

Candidates Name.....

Signature.....Random No...../...../...../...../.....Personal No.....

545/2

CHEMISTRY

Paper 2

Aug/Sept.2022

2 hours

CHEMISTRY DEPARTMENT

Resourceful chemistry pre- UNEB set 3

UGANDA CERTIFICATE OF EDUCATION

PAPER 2

TIME. 2 hours

INSTRUCTIONS TO CANDIDATES.

Section A consists of 10 structured numbers. Attempt all questions in this section. Answers to this section must be written in the spaces provided.

Section B consists of 4 semi-structured questions. Attempt only 2 questions from this section. Answers to this section must be written in the answer booklets provided. In both sections, All working must be clearly shown.

Where necessary use, (Al = 27, C = 12, O = 16, N = 14, S = 32, Pb = 207)

1 mole of a gas occupies **24 l** at room temperature.

1 mole of a gas occupies **22.4 dm³** at s.t.p

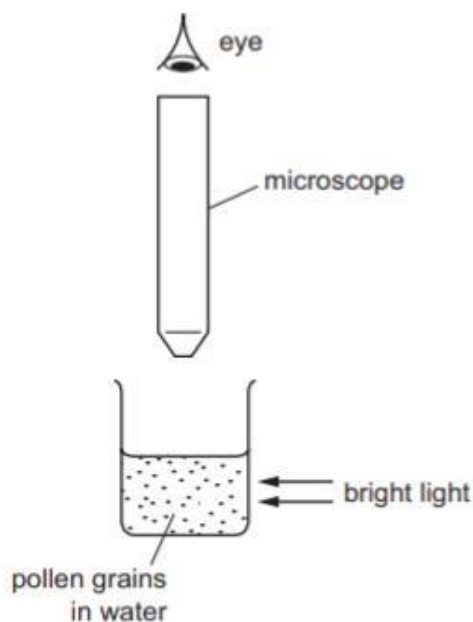
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (50 marks)

Attempt all questions from this section

1. (a) Bright light from the touch was passed into a glass beaker containing water , into which finely grounded pollen grain particles was poured. The experiment was then viewed under the microscope as the set up apparatus below



- (i) State what was observed? (½ mark)

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

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- (iii) State what the experiment indicated? (½ mark)

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- (b) The experiment in (a) was repeated using water at 80 o C

- (i) State what was observed? (½ mark)

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- (ii) Explain your observations in (a) (i) (01 mark)

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2.(a) A mixture **X** consists of iron powder and sulphur in the ratio of 1:1

(i) Describe briefly how each substance can be obtained from the mixture.

(1 ½ marks)

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(ii) Write ionic equation of reaction that would take place when warm dilute hydrochloric acid was added to mixture **X**. (1½ marks)

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(b) Mixture **X** in (a) was strongly heated until there was no further change.

(i) Name the product formed. (½ mark)

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(ii) Write equation of reaction that would take place when dilute sulphuric acid was added to the product in (i). (1½marks)

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(c) State one difference between mixture **X** in (a) and the product named in (b) (i). (½ mark)

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(3) The atomic numbers of chlorine, magnesium and phosphorus are 17, 12 and 15 respectively.

(a) State what is meant by *atomic number*? (01 mark)

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.....

(b) State the,

(i) valency of magnesium, give a reason for your answer. (01 mark)

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.....

(ii) the group of the periodic table to which phosphorus belong, (½ mark)

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.....

(c) Chlorine separately reacted with phosphorus and magnesium respectively forming compounds W and Y respectively. State the type of bond in compound,

(i) W. (½ mark)

.....
(ii) Y. (½ mark)

.....
(d) (i) Which of the compounds W and Y doesn't conduct electric current when current is passed through its molten state. (½ mark)

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(ii) Give a reason for your answer in (d) (i). (½ mark)

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4.(a) Anhydrous copper(II) sulphate was strongly heated until there was no further change. Write equation of reaction that took place. (01marks)

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(b) Magnesium powder was mixed with the residue in (a) and mixture heated strongly until there was no further change

(i) State what was observed. (1½ marks)

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

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(c) Explain your observations in (b). (1½ marks)

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5.(a) (i) Name the method that can be used to produce a sample of hydrogen gas from sodium chloride solution in the laboratory. (½ mark)

