THE CATHOLIC DIOCESE OF SAME
KINDOROKO GIRLS' SECONDARY SCHOOL
FORM THREE SEPTEMBER MID–TERM EXAMINATIONS

032/1 **CHEMISTRY 1**

(For Both Private and School Candidates)

Time: 3:00 Hours **Year: 2024**

Instructions

1. This paper consists of sections A, B and C with a total of **eleven (11)** questions.
2. Answer **all** questions in sections A and B and **two (2)** questions from section C.
3. Section A carries **sixteen (16)** marks, section B **fifty four (54)** marks and section C carries **thirty (30)** marks.
4. Except for drawings which must be drawn in pencil, all writings must be in **blue** or **black** ink.
5. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Name in Full** on every page of your answer booklet(s).
7. Where necessary, the following constants may be used:

   Atomic masses: H=1, C=12, N=14, O=16, Na=23, Mg=24, Al=27, S=32, Cl=35.5, K=39, Cu=64.

   Avogadro's number = 6.02×10^{23}

   GMV at s.t.p. = 22.4 dm^3

   1 Faraday = 96.500 coulombs

   Standard pressure = 760 mmHg

   Standard temperature = 273 K

   1 Litre = 1 dm^3 = 1000 cm^3

SECTION A (16 Marks)

Answer **all** questions in this section

1. For each of the items (i) – (x) choose the correct answer from among the given alternatives and write its letter besides the item number in the answer booklet(s) provided.

(i) Which fuels among the following are originated from fossil fuels?

A Firewood and coal
B Coal and firewood
C Petrol and Coal
D Petrol and charcoal
E Diesel and firewood

(ii) The granules of solid substances can be grinded into fine powder in the laboratory by:

A Pestle and filter funnel
B Separating funnel and motor
C Pestle and filter paper
D Thistle funnel and motor
E Pestle and motor

(iii) An element X is found in period 4 and group II of the periodic table. If element X undergoes the reaction $X \longrightarrow X^{2+} + 2e$, the electronic configuration of X^{2+} ion is:

A 2:8:6
B 2:8:2
C 2:8:8
D 2:8:4
E 2:8:8:2

(iv) What mass of pure sulphuric acid is found in $400cm^3$ of its 0.1M aqueous solution?

A 9.8 g
B 2.45 g
C 4.9 g
D 3.92 g
E 98 g

(v) The following are the uses of iron. In which of these uses is the iron mostly likely to rust?

A Iron bucket electroplated with zinc
B Iron hinges on gate
C Alloyed piston
D Painted iron gate
E Iron wired aluminum electric cable

(vi) What happens when dilute sulphuric acid is poured on zinc earring?

A Zinc sulphate is formed
B Earring shines because will be decorated by Sulphur
C Zinc sulphide is formed
D Copper sulphate formed
E Zinc chloride formed

(vii) Which of the following groups of substances represents flammable liquids?

A Petrol, pesticides, hydrogen
B Petrol, sulphuric acid, methylated spirit
C Methylated spirit, petrol, kerosene
D Kerosene, diesel, hot water
E Hydrochloric acid, nitric acid and sulphuric acid

(viii) Which physical method can be used to separate the products of the following reaction:

$$BaCl_{2(aq)} + Na_2SO_{4(aq)} \longrightarrow BaSO_{4(s)} + 2NaCl_{(aq)}$$

A Evaporation
B Filtration
C Chromatography
D Sublimation
E Distillation

(ix) Ammonia is the basic gas that can be obtained by reacting ammonium salt and calcium hydroxide. Which of the following can be used to dry ammonia during its preparation?

A Concentrated sulphuric acid
B Calcium chloride
C Calcium oxide
D Lime water
E Calcium carbonate

(x) If Kikwelele wants to electroplate a spoon with copper by using copper (II) sulphate solution, he should arrange the electrodes as:

A Spoon as anode and copper as cathode
B Spoon as cathode and copper as anode
C Spoon as anode and carbon as cathode
D Spoon as cathode and copper sulphate solution
E Spoon as copper solution

2. Match the items in List A with their responses in List B by writing the letter of the correct response besides the item number in the answer booklet(s) provided.

LIST A	**LIST B**
(i) Foam extinguisher	A Air pressurized water
(ii) Halons extinguisher	B Asbestos
(iii) Dry chemical extinguisher	C Potassium acetate
(iv) Blanket extinguisher	D Carbon-dioxide under extreme pressure
(v) ABC extinguisher	E Bromochlorofluoro methane
(vi) Wet chemical extinguisher	F Mono-Ammonium phosphate with nitrogen carrier
	G Protein and fluoroprotein
	H Sodium bicarbonate powder pressurized by nitrogen

SECTION B (54 Marks)

Answer **all** questions in this section

3. (a) Explain the significance of each of the following:
   (i) Refrigerators and freezers used in the laboratory must be labeled for chemical use only
   (ii) A chemistry laboratory should have safety measures
   (iii) It is necessary to familiarize yourself with laboratory apparatus
   (iv) Chemicals in the laboratory should be labeled and stoppered

