

NAME:.....CAMPUS.....

STREAM:.....

545/2
CHEMISTRY
PAPER 2
JUNE, 2023
2 HOURS

PRE-MOCK EXAMINATIONS
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: (50 MARKS)

1. (a) What is meant by the term an alloy (1 mark)

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(b) State any one reason why alloys are preferred to pure metals (1 mark)

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Complete the table below by stating the components and one use of each of the alloys provided (3 marks)

Alloy	Composition	Use
Brass		
Solder		

2. a) under certain conditions a mixture of iron and sulphur can be converted in a compound P

i) State the condition(s) for reaction leading to formation of P from the mixture (1 mark)

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ii) Write the equation for the reaction leading to formation of compound P from the mixture (1½ marks)

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b) A portion of compound P was shaken with excess dilute sulphuric acid

i) State what was observed (1 mark)

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

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3. a) Write equation for the reaction that would take place if each of the following was burnt separately in excess oxygen

i) Magnesium (1 ½ marks)

.....

ii) Phosphorus (1 ½ marks)

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b) Each of the products from (a) was carefully collected, shaken with water and the resultant solution tested with litmus paper(s). State what was observed in the case of the solution of the product from;

i) Burnt magnesium (½ mark)

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ii) Burnt phosphorus (½ mark)

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c) Name the type of reaction that would take place if the aqueous solutions in (b) were mixed together. (1 mark)

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4. When excess hydrogen was passed over 2.50g of a strongly heated oxide of iron, Z, 1.82g of solid residue remained

(a) State a reason why there is decrease in mass (1 mark)

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(b) . Calculate the empirical formula of Z. (O=16, Fe=56) (4 marks)

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5. (a) Copper (II) carbonate was heated until there was no further change.

i) State what was observed. (1 mark)

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

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b) Dilute sulphuric acid was added to the residue from (a) above and the mixture heated.

i) State what was obtained (1 mark)

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

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6. a) Ethanol reacts with concentrated sulphuric acid to form ethene.

i) state the conditions for the reaction (1 mark)

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ii) write the equation for the reaction leading to the formation of ethene from ethanol (1 mark)

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b) i) Name one reagent that could be used to identify ethene. (½ mark)

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ii) State what would be observed if the reagent you have named in (b) (i) was used to test for ethene. (1 mark)

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.....

c) Under appropriate conditions ethene molecules can react amongst themselves to form a compound with a much larger molecular mass than ethene itself.

i) State one word, which means conversion of a compound with a low molecular mass to one with a relatively larger molecular mass. (½mark)

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ii) Name the compound with a much large molecular mass than ethene which is derived from ethene. (½mark)

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.....

iii) State on use of the compound that you have named in (b) (ii). (½ mark)

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7. a) An acid R, with the formula $H_xC_yO_z$ contains 26.7% Carbon, 2.2% hydrogen and 71.1% Oxygen by mass.

i) Calculate the empirical formular of anhydrous form of R. (2 marks)

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

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ii) Determine the values of X, Y and Z in the formula of R. (2 marks)

($H_xC_yO_z = 90$)

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b) 20.0cm³ of a solution containing R required exactly 18.5cm³ of a 0.1M sodium hydroxide solution for complete neutralization. Calculate the molarity of the solution of R given that R is a dibasic acid (3 marks)

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8. a) The reaction between a given mass of calcium carbonate and dilute nitric acid gives a high yield of carbon dioxide, but a similar reaction between the same mass of calcium carbonate and dilute sulphuric acid results into relatively lower yield of carbon dioxide under identical conditions.

i) Write equation for the reaction between calcium carbonate and dilute nitric acid.

(1 ½ marks)

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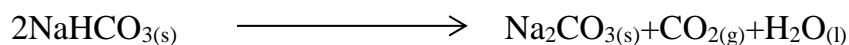
ii) Briefly explain why calcium carbonate/nitric acid mixture gives a higher yield of carbon dioxide compared to calcium carbonate/sulphuric acid mixture. (2 marks)

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b) When heated, sodium hydrogen carbonate decomposes giving carbon dioxide according to the following equation;



Calculate the maximum volume of carbon dioxide, measured at STP that would be given off if 3.5g of sodium hydrogen carbonate was heated until there was no further change. (H=1, C=12, O=16, Na=23, 1 mole of a gas occupies 22400cm³ at s.t.p) (2 ½ marks)

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9. The table below shows the number of electrons, neutrons and protons in particles A to F.

