

NAME.....Signature:.....

545/2

Chemistry

Paper 2

2 Hours

Uganda Certificate of Education

Chemistry

Paper 2

2 Hours

INSTRUCTIONS

Section **A** consists of **10** structured questions. Answer all questions in this section.

Answers to these questions must be written in the spaces provided.

Section **B** consists of 4 semi - structured questions. Answer any **two** questions from this section. Answers to the questions **must** be written in the answer sheets provided.

In both sections , all working **must** be clearly shown and must be in blue or black ink.

Any work done in pencil will **not** be marked except drawings.

Mathematical tables and silent non - programmable calculators may be used.

FOR EXAMINERS' USE ONLY														
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. Name the method that can be used to separate the component of the following mixtures.

(a) Iron pieces and sand (01mark)

.....

(b) Solid sodium chloride and glass pieces (01mark)

.....

(c) Water and ink (01mark)

.....

(d) Sodium chloride and potassium nitrate (01mark)

.....

(e) Petrol and diesel (01mark)

.....

2. **M** is the ion of an element **T**. **M** contains 11 proton, 12 neutrons and 10 electrons.

(a) (i) What is the nucleon number of **M**? (½ mark)

.....

(ii) Write the electronic structure of **M** (½ mark)

.....

(b) Write the formula of the;

(i) Oxide of **T** (½ mark)

.....

(ii) Hydride of **T** (1 ½ mark)

.....

(c) State the type of bond that exists in the oxide of **T** (½ mark)

.....

- (d) Using outermost energy level electrons only, draw diagrams to show how oxygen forms a compound with;
 (i) element **T** (01mark)

.....

- (ii) hydrogen (01mark)

.....

- (e) (i) Which **one** of the compounds in (d) when dissolved in water conducts electric current? (½ mark)

.....

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

.....

3. The **table 1**, below gives information about five elements, **A** to **E**

Table 1

Element	Melting point (°C)	Boiling point (°C)
A	-189	-186
B	-144	37
C	17	118
D	29	222
E	660	2450

- (a) At room temperature (30°C), which element(s) is/are ;

- (i) Solid(s) ? (01mark)

.....

- (ii) Liquid(s) ? (01mark)

.....

- (iii) Gas(es)? (½ mark)

.....

(b) (i) Which element will turn into a liquid only on a warm day (37°C)?
($\frac{1}{2}$ mark)

.....
(ii) Which other element will change state only on a warm day (37°C)?
($\frac{1}{2}$ mark)

.....
(c) Which element is a volatile liquid?
($\frac{1}{2}$ mark)

.....
(d) Which element will turn from a liquid to solid when placed in a refrigerator
(temperature 4°C)?
($\frac{1}{2}$ mark)

.....
(e) Which element is likely to be a metal at room temperature?
($\frac{1}{2}$ mark)

.....
4. (a) (i) What is meant by the term **corrosion** of iron?
(01mark)

.....
(ii) Write down the chemical name and the formula of rust
(01mark)

.....
(b) A clean sample of steel wool was placed in a test tube containing some and the test tube inverted in the trough of water. After three days the volume of air in the test tube changed from 20cm^3 to 16cm^3

(i) State what was observed on the steel wool after three days
(01mark)

.....
(ii) Calculate the percentage decrease in the volume of air in the test tube
(01mark)

(c) State;

(i) **one** method of preventing rust formation (½ mark)

.....

(ii) **one** disadvantage of rusting (½ mark)

.....

5. Gas **X** constitutes the largest proportion of air in the atmosphere.

(a) Name gas **X** (½ mark)

.....

(b) Name the method which can be used to collect a dry sample of gas **X** (½ mark)

.....

(c) On an industrial scale, gas **X** combines with hydrogen to form gas **W**.

(i) Identify gas **W** (½ mark)

.....

(ii) State the process by which **W** is produced on an industrial scale (½ mark)

.....

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

(i) State what was observed (01mark)

.....

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

.....

6. (a) Calcium oxide, a hygroscopic substance, can be obtained from limestone .

(i) What is a hygroscopic substance? (01mark)

.....

(ii) Write an equation to show how calcium oxide is obtained from limestone (1 ½ marks)

.....

(iii) State **one** practical application of the hygroscopic nature of calcium oxide. (½ mark)

(iv) Name **one** other oxide which is hygroscopic in nature (1 ½ mark)

(b) Write an equation for the reaction that can take place when a mixture of calcium oxide and silicon(IV) oxide is heated (1 ½ marks)

7. Graphite and diamond are the **two** allotropes of carbon.

(a) What is meant by the term allotropy? (01mark)

(b) Explain the electrical conductivity of the **two** allotropes (02marks)

(c) In the space below, draw the structure of graphite. (1 ½ marks)

(d) Give **one** use of each of the two allotropes (01mark)

8. (a) Differentiate between **hard water** and **soft water** (01mark)

(b) Name **two** ions responsible for water hardness. (02marks)

(c) Give **one** advantage of;

(i) soft water

(½ mark)

(ii) hard water

(½ mark)

(d) Soap solution was added to a sample of hard water for a long time. State what was observed

(½ mark)

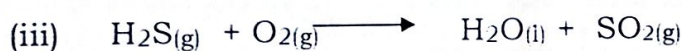
9. (a) Balance the following equations



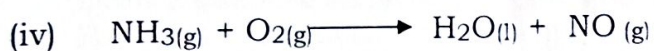
(½ mark)



(½ mark)

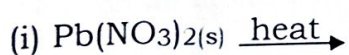


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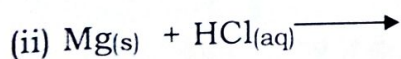


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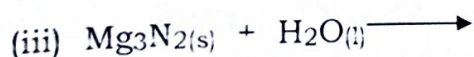
(b) Copy and complete the following equations;



(01mark)



(01mark)



(01mark)

10. (a) Nitrogen can react with hydrogen in the presence of a finely divided catalyst to form ammonia in the Haber process.

