PERAMIHO GIRLS' SECONDARY SCHOOL

FORM THREE MONTHLY TEST

032 **CHEMISTRY**

Time: 2:30 Hours **6th August, 2024**

Instructions

1. This paper consists of sections **A**, **B** and **C** with a total of **eleven (11)** questions.
2. Answer **all** questions from sections **A** and **B** and **two** questions from section **C**.
3. Non-programmable calculators are allowed in the examination room.
4. For your calculations, show clearly the manipulation of units.
5. The following constants may be used;
   - Avogadro's constant, $N_A = 6.022 \times 10^{23}$ mol^{-1}
   - 1 L = 1 dm^3 = 1000 cm^3
   - GMV = 22.4 dm^3/mol or 22400 cm^3/mol
   - Atomic masses: H = 1, C = 12, O = 16, Mg = 24, S = 32, Cl = 35.5, K = 39, Fe = 56, Zn = 65

SECTION A: (16 Marks)

Answer **all** questions in this section

1. For each of the following items (i) - (x), choose the correct answer from among the given alternatives and write its letter beside the item number in the answer sheet(s) provided.

(i) Identify the process whereby fast-moving molecules escape from the surface of a liquid at room temperature.
A. Evaporation B. Diffusion C. Boiling D. Condensation E. Heating

(ii) Why you are not advised to use luminous flame to heat solution during experiment in the laboratory?
A. Produces more heat for short time B. Gives the accurate results
C. Produces no results D. Simplifies the experiment
E. Produces soot to apparatuses

(iii) Form three students were doing scientific research about Malaria disease at Songea district Council and obtained the results from their experiment that do not support their hypothesis formulated earlier. What advice could you give to them?
A. The experiment should be changed B. Restart the research
C. A new problem should be identified D. Changing the participants
E. Idea for further testing should be formulated

(iv) What volume of Hydrogen gas will be produced when 1.3 g of Zinc granules react completely with excess dilute sulphuric acid at S.T.P?
A. 224 cm^3 B. 130 cm^3 C. 448 cm^3 D. 220 cm^3 E. 440 cm^3

(v) Consider the following fuels which are used for different purposes.
1. Charcoal **2**. Paraffin **3**. Coal **4**. Fire wood.
Which fuels are considered as secondary fuels?
A. **1** and **4** B. **1** and **2** C. **2** and **3** D. **3** and **4** E. **1** and **3**

(vi) Which of the following groups consists of home care products?
A. Yeast, Plastics and Disinfectants B. Paints, Air freshners and Petrol
C. Rubbers, Clothes and Soap D. Detergents, Disinfectants and Air freshners
E. Paints, Rubber and Soap

(vii) Determine the chemical warning signs that should be put on bottles containing kerosene? A. Corrosive B. Flammable C. Harmful D. Toxic E. Explosive

(viii) Which among the following series of factors influence the occurrence of a chemical reaction when two chemical substances react?
A. Effective collision, proper orientation, covalent reactants, low activation energy
B. Ineffective collision, proper orientation, ionic reactants, low activation energy
C. Effective collision, proper orientation, covalent reactants, high activation energy
D. Effective collision, improper orientation, ionic reactants, low activation energy
E. Ineffective collision, proper orientation, covalent reactants, low activation energy

(ix) Pilot titration is important in volumetric titrations because……..
A. It is carried out in order to calibrate the acids.
B. It is used to rinse the burette.
C. It is used to obtain the approximate end point.
D. It is used to lower the end point of reaction.
E. It is used to show that at the end point of reaction the solution becomes neutral.

(x) The following substances react to form products at different rates. Identify the pair which produce products in a long period of time.
A. $HCl(aq)$ and $CaCO_3(s)$ B. $HCl(l)$ and $CaCO_3$ C. $Na_2S_2O_3(aq)$ and $H_2SO_4(aq)$
D. $Fe(s)$, $O_2(g)$ and $H_2O(l)$ E. $NaCl(aq)$ and $AgNO_3(aq)$

2. Match the name of oxides in **List A** with their corresponding examples in **List B** by writing the letter of the most correct response beside the item number in the answer sheet(s) provided.

List A	List B
(i) Neutral oxides	**A.** CO_2, SO_2, ClO_3
(ii) Acidic oxides	**B.** CaO, Al_2O_3, CuO
(iii) Peroxides	**C.** CaO, MgO, BaO, Na_2O, K_2O
(iv) Superoxides	**D.** Al_2O_3, ZnO, PbO
(v) Basic oxides	**E.** H_2O_2, AgO, HgO
(vi) Amphoteric oxides	**F.** Na_2O_2, H_2O_2, K_2O_2
	G. NaO_2, KO_2, RbO_2
	H. CO, N_2O

SECTION B: (54 Marks)

Answer **all** questions in this section

3. (a) A table salt is a chemical combination of sodium and chlorine.

