as a drying agent for ammonia. (½ mark)

ii) Explain why the other two compounds are **not** suitable for drying ammonia. (4 ½ marks)

c) Give a reason why ammonia cannot be collected over water, and write equation to illustrate. (2marks)

d) Write an ionic equation to show the reaction that would take place if few bubbles of ammonia were passed into copper(II) sulphate solution. (1½ marks)

e) A lot more bubbles of ammonia were passed into the resultant mixture in (d).

i) State what was observed. (1½ marks)

ii) Briefly explain your observation(s) in e(i). **(No equation is required).** (2marks)

f) State **one** industrial use of ammonia. (½ mark)

14. a) conversion of sulphur dioxide into sulphur trioxide by contact process is a reversible reaction, which takes place in the presence of a finely divided catalyst; under low temperature and high pressure conditions.

i) State what is meant by the term **"reversible reaction"**, and write equation to the formation of sulphur trioxide by the contact process. (2 ½ marks)

ii) Name the catalyst used in the contact process and suggest why it has to be finely divided. (1 ½ marks)

iii) In each case, give a reason as to why formation of sulphur trioxide by contact process is favoured by low temperature and high pressure. (2marks)

b) Explain how sulphuric acid is obtained from the sulphur trioxide formed by contact process. **(No equation(s) is/are required)** (2 ½ marks)

c) 50.0cm^3 of a 4Msulphuric acid was measured out into a volumetric flask. Distilled water was then added to the acid until the total volume of the dilute solution was 250cm^3. Calculate;

i) the concentration of the dilute sulphuric acid solution in $moldm^{-3}$ (2marks)

ii) the volume of a sodium hydroxide solution, concentration of which is 1$moldm^{-3}$, that would be required to react completely with 12.5cm^3 of the dilute sulphuric acid solution. (2 ½ marks)

d) State what would be observed and write ionic equation for the reaction that would take place, if dilute sulphuric acid was added to barium chloride solution. (2marks)

END