

THE CATHOLIC DIOCESE OF SAME
FORM FOUR JOINT PRE – CSSC EXAMINATION

KINDOROKO GIRLS' SECONDARY SCHOOL
ST. JOACHIM BOYS SCIENCE SECONDARY SCHOOL
ST. JACOBUS TECHNICAL AND AGRICULTURAL SCIENCE SECONDARY SCHOOL

032/1

CHEMISTRY 1

(For Both Private and School Candidates)

Time: 3:00 Hours

July: 2025

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 = 63.5
GMV at STP = 22.4 dm^3
Avogadro's number = 6.02×10^{23}
1 Faraday = 96,500 coulombs
Standard pressure = 760 mm Hg
Standard temperature = 273 K.
1 Litre = $1 \text{ dm}^3 = 1000 \text{ cm}^3$.



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) Wind is a promising future source of energy because:
- A It does not produce harmful gases
 - B It does not involve chemical reactions
 - C It is renewable
 - D It has high velocity of combustion
 - E It blows in very many directions
- (ii) A juice was made from the certain leaves. The juice was found to neutralize heartburn irritations. What could be the property of that juice?
- A It turns blue litmus paper red
 - B It has a sour taste
 - C It has a soapy or slippery feel
 - D It can dissociate to produce hydrogen ions
 - E Its pH ranges between 5 and 6.9
- (iii) The name hydrogen originates from the Greek words **hydro** and **genes** meaning:
- | | |
|--------------------------|----------------------------|
| A Water fearing gas | B Water forming gas |
| C Fire forming gas | D Electric power generator |
| E Water dissociating gas | |
- (iv) During the formation of ions:
- A Non-metal atoms gain protons
 - B Metal atoms lose their outermost electrons
 - C Metal atoms gain electrons in their outermost shells
 - D Non-metal atoms lose electrons of their outermost shells
 - E A metal and non-metal atoms form electrovalent bonds
- (v) One of the following represents the composition of straight fertilizers. What is that?
- A Two micronutrients
 - B Two primary macronutrients
 - C Only one primary macronutrient
 - D At least one primary macronutrient and one micronutrient
 - E Six macronutrients and molybdenum
- (vi) What type of fire is caused by burning of cooking oils and fats?
- | | |
|-----------|-----------|
| A Class F | B Class D |
| C Class A | D Class E |
| E Class B | |

- (vii) The following reagents can be used to differentiate iron (II) ions from iron (III) ions:
- A Sulphuric acid
 - B Potassium thiocyanate solution
 - C Potassium iodide solution
 - D Sodium sulphate solution
 - E Liquified petroleum gas (LPG)
- (viii) Why is loose or floppy clothing not allowed in the laboratory?
- A It will move fast
 - B It will get wet when water splashes
 - C It may catch fire or cause one to fall
 - D It causes poor ventilation in the body
 - E It limits the rate of reactions for the experiments being conducted
- (ix) What is the objective of water treatment?
- A To minimize water diseases
 - B To remove unwanted materials
 - C To remove mud
 - D To remove dissolved substances
 - E To increase its particulate nature
- (x) An isotope of cadmium has an atomic number of 48 and a mass number of 112. This means that cadmium atom has:
- A 48 protons, 64 neutrons and 48 electrons
 - B 64 protons, 48 neutrons and 64 electrons
 - C 48 protons, 112 neutrons and 48 electrons
 - D 48 protons, 48 neutrons and 112 electrons
 - E 112 protons, 48 neutrons and 112 electrons

2. Match the description in List A with the respective items 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) Degradation of the earth's surface at, and below the ground level through human activities	A Ozothosphere
(ii) A phenomenon where nutrients from fertilizers are carried by rainwater into water bodies and cause excessive growth of aquatic plants and algae	B Eutrophication
(iii) A reddish-brown haze that is formed when oxides of nitrogen and hydrocarbons react in presence of sunlight	C Chlorofluorocarbons
(iv) One of the greenhouse gases that contribute to global warming	D Land pollution
(v) An increase of the earth's average temperature as a result of the increase of the greenhouse gases levels in the atmosphere	E Stratosphere
(vi) The layer of the atmosphere in which a belt of naturally occurring ozone (O ₃) gas is mainly found	F Photochemical smog
	G Global warming
	H Mulching

SECTION B (54 Marks)

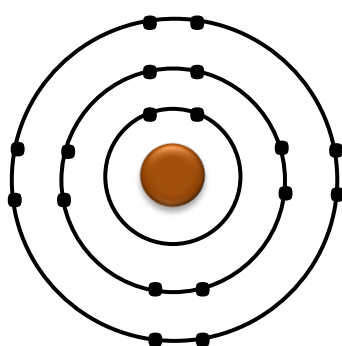
Answer **all** questions in this section

3. (a) Chemistry students at the certain school conducted an experiment in the laboratory using Bunsen burners. They lighted Bunsen burner **A** with its air hole open and Bunsen burner **B** with its air holes closed.
- (i) What could be the aim of their experiment?
 - (ii) Name the flames observed on each burner.
 - (iii) Give the reason for each of the flames observed on the two burners.
- (b) samples of water (**A – D**) from four different areas were tested with a soap solution to establish how much soap solution was needed to form lather that lasted for 30 seconds. The experiment was repeated for the second time by using the samples that had been boiled and then for the third time by using the samples that had been passed through an ion exchanger. Experimental results are presented in the following table.

