TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL

FORM FOUR INTER ISLAMIC MOCK EXAMINATION

CHEMISTRY 1

(For both School and Private Candidates)

032/1

TIME: 3 HOURS **Wednesday, 28th July 2021 am**

Instructions

1. This paper consists of sections A, B and C.
2. Answer all questions from sections A and B and only one question from section C.
3. Non-programmable calculator is allowed but cellular phones are not allowed in the examination room.
4. Write your Examination Number on every page of your answer booklet(s).
5. The following constants may be used:

   H = 1, C = 12, O = 16, N = 14, Na = 23, Zn = 65, Cl = 35.5, Ca = 40.

   Avogadro's constant, NA = $6.02 \times 10^{23} mol^{-}$.

   G.M.V at s.t.p = 22.4 dm^3

   1 Faraday = 96,500 coulombs

   Standard pressure = 760mmHg

   Standard temperature = 273K

   1 litre = $1dm^3 = 1000cm^3$

SECTION A: (15 Marks)

Answer **all** questions in this section

1. Choose the letter of the most correct answer from the given alternatives and write it in the box provided:

(i) In preparation of Hydrogen chloride gas in the laboratory the gas is collected by:

A. Downward displacement of water
B. Downward displacement of air
C. Downward displacement of water and air
D. Upward displacement of air
E. Downward delivery.

(ii) Four separate beakers contain 2g of magnesium were placed in different beakers each contain $100cm^3$ of dilute Sulphuric acid. The mixture which showed the fastest reaction rate at the start was the one containing magnesium:

A. Block
B. Ribbon
C. Turnings
D. Powder
E. Granules.

(iii) During the electrolysis of molten aluminium oxide, 3 faradays were needed to deposit one mole of aluminium. The number of electrons of aluminium will be:

A. 6.02×10^{23}
B. 1.806×10^{23}
C. 180×10^{23}
D. 18.06×10^{23}
E. 1806×10^{23}.

(iv) The most appropriate method for separating a mixture of Sodium chloride and ammonium chloride is:

A. Chromatograph
B. Evaporation from an aqueous solution
C. Solvent extraction
D. Sublimation
E. Layer separation.

(v) A sodium atom and sodium ion have the same:

A. Electronic configuration
B. Number of electrons
C. Chemical properties
D. Atomic number
E. Proton number.

(vi) 10 drops of organic liquid N were carefully warmed with 10 drops of acetic acid and drops of concentrated Sulphuric acid. What is the functional group of the organic liquid N?

A. —COOH
B. —CHO
C. —OH
D. C ≡ C—
E. R — C(=O)—O—R

(vii) A salt in exposure to air becomes covered with a liquid is:
A. Efflorescent
B. Deliquescent
C. Hydroscopic
D. Hydrolytic
E. Hydrous crystals.

(viii) Sprays and insecticides are examples of:
A. Solution
B. Solute
C. Solvent
D. Homogenous mixture.

(ix) Consider the following reaction $A + B \rightleftharpoons C + D$, ΔH = -Ve. Which of the following is going to happen if temperature is increased:
A. Concentration of A will increase
B. Concentration of B will increase
C. Concentration of C will increase
D. Concentration of D will increase
E. Concentration of A and B will increase.

(x) An example of homologous series is:
A. Ethene, ethyne and propyne
B. Propane, butene and pentyne
C. Ethene, propane and butyne
D. Ethane, propene and butane
E. Methane, ethane and propane.

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

LIST A	**LIST B**
(i) 0.001M sodium hydroxide	A. Citric acid
(ii) Sodium sulphate	B. Dilute base
(iii) Precipitation reaction	C. Normal salt
(iv) An acid found in certain fruits	D. Acidic salt
(v) Sodium hydrogen sulphate.	E. $H+ + OH^- \longrightarrow H_2O$
	F. Concentrated base
	G. Basic salt
	H. Concentrated acid
	I. $Ag^+(aq) + CI^-(aq) \longrightarrow AgCl(s)$
	J. Neutral salt

SECTION B: (70 Marks)

Answer **all** questions in this section

3. (a) Explain why solid magnesium chloride does not conduct electricity but aqueous Magnesium chloride does conduct.

   (b) Chlorine and hydrogen are manufactured by the electrolysis of concentrated aqueous sodium chloride. Chlorine is released at the positive electrode and hydrogen released at the negative electrode.
   (i) Why are hydrogen ions and not sodium ions discharged at the negative electrode?
   (ii) Construct the equation for the reaction at positive electrode.
   (iii) Suggest why the solution becomes alkaline as the electrolysis proceeds.

4. (a) Two isotopes of potassium are ${}^{39}_{19}K$ and ${}^{40}_{19}K$. Complete the table about the number of particles found in one atom of each of these two isotopes.

Element	**Number of Protons**	**Number of electrons**	**Number of neutrons**
${}^{39}_{19}K$			
${}^{40}_{19}K$			

   (b) Write the electronic configuration of
   (i) Gaseous/ionized potassium
   (ii) Potassium at ground state

5. (a) Potassium reacts with water as shown in the equation below:

   $2K_{(s)} + 2H_2O_{(i)} \rightarrow 2K^+_{(aq)} + 2OH^-_{(aq)} + H_{2(s)}$

   A sample of 0.195g of potassium was added to 500cm^3 of cold water. When the reaction was finished, 100cm^3 of 0.100moldm^{-3} hydrochloric acid was added to form solution X.

   (i) Calculate the number of moles of hydrogen ions in 100cm^3 of 0.100moldm^{-3} hydrochloric acid.
   (ii) Calculate the number of moles of hydroxide ions formed when the potassium was added in water.
   (iii) Is a solution X acidic, neutral or basic? Explain your answer.