Particle	Electrons	Neutrons	Protons
P	19	20	19
Q	18	22	18
R	19	22	19
S	10	8	8
T	10	14	13
U	2	2	2

a) Identify the letters that present

i) a cation (½ mark)

.....

ii) an anion (½ mark)

.....

iii) a pair of isotopes (½ mark)

.....

iv) atoms of elements in the same group of the periodic table. (1 mark)

.....

b) Particle T combined with particle S to form a compound W. write what would be the most accurate formula of W. (1 mark)

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10. a) State what would be observed if into aqueous potassium iodide was;

i) bubbled chlorine (1 marks)

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ii) added 2-3 drops of lead(II)nitrate solution. (½ marks)

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b) i) Give a reason for the reaction in (a) (i). (1 mark)

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ii) Write an ionic equation for the reaction in (a) (ii). (1 ½ mark)

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SECTION B (30 MARKS)

*Answer **two** questions from this section.*

11. (a) Describe how a pure dry sample of carbon dioxide can be prepared in the laboratory from calcium carbonate. (No diagram is required but illustrate your answer with an equation) (5 marks)

(b) Excess carbon was bubbled through a solution of sodium hydroxide.

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

(ii) Write equation(s) for the reaction(s) that took place. (3 marks)

(c) Burning magnesium ribbon was lowered into a jar of carbon dioxide

(i) state what was observed. (1 ½ marks)

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

c) (i) Briefly explain how carbon dioxide used in fire extinguishers puts out a flame (2 marks)

(ii) State any other two uses of carbon dioxide (1 mark)

12. a) State the conditions under which Sulphur dioxide can be produced from

i) Sulphur

ii) Sodium sulphite;

write equations for the reaction leading to the formation of Sulphur dioxide in each case. (4 marks)

b) State what would be observed, give a reason for your observation if Sulphur dioxide was bubbled through an acidified potassium dichromate (VI) solution.

(2 marks)

c) write equations to show how Sulphur dioxide can be converted into sulphuric acid on industrial scale (4 ½ marks)

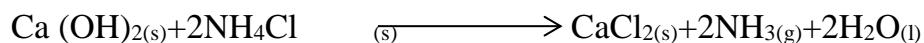
d) Write an equation only, to show an example of a reaction in which sulphuric acid acts as;

i) a dehydrating agent (1 ½ marks)

ii) acid (1 ½ marks)

iii) an oxidizing agent (1 ½ marks)

13. a) Under suitable condition(s) a dry sample of ammonia can be prepared in the laboratory using ammonium chloride mixed with calcium hydroxide according to the following equation.



i) State;

- the condition(s) for the reaction leading to the formation of ammonia. (1 mark)

- how ammonia is collected and give a reason for your answer .

(1 mark)

ii) Briefly explain why ammonia is not dried using fused calcium chloride or concentrated sulphuric acid. (No equation is required).

(1 ½ marks)

iii) Name the substance, which is usually used as a drying agent for ammonia. (½ mark)

b) When some mass of ammonium chloride were used in the preparation of ammonia as shown by the equation in (a), 3.0g of pure and dry calcium chloride were obtained.

i) Determine the mass of ammonium chloride that produced the 3.0g of calcium chloride.

(2 ½ marks)

(H=1.0, N=14.0, Cl=35.5, Ca=40.0).

ii) Calculate the volume of dry ammonia, measured at room temperature that was collected.

(2 marks)

(1 mole of a gas occupies 24.0dm³ at room temperature)

c) describe the reactions of dry ammonia with oxygen and write equation(s) for the reaction(s) that take(s) place.

(5 marks)

d) Write equation to show how ammonia reacts with chlorine.

(1 ½ marks)

14. (a) what is meant by the term enthalpy of combustion?

(1 mark)

(b) draw and label the set-up of apparatus that can be used in an experiment to determine the enthalpy of combustion of Methanol

(4 marks)

(c) the enthalpy of combustion of methanol is -762KJmol⁻¹

(i) what does the negative sign show about the combustion of methanol

(1 mark)

(ii) state one use of methanol owing to its enthalpy of combustion

(1 mark)

(iii) write an equation for the complete combustion of methanol(CH₃OH)

(1 ½ marks)

(iv) calculate the mass of methanol which on complete combustion will raise the temperature of 100cm³ of water by 17.5⁰c (C=12, H=1, O=16, specific heat capacity of water is 4.2 and density of water is 1gcm⁻³)

(4 ½ marks)

d) state any two ways in which enthalpy of combustion is important

(2 marks)

END