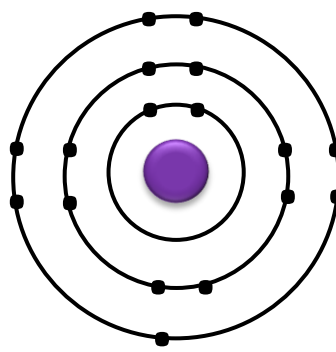
WATER SAMPLE	VOLUME OF SOAP SOLUTION USED (cm ³)		
	<i>Untreated water</i>	<i>Boiled water</i>	<i>Water passed through an ion exchanger</i>
A	12	1.8	1.8
B	17	17	1.7
C	26	20	1.8
D	1.6	1.6	1.6

- (i) Which of the samples was the hardest water? Give reasons.
 - (ii) Which sample behaved like distilled water? Explain.
 - (iii) Which water samples had the permanent or temporary water hardness? Give reasons.
 - (iv) Write an equation for the reaction of removing hardness in sample C.
4. (a) Distinguish mole from molarity.
- (b) The reduction of copper (II) oxide can be done by using hydrogen gas.
- (i) Write a balanced chemical equation for the process.
 - (ii) Calculate the mass of copper produced if 4.93 g of the hydrogen gas are pumped in the reactor.
 - (iii) Calculate the volume of the hydrogen gas that is used when 4 g of copper (II) oxide are reduced at STP.
5. (a) Name any two metal oxides that are soluble in water.
- (b) Write a balanced chemical equation to show:
- (i) The reaction of sodium with atmospheric air.
 - (ii) The burning of sodium in air.
 - (iii) The reaction of sodium peroxide with water at room temperature.
- (c) A doctor prescribed antacid tablets made from magnesium hydroxide to a student who was suffering from excess stomach acid.
- (i) Why did the doctor prescribe the antacid tablets?
 - (ii) Write a balanced chemical equation that took place in the student's stomach after taking tablets.

6. (a) The following diagrams show the structures of atoms of elements X and Y. Study them carefully and then answer the questions that follow:

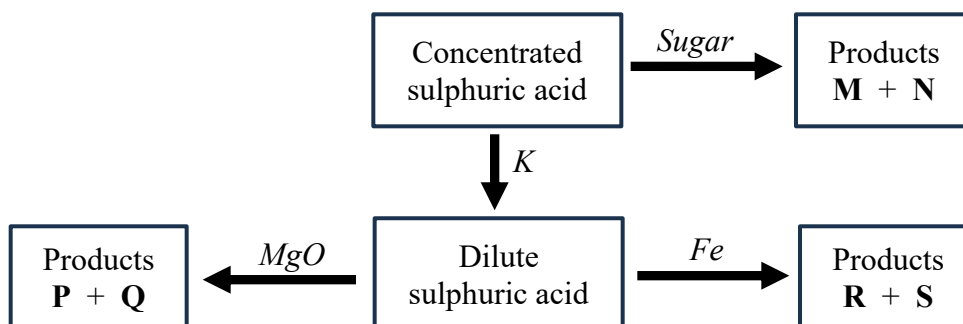


Element X



Element Y

- (i) Which one is stable?
 - (ii) Which one can conduct electricity?
 - (iii) Which one is chemically more reactive? Explain.
 - (iv) Identify elements X and Y by their names.
- (b) The following are thermochemical equations for two reactions:
- A** $\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \longrightarrow \text{CO}_{2(\text{g})} \quad \Delta H = -92 \text{ kJ/mol}$
- B** $2\text{C}_{(\text{s})} + \text{H}_{2(\text{g})} \longrightarrow \text{C}_2\text{H}_{2(\text{g})} \quad \Delta H = +53.2 \text{ kJ/mol}$
- (i) Explain whether the two reactions are endothermic or exothermic.
 - (ii) Draw an energy level diagram for each of the reactions.
7. (a) How would life be if there was no chemistry at all? Give four points.
- (b) A saturated sugar solution can dissolve more sugar after being heated. Briefly justify this fact.
- (c) Explain briefly any three changes of states of matter involved in the hydrological cycle.
8. Use the following illustration to answer the questions that follow:



- (a) What do letters M, N, P, Q, R and S represent?
- (b) Write the chemical equations to show the formation of the products:
 - (i) M and N
 - (ii) P and Q
 - (iii) R and S
- (c) State the type of reaction that forms products M and N.
- (d) How does process K take place in the laboratory? Explain.

SECTION C (30 Marks)

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

9. (a) With the aid of mathematical expressions, state the Faraday laws of electrolysis.
(b) Use the Faraday's First Law of electrolysis to verify the following results:
(i) A current of 47.86 A is required to produce 20 dm³ of chlorine gas by electrolysis at STP within one hour.
(ii) When a current of 10000 A is passed through an electrolytic cell during purification of copper for 12 hours, 142.1 kg of copper will be deposited.
(The electrochemical equivalent of Cu = $3.290 \times 10^{-4} \text{ gC}^{-1}$)
10. (a) Why does fractional distillation of crude oil give different products?
(b) Briefly explain any three sources of organic compounds.
(c) The compounds **A**, **B** and **C** are three isomers of an organic compound **Z**.
- A $\text{CH}_3(\text{CH}_2)_2\text{C}\equiv\text{CH}$
- B $\text{CH}_3\text{C}\equiv\text{CCH}_2\text{CH}_3$
- C $\begin{array}{c} \text{HC}\equiv\text{CCHCH}_3 \\ | \\ \text{CH}_3 \end{array}$
- (i) Give the molecular formula of the compound **Z**.
(ii) Give the IUPAC name of each isomer.
(iii) With the aid of chemical equation, show how many moles of hydrogen will be needed for complete unsaturation of **Z**.
11. Describe the impacts that are caused by extraction of metals to the environment through mining and hence suggest the major ways which can be used to control such impacts.