Name ……Index No…..……

KAMUGANGUZI JANAN LUWUM MEM SCHOOL
UCE MOCK EXAMINATIONS 2020
CHEMISTRY
PAPER 2
TIME:

Instructions:

- This paper consists of sections A and B
- Section A is compulsory
- Attempt only two questions in section B
- Answers to questions in section B should be written on fresh sheet of paper.

SECTION A: (50 MARKS)

1. Air is a mixture of gases
   (a) State:
      (i) Two reasons why air is regarded as a mixture and not a compound. (1 mark)
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      (ii) The method by which the major components of air are separated industrially. (1 mark)
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   (b) Give a reason for your answer in (a) (ii) (½ mark)
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   (c) Write equation to show the reaction that can take place between the most abundant component of air and magnesium. (1 ½ mark)
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   (d) A clean iron-nail that remained exposed in air overnight had a reddish brown solid deposited on it.
      (i) Name the component(s) of air that caused formation of the reddish brown solid. (1 mark)

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(ii) State one industrial method that is normally used to avoid formation of the reddish brown solid on iron. (½ mark)

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2. (a) Define the term "electrolyte" (1 mark)

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(b) Name the particles by means of which electric current is conducted in

(i) graphite (½ mark)

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(ii) Molten lead (II) bromide (½ mark)

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(c) Give a reason why

(i) Lead (II) bromide when melted conducted electricity but when in solid state it does not. (1 mark)

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(ii) Electrolysis of concentrated sodium chloride solution is done using graphite anode but not a metal like iron. (1 mark)

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3. A colourless gas, G decolorized potassium manganate (VII) solution.

(a) Name two gases that are likely to be G. (1 mark)

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(b) G also decolorized a solution of bromine in tetra chloromethane, but did not have any effect on acidified potassium dichromate solution (½ mark)

(i) Identify G .

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(ii) Write an equation to show the reaction between G and bromine in tetra chloromethane. (1 mark)

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(c) G was burnt in air containing plentiful supply of oxygen. Write equation for the reaction that took place.

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(d) Name two substances that can react to produce G. (1 mark)

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4. A white solid Q reacted readily with concentrated sulphuric acid, giving effervescence and a colourless gas T, which gave a white precipitate with silver nitrate solution. Q also readily dissolved in dilute sodium hydroxide solution which on warming, gave off ammonia gas.

(a) Identity

(i) Solid Q

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(ii) Gas T

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(b) Write an ionic equation for

(i) The reaction between T and silver nitrate solution. (1 ½ marks)

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(ii) The reaction of Q leading to the formation of ammonia. (1 ½ marks)

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5. (a) Write an ionic equation for the neutralization of potassium hydroxide with sulphuric acid (1 ½ marks)

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(b) When $100cm^3$ of a 0.25M sulphuric acid was added to $100cm^3$ of a 0.5M potassium hydroxide solution, the temperature of the solution rose from 25.6°C to 28.9°C. Calculate the enthalpy of neutralization of potassium hydroxide with sulphuric acid. (Density of water = $1g/cm^3$; the specific heat capacity of water = $4.2Jg^{-1}\,{}^0C^{-1}$)

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(c) Ammonia solution was neutralized with sulphuric acid. Comment on the numerical value of the enthalpy of neutralization compared to that in (b); and give a reason for your answer. (1 mark)

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6. (a) Define the term "oxide" (1 mark)

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(b)When excess carbon monoxide was passed over 4.64g of a heated sample of an oxide of iron, 3.36g of solid residue remained.

(i) calculate the formula of the oxide of iron. (O = 16, Fe = 56) (2 ½ marks)

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(ii) Write the equation for the reaction between carbon monoxide and the oxide of iron. (1 ½ marks)

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7. $90cm^3$ of 0.01M calcium hydroxide solution was added to a sample of water containing 0.001 moles of calcium hydrogen carbonate.

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

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

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(iii) Calculate the number of moles of a calcium ions in $90cm^3$ of 0.01M calcium hydroxide. (1 ½ marks)

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(iv) State what would be observed if soap solution was added dropwise to a sample of the water after the addition of calcium hydroxide. Give a reason. (1 mark)

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8. (a) Define the term

(i) Isotopy

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(1 mark)

(ii) Allotrope

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(1 mark)

(b) Name one common element that exhibits both isotopy and allotropy. (½ mark)

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(c) Give one example of

(i) the isotopes of the element that you have named in (b) (½ mark)

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(ii) the allotropes of the element that you have named in (b) (½ mark)

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(d) State one use of the allotrope that you have given in (c) (ii) (½ mark)

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9. (a) At room temperature, hydrogen, peroxide decomposes rather slowly forming oxygen.