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(ii) State the condition under which a sample of hydrogen gas can be produced from sodium chloride solution by the method stated in (i). (½ mark)

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(b) Write ionic equation of reaction that would take place leading to the formation of hydrogen gas in (a). (01 mark)

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(c) Excess dry hydrogen gas was passed over strongly magnesium oxide.
(i) state what was observed? (½ mark)

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(ii) Give a reason for your answer in (i) (01 mark)

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6.(a) when 1.2 g of divalent metal element W completely reacted with 0.336 dm³ of sulphur dioxide at s.t.p, a white – yellow powdery mixture was formed

(i) Write equation of reaction that took place between divalent metal element W and sulphur dioxide gas leading to the formation of white – yellow powdery mixture. (1½ marks)

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(ii) calculate the relative atomic mass of divalent metal element W. (1 mole of gas occupies 22.4 dm³ at s.t.p). (2 ½ marks)

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7. Diamond is one of the two *crystalline allotropes* carbon.

(a) (i) State what is meant by *allotropes*? (01 mark)

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(ii) Name another crystalline allotrope of carbon. (½ mark)

.....
(b) State one use of,

(i) diamond. (½ mark)

.....
(ii) the crystalline form of carbon named in (a) (ii). (½ mark)

.....
(c) State the property of,

(i) diamond which is as a result of the its use stated in (c) above. (½ mark)

.....
(ii) the allotrope of carbon named in (b) as a result of its use in (c). (½ mark)

.....
(d)(i) State the condition(s) under which nitric acid can react with carbon.

(01 mark)

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(ii) Write equation of reaction that would take place when nitric acid reacts with carbon under the condition(s) stated in (i). (1½ marks)

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8. (a) Dilute ammonia solution was added to aqueous mixture of aluminium sulphate and zinc nitrate drop-wise until in excess, and then filtered.

(i) Write the formula of cation in the filtrate. (½ mark)

(ii) Write equation of reaction that took place leading to the formation of the residue. (1½marks)

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(b) Dilute sodium hydroxide solution was added to the residue in (a) drop wise until in excess and shaken.

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

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(ii) Give a reason for your observation in (b) (i). (½ mark)

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(c) The filtrate in (a) was acidified with dilute nitric acid.

(i) State what was observed when 2 drops of lead(II) nitrate solution were added to 2cm³ of resultant acidified solution. (½ mark)

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(ii) Write ionic equation of reaction that took place in (i). (1½ marks)

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9. (a) Name the process by which ammonia gas is manufactured on a commercial scale. (½ mark)

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(b) Ammonia gas is formed by the process you have named in (a) from two gases P and Q in the ratio of 3:1 in presence of finely divided catalyst.

(i) Name gas,

•P. (½ mark)

.....

•Q. (½ mark)

.....

(ii) Name the source from which each gas P and Q used to manufacture ammonia gas on a commercial scale is obtained from.

•P (½ mark)

.....

•Q. (½ mark)

.....

(iv) Write equation of reaction for the formation of ammonia gas on a commercial scale from two gases P and Q named in (b) (i) (1½ marks)

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(c)(i) Name the catalyst used in the manufacture of ammonia gas on a commercial scale. (½ mark)

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(iii) State other two conditions of reaction favourable for the formation of ammonia gas on a commercial large by the process named in (a). (01 mark)

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(d) State one industrial use of ammonia gas. (½ mark)

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10.(a) Define *enthalpy of combustion* . (01mark)

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(b) (i) Write equation of reaction for the complete combustion of methane in air. (1½ marks)

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(ii) 5.19g of methane when burnt in excess air raised the temperature of 1 litre of water from 23 °C to 91 °C. Calculate the heat of combustion in KJ of 1 mole of methane. (02 marks)

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(iii) A litre of methane costs shs 4,850 . Calculate the amount of heat that would be produced at r.t.p by litres of methane which cost shs 986,000 (1½ marks)

(1 mole of a gas occupies 24dm³ at room temperature)

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SECTION B

Attempt only two questions in this section

11. (a) Outline briefly with the aid of a well labelled diagram how a dry sample of hydrogen chloride can be prepared in the laboratory from potassium chloride. (6½ marks)

(b) (i) Name the reagent that can be used to identify hydrogen chloride gas in the laboratory and state what would be observed when the reagent named is treated with hydrogen chloride gas. (01 mark)

(ii) Write equation for the reaction that would take place in (b) (ii)
(1½ marks)

(c) State what would be observed and write the ionic equation for the reaction that would take place when hydrogen chloride is bubbled through aqueous,

(i) Silver nitrate solution. (02 marks)

(ii) Magnesium hydrogen carbonate. (02 marks)

(d) Explain why an aqueous solution of hydrogen chloride conducts electric current where as a solution of hydrogen chloride in methylbenzene doesn't.