   (b) According to Avogadro's law; each mole of gas will contain two things in common. Mention them.

6. (a) Sultan carried out an experiment to compare the hardness of water in towns. He measured $50cm^3$ of each sample into separate conical flasks. He added soap solution gradually to each flask, shaking them until lather was formed.
His results were as shown in the table:

Water sample	Volume of soap solution
Mbeya	2.0
Tanga	7.5
Arusha	10.0
Iringa	4.0

(i) Which town has the hardest water? Explain your answer.
(ii) Name two anions that caused the harness of water in the town named in (a) (i) above.

(b) (i) Why drinking hard water is better for health than drinking soft water?

(ii) Outline two disadvantages of using hard water.

7. (a) The following names are mistaken. Write their structures and suggest the correct IUPAC names.

(i) 1 – Chloro -3 - dimethylbutan-4-01

(ii) 3-methyl-3-bromohex-6-ene

(iii) 3-methylpropanoic acid

(iv) 3-Methypropane

8. (a) Consider the following reactions below:

(i) $A \rightleftharpoons B$ (ii) $A \rightleftharpoons B$ (iii) $A \rightarrow B$

Identify and describe the three kinds of the reactions above in (i) – (iii).

(b) Giving reason(s), identify the activities below as either endothermic or exothermic reactions.

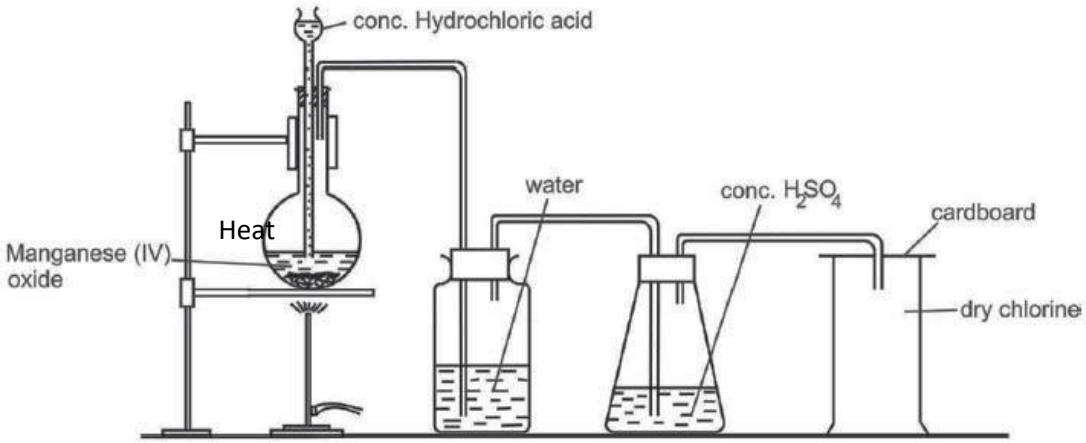
(i) Burning of charcoal

(ii) Photosynthesis

(iii) Evaporation of water

(iv) Feeling cold after taking shower with hot water

9. This set up below was used to prepare gas called chlorine in the laboratory. Study it carefully then answer the questions below it:



(a) With reference of the set up above, write a balanced reaction equation for the oxidation of concentrated hydrochloric acid.

(b) During preparation of chlorine in the laboratory, the gas may be passed through water and concentrated Sulphuric acid before collection. State the role of:
   (i) Water
   (ii) Concentrated Sulphuric acid

(c) Chlorine gas is collected by downward delivery, not upward delivery. Why?

(d) State three industrial uses of Sulphuric acid.

10. (a) Name and state the function of four (4) main raw materials which are used in the blast furnace for the production of iron.

(b) Why the wall of the blast furnace does not melt while temperature is too high?

Give reason(s).

11. (a) 0.8g of unknown gas occupied at s.t.p a volume of 560cm^3.

(i) Calculate the molar mass of the gas.

(ii) Identify the unknown gas.

(b) Calcium carbonate reacts with dilute nitric acid to form three compound X, Y and Z.

X is a salt
Y is a colourless gas
Z is a colourless liquid

(i) Name Y and describe a test for this gas.
(ii) Name Z and describe two chemical tests for this liquid.
(iii) Write the balanced chemical equation for the reaction above.

12. (a) Explain the following observations:

(i) When copper is dipped into a dilute HCl no-reaction occurs but in conc. Nitric acids it reacts forming a blue solution and dense thrown fumes.

(ii) When a blue hydrated copper sulfate is added into a test-tube containing concentrated H_2SO_4 acid it turns white.

(iii) Egg shells are dipped into a dilute HCl an effervescence colourless gas is evolved.

(iv) Addition of silver nitrate solution into water taps results into the formation of white precipitate.

(b) Explain the role of the following reagents in the qualitative analysis tests.

(i) Sodium hydroxides

(ii) Barium chloride/Barium nitrate

SECTION C: (15 Marks)

Answer **only one (1**) question in this section

13. Write an essay about global warming using the following guidelines:

(i) Meaning of global warming

(ii) Greenhouse effects and how cause global warming.

(iii) Effects caused by global warming.

(iv) Ways of preventing global warming.

14. Just as animals; plants as living organisms require the essential nutrients categorized as micronutrients and macronutrients for their proper growth and productivity. As an agricultural specialist prepare a public address to farmers educating them about:

(i) Categorization of plants nutrients.

(ii) At least one role played by each one of primary macronutrients.

(iii) Management of the loss of the plants nutrients.

Wabillah Tawfiiq