(i) State two ways by which the decomposition of hydrogen peroxide can be made faster. (1 mark)

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(ii) Write equation for the decomposition of hydrogen peroxide. (1 ½ marks)

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(b) Write equation for the reaction that would take place if

(i) phosphorus was burnt in limited supply of oxygen. (1 ½ marks)

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(ii) sodium was heated in excess oxygen. (1 mark)

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10. (a) When preparing hydrogen using the reaction between sulphuric acid and zinc granules, copper (II) sulphate solution is added to the mixture of the reactants. State

(i) the role of copper (II) sulphate (1 mark)

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(ii) the conditions under which sulphuric acid can react with zinc granules to produce hydrogen. (1 mark)

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(b) Write equation for the reaction leading to the formation of hydrogen as described in (a) (1 ½ marks)

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(c) The mixture obtained when zinc granules were treated with sulphuric acid as stated in (a) was filtered and a few drops of the solution were added to the filtrate. Write equation for the reaction that took place. (1 ½ marks)

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SECTION B:

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

11. (a) Explain

(i) what is meant by the term "rate of a chemical reaction" (2 marks)

(ii) the effect of concentration of reactant on the rate of a chemical reaction. (2 marks)

(b) The table below shows the times taken for reaction of a certain substance Z to go to completion when solutions containing various concentrations of Z were used.

Concentration of Z ($moldm^{-3}$)	0.1	0.3	0.4	0.6	0.8
Time, t for completion of reaction (s)	120	40	30	20	15
Reciprocal of time $^{1}/_{t}$ (s^{-1})					

(i) Calculate the value of $^{1}/_{t}$ for each time, t above and enter your answer in the space provided in the table above. (2 ½ marks)

(ii) Plot a graph of $^{1}/_{t}$, vertical axis against concentration of Z. (4 marks)

(iii) Deduce from your graph how the rate of the reaction varies with concentration of Z. (1 mark)

(c) (i) Draw a sketch graph to show how volume of carbon dioxide would vary with time if excess dilute hydrochloric acid was added to a certain mass Wg of marble chips and label it x. (1 mark)

(ii) Draw on the same axes in (c) (i) the sketch graph you would expect if equimolar volume of the hydrochloric acid was added to Wg of finely ground marble chips; and label it Y. (1 mark)

(d) (i) State one factor which can affect the rate of a chemical reaction other than concentration and the factor investigate in (c) (½ mark)

(ii) Mention the effect of the factor you have stated in (d) (i) on the rate of reaction. (1 mark)

12. (a) State one method for preparing

(i) lead (II) nitrate other than from lead (II) carbonate (½ mark)

(ii) lead (II) sulphate (½ mark)

(b) Describe how a pure dry sample of lead (II) nitrate can be prepared in the laboratory, starting from lead (II) carbonates. (No diagram or equation is required) . (7 ½ marks)

(c) State what would be observed and in each case write equation for the reaction that would take place if

(i) lead (II) nitrate was heated until there was no further charge. (3 ½ marks)

(ii) dilute sulphuric acid was added dropwise until in excess to lead (II) nitrate solution. (2 marks)

(d) Acidified lead (II) nitrate solution is an important laboratory reagent. Give a reason (1mark)

13. (a) Ethene can undergo polymerization

(i) Explain what is meant by the term "polymerization of ethene" (2 marks)

(ii) Name the product of polymerization of ethene and write equation for the reaction leading to the formation of the product that you have named. (2 marks)

(iii) State one use of the product you have named in (a) (ii) (2 marks)

(b) On polymerization, ethene formed a compound T, molecular mass = 16,660.

(i) Determine the number of moles of ethene molecules that combined to form T. (C = 12, H = 1) (2 marks)

(ii) State the term which is used to describe a single unit of the ethene molecule in T. (1 mark)

(c) (i) Distinguish between the terms "Synthetic polymer" and " natural polymer", and use silk and nylon to match with the type of polymer that you have distinguished. (2 marks)

(ii) State one use each of silk and nylon.

(d) State

(i) one characteristic property of thermosetting plastics and thermoplastics. (2 marks)

(ii) one example each of thermosetting plastics and thermoplastics

14. (a) Briefly describe how a dry sample of hydrogen chloride can be prepared in the laboratory; and write equation to illustrate your answer. (No diagram is required) (5 marks)

(b) Draw a labeled diagram of the set up of apparatus that can be used to prepared a solution of hydrogen chloride in water. (2 marks)

(c) Write equation for the reaction that would take place if;

(i) dry hydrogen chloride was passed over strongly heated iron-wire. (1 ½ marks)

(ii) A solution of hydrogen chloride was added to zinc carbonate. (1 ½ marks)

(d) The product from (c) (i) was dissolved in water, and chlorine bubbled through the aqueous solution.

(i) State what was observed

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

(e) To the mixture in (c) (ii) was added silver nitrate solution. State what was observed and write an ionic equation for the reaction that took place. (2 marks)

(f) Aqueous ammonia was added to the product in (e) until there was no further change. State what was observed. (½ mark)

END