(02 marks)

12. Sodium is extracted from its commonest ore by electrolysis method. Calcium chloride is added to the electrolyte in the cell .The anode is usually separated from the cathode using iron gauze cylinder. Sodium formed during the electrolysis is usually collected in dry nitrogen gas.

(a) (i) Name the ore from which sodium is extracted. (½ mark)

(ii) State the condition under which the ore is electrolysed.

(½ mark)

(iii) State the role of calcium chloride in sodium extraction.

(½ mark)

(b) State the material used as the,

(i) anode. (½ mark)

(ii) cathode (½ mark)

(c) (i) Write equation of reaction that takes place at each electrode. (02 marks)

(ii) Give a reason why the anode is usually separated from anode.

(01 mark)

(iii) Explain why sodium formed is formed collected under dry nitrogen gas. (01 mark)

(iv) State one use of the product formed at the anode. (½ mrk)

(d) Sodium was burnt in excess air.

(i) State what was observed? (½ mark)

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

(e) State and write equation of reaction how sodium reacts with,

(i) chlorine (2½

marks)

(ii) Water. (03 marks)

(f) State one industrial use of sodium. (½ mark)

13(a) Define the following terms as used in electrolysis.

(i) Electrolyte. (01 mark)

(ii) Electrodes. (01 mark)

(b)(i) Explain why copper (II) sulphate in solid state doesn't conduct electric current where as in aqueous solution, it conducts current. (02 marks)

(ii) State the factors that affect the selective discharge of ions at respective electrode during electrolysis. (1½ marks)

(c) A dilute aqueous solution of copper(II) sulphate was electrolyzed using copper electrodes.

(i) State what was observed at each electrode ,anode and cathode. (01marks)

(ii) Write equation of reaction at each electrode ,anode and cathode. (02 marks)

(iii)State the industrial application of above electrolysis. (½ mark)

(d)Comment on the concentration of copper(II) sulphate solution in (c) at the end of electrolysis. Give a reason for your comment. (02 marks)

(e)The electrolysis of dilute copper(II) sulphate solution in (c) was repeated using graphite electrodes instead of copper electrodes.

(i)Name the substance formed at the cathode. (½ mark)

(ii)Write the equation of reaction that took place at the anode. (01 mark)

(iii)Describe how the product at the anode can be tested in the laboratory. (01 mark)

(f)2 drops of litmus solution were added to the resultant solution around the cathode after electrolysis in (e)

(i) State what was observed? (½ mark)

(ii)Give a reason for your answer in (i). (01 mark)

14.(a) In the manufacture of sulphuric acid on industrial scale, sulphur dioxide is first purified ,and then converted to sulphur trioxide gas in presence of a catalyst which is finely divided.

(i)Name the catalyst used. (½ mark)

(ii)State why the catalyst is finely divided? (01 mark)

(iii)Write equation for the reaction leading to the formation of sulphur trioxide. (1½ marks)

(iv) State two other factors which favour the yield of sulphur trioxide gas.

(02

marks)

(b)(i) what name is given to the reaction leading to the formation of sulphur trioxide In the reaction in (a) (½ mark)

(ii) Write equation(s) to show how sulphur trioxide can be converted to Sulphuric acid. (03 marks)

(c) State the conditions under which sulphuric acid reacts with each of the following substances below. Write equation of reaction that took place in each case.

(i) Copper. (02 marks)

(ii) Aluminium oxide (02 marks)

(d) State the property of Sulphuric acid which is shown by its reaction with,

(i) Copper. (½ mark)

(ii) Aluminium sulphate (½ mark)

(e)(i) Sulphuric acid can be used in the laboratory to prepare iron(II) sulphate salt using iron. Write equation of reaction to show the effect of heat on anhydrous iron(II) sulphate (1½ marks)

(ii) State one industrial use of Sulphuric acid. (½ mark)

END.

Success requires Hardwork, perseverance and persistence!

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