(b) Briefly explain the following scientific facts:
   (i) Argon and neon qualify as noble gases
   (ii) Fluorine and chlorine are termed as halogens
   (iii) Potassium and sodium are known as alkali metals
   (iv) Carbon and silicon are termed as metalloids
   (v) All metals undergo electropositivity

4. Form one students at Kindoroko Secondary School conducted an experiment to find out the relationship between solubility of potassium nitrate salt in water against temperature. The results were recorded as shown in the table below:

Mass of salt (g)	20	40	60	75	99	125
Mass of water (cm^3)	200	200	200	200	200	200
Temperature (^0C)	0	20	30	40	50	60

With reference to the experiment:
(a) Provide the statement of the problem.
(b) Give the hypothesis.
(c) Identify:
   (i) The dependent variable.
   (ii) The independent variable.
   (iii) The controlled variable.
(d) Make an interpretation of the data given.
(e) Make an inference and conclusion.

5. (a) A chemical substance "Z" has density of $1gcm^{-3}$ and specific heat capacity of 4.2g/J°C. The substance "Z" freezes at 0^0C and boils at 100^0C. It is also neutral to litmus paper.
   (i) Specify the name and chemical formula of substance "Z"
   (ii) How can substance "Z" be tested and confirmed in the laboratory?
   (iii) Describe two (2) confirming method of substance "Z" and provide its positive observation.
   (iv) State two (2) physical properties of substance "Z" and show the usefulness of each property in our daily lives.
   (b) With two (2) points, differentiate sodium atom from chlorine atom.

6. (a) List down the uses of metal in reflection to the following physical properties:

S/N	Physical property	Uses
(i)	Ductility	
(ii)	Sonority	
(iii)	Malleability	
(iv)	Lustrous	

(b) Suggest one best method for separating each of the following mixtures:
   (i) Common salt and water
   (ii) Iodine and sand
   (iii) Olive oil and water
   (iv) Husk from rice
   (v) Ethanol and water
   (vi) Beams and maize seeds.

7. (a) The solution obtained after mixing marble chips with dilute hydrochloric acid was then allowed to evaporate to dryness in the same container. After evaporation process, the container together with its contents was measured and the total weight was 97.3g. On the next day, the weight of the container and its content was found to be 98.6g
   (i) Why did the mass increase?
   (ii) What is the name of property shown by substance left in container?
   (iii) What would happen to the rate of the reaction if calcium carbonate powder was used instead of marble chips? Explain.
   (b) Briefly explain what is observed when:
   (i) Cobalt (II) chloride paper come into contact with water
   (ii) Hydrogen gas is passed over heated copper (II) oxide
   (iii) The gas that relight glowing splint collected by downward displacement of water.

8. (a) State the Le Chatellier's principle.
   (b) What is equilibrium reaction?
   (c) In the industrial preparation of sulphur trioxide, equilibrium is established between sulphur dioxide and oxygen gas as follows:

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \qquad \Delta H = -94.9\ KJ/mol$$

   (i) How would you adjust the temperature and pressure to maximize the production of the product at equilibrium?
   (ii) Why it is unfavorable to work with very low temperature in contact process?
   (iii) What catalyst is used to speed up the rate of formation of sulphur trioxide before attaining equilibrium?

SECTION C (30 Marks)

Answer **two (2)** questions in this section

9. (a) State six (6) sources of errors during titration process in the laboratory.
   (b) A 2.12g sample of unknown monovalent metal carbonate (M_2CO_3) was dissolved in water to make 250cm^3 of solution. 25cm^3 of M_2CO_3 was reacted with 0.2500M hydrochloric acid solution by using methyl orange indicator. The results were as follows:

Burette reading	PILOT	1	2	3
Final reading cm^3	17.00	16.10		48.10
Initial reading cm^3	0.00	0.00	16.10	32.00
Volume used cm^3			15.90	

   (i) Copy the table and complete the missing values.
   (ii) Calculate the average volume of hydrochloric acid used in the reaction.
   (iii) Write the balanced chemical equation for the reaction.
   (iv) Calculate the number of moles of hydrochloric acid used and those of metal carbonate solution used in the reaction.
   (v) Determine the relative molecular mass of metal carbonate.
   (vi) Identify the unknown element "M" in the compound M_2CO_3

10. (a) A metallic object coated with copper is placed in $CuSO_4$ electrolyte.
    (i) To which electrode should the object be coated placed? Give reason.
    (ii) What current would be required to produce $1120cm^3$ of oxygen gas by the electrolysis at S.T.P for one hour and 30 minutes?
    (iii) What would happen if the principles of electrolysis were not discovered up to now? Give three (3) reasons.
    (b) State the faraday's laws of electrolysis and show the derivation of their equations.

11. A form four student had a task to mop the laboratory chamber. Accidentally, bees attached and stung on her hand. The laboratory teacher advised her to apply ashes powder to the sting area. Explain five (5) importance of the process that took place on her skin surface after applying ashes powder to our daily lives.