(i) State the catalyst used in the reaction (½ mark)

.....

(ii) Why is the catalyst finely divided? (½ mark)

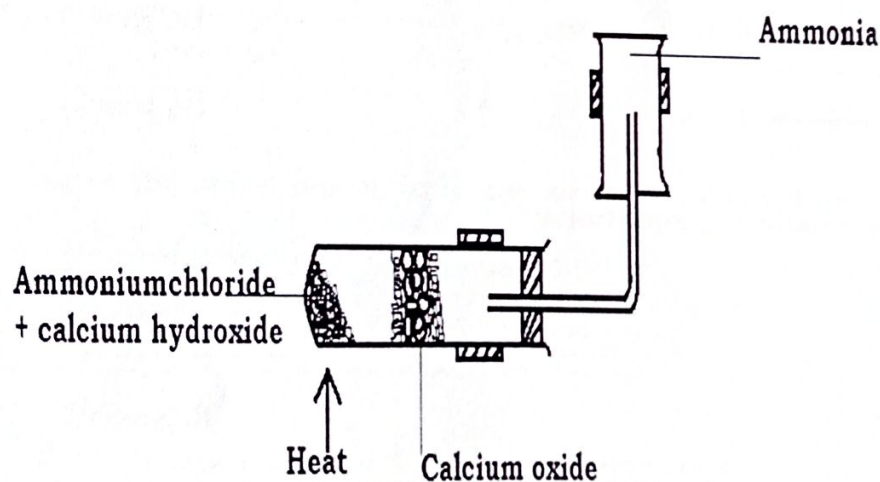
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(iii) State **two** other factors which can affect the yield of ammonia in the Haber process. (01mark)

.....

.....

(b) The set - up below shows the preparation of ammonia gas in the laboratory



(i) Write the equation for the reaction that takes place in the boiling tube (1 ½ marks)

.....

(ii) What is the purpose of the calcium oxide? (½ mark)

.....

(iii) Explain the method used to collect ammonia gas (01mark)

.....

SECTION B (30marks)

Answer any **two** questions from this section

Any additional question(s) answered will **not** be marked

11. (a) (i) Differentiate between **simple** and **fractional distillation**

(02marks)

(ii) State **one** advantage of fractional distillation over the simple distillation

(01mark)

(b) State **one** method that can be used to purify the sea water and draw a diagram for the set-up of apparatus that can be used during the process.

(04marks)

(c) The **table 2**, shows temperature variation with time when a solution of ethanol and water undergoes fractional distillation

Table 2

Time (minutes)	0	1.4	2.1	3.7	4.4	5.1	6.3
Temperature(^o c)	45	66	78	78	89	100	100

(i) Draw a graph of temperature against time

(04marks)

(ii) Explain the shape of the graph

(04marks)

12. (a) (i) Name the three sub - atomic particles in an atom

(1 ½ marks)

(ii) Draw a labelled diagram to show the location of these sub - atomic particles in an atom.

(02marks)

(b) The full symbol of atoms **X** and **Y** are represented by ${}^{39}_{19}\text{X}$ and ${}^{35}_{17}\text{Y}$ respectively.

(01mark)

(i) Write the electronic configuration of **X** and **Y**

(ii) What name is given to elements belonging to the same group as **Y**? (½ mark)

(c) Name the type of chemical bond that would be formed between;

(½ mark)

(i) an atom of **X** and **Y**

(ii) an atom of **Y** and an atom of carbon (atomic number of carbon is 6)

(½ mark)

(d) With the aid of "**dot** and **cross**" diagrams, describe how the bonds you have named in (c) are formed.

(05marks)

(e) With the aid of a labeled diagram, describe an experiment to prove that the compound formed between **X** and **Y** can conduct electricity in molten state but not in the solid state.

(04marks)

- 13.(a) (i) Draw a labelled diagram of the set – up of apparatus that can be used to prepare a dry sample of hydrogen in laboratory. (3 ½ marks)
- (ii) Write an equation for the reaction leading to the formation of hydrogen (1 ½ marks)
- (iii) Name the catalyst that can be used in this reaction (½ mark)
- (b) Hydrogen burns in air to form liquid **Q**. (½ mark)
- (i) Identify liquid **Q**
- (ii) Name the reagent that can be used to test for liquid **Q** and state what would be observed if **Q** was treated with the reagent you have named (02marks)
- (iii) Write the equation for the reaction leading to the formation of liquid **Q** (01mark)
- (c) Hydrogen gas was passed over copper(II) oxide.
- (i) State the condition(s) for this reaction (01mark)
- (ii) State what was observed (1 ½ marks)
- (iii) Write the equation for the reaction that took place (1 ½ marks)
- (d) Name **one** reagent that can be used to test for hydrogen in the laboratory and state what would be observed if this reagent is used. (01mark)
- (e) State **one** industrial use of hydrogen (01mark)
- 14.Explain the following observations and in each write equation(s) to illustrate your answer where necessary
- (a) When solid sodium hydroxide was exposed to air, a colourless solution was formed and later a white crystalline solid developed. (3 ½ marks)
- (b) Solid sodium chloride does not conduct electricity while molten sodium chloride conducts electricity (2 ½ marks)
- (c) Diamond does not conduct electricity while graphite does (06marks)
- (d) Water from limestone areas reacts with soap to form white curds (3marks)

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