(i) Identify the type of bond formed in (a) above. **(01 mark)**

(ii) Show the bond formation by using diagram. **(02 marks)**

(b) A compound consists of 26.70 % carbon, 2.20 % hydrogen and 71.10 % oxygen. If its vapour density is 45, determine;

(i) Empirical formula (ii) Molecular formula of the compound. **(06 marks)**

4. Two gas jars, one containing gas **X** and other containing gas **Z**. Gas **X** is used to prepare water gas in the laboratory and gas **Z** is used in treatment of sewage plants.

(a) Identify the two gases. **(02 marks)**

(b) Show the chemical test of gas **X** and **Z**. **(02 marks)**

(c) With reason give the method used to collect gas **Z** in the laboratory. **(01 mark)**

(d) Give any two (2) methods used to prepare gas **X** in the laboratory. **(02 marks)**

(e) Give two (2) uses of gas **X** in our daily life. **(02 marks)**

5. A form three student tested four samples of water each containing 10 cm^3 from different areas at Peramiho village by shaking with the drops of soap solution. The experiment was repeated a second time by boiling each sample of water (10 cm^3) with three drops of soap solution. The observations were recorded as shown in the table below;

Sample	Observations with soap solution	Observation for boiled sample with soap
A	No lather	Lather
B	Lather	Lather
C	Lather	Lather
D	No lather	No lather

(a) Which sample contains only temporary hard water? Give the reason **(02 marks)**

(b) Which sample contains permanent hard water? Give the reason **(02 marks)**

(c) Name the chemical substances that would be the causes of hardness in sample **A**. **(02 marks)**

(d) Write the chemical equation for removing hardness in

(i) Sample **A** (ii) Sample **D** **(03 marks)**

6. (a) Why do the thermal conductivities and electrical conductivities of elements in a periodic table decreases across the periods? Explain **(03 marks)**

(b) Write three physical properties of alkali earth metals. **(03 marks)**

(c) What happens when alkali earth metals burn in air? Explain **(03 marks)**

7. A mixture of iron and sulphur was gently heated until it started to glow. The mixture continued to glow for some time even after heating had been stopped.

(a) Write an equation for the reaction between sulphur and iron

(b) Why did the mixture continue glowing even after heating was stopped? Explain

(c) Can the product formed in (a) above be attracted by a magnet? Explain **(09 marks)**

8. Minja wanted to conduct an experiment that involves the use of heat but she was not aware on how to light a Bunsen burner. As a form three student, re-arrange the following steps using letters **A** to **F** to help Minja to light a Bunsen burner.

(i) To extinguish the flame, turn off the gas tap to stop the gas flow.
(ii) Light the gas at the top of the barrel with a lighted match stick.
(iii) Turn the collar to close the air hole completely.
(iv) keep your face away from the top of the barrel.
(v) Adjust the gas tap until the supply of gas is enough for a flame.
(vi) Turn on the gas fully to ensure that plenty of the gas enters the burner. **(09 marks)**

SECTION C: (30 Marks)

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

9. (a) Name the indicator you would choose for each of the following titration reactions:

(i) Hydrochloric acid against ammonia solution
(ii) Acetic acid (vinegar) against sodium hydroxide **(02 marks)**

(b) A form three student dissolved 9.57 g of potassium chloride and potassium carbonate in distilled water to make half a litre of solution. She pipetted 20 cm^3 of this solution into a conical flask and titrated against monobasic acid of concentration 0.25 M using methyl orange (MO) indicator. Her titration results are shown in the table below;

Titration	**PILOT**	**1**	**2**	**3**
Final volume (cm^3)	15.90	30.90	46.00	15.00
Initial volume (cm^3)	0.00	15.90	31.00	0.00
Volume of acid used (cm^3)				

(i) What was the colour of the solution at the end point of the titration? **(02 marks)**
(ii) Complete the table above. **(02 marks)**
(iii) Determine the average volume of the acid used. **(02 marks)**
(iv) Calculate the mass of potassium chloride in the mixture. **(07 marks)**

10. A doctor prescribed antacid tablets made from magnesium hydroxide to a student who was suffering from excess stomach acid:

(a) Why did the doctor prescribed the antacid tablets to the student?
(b) Write a balanced chemical equation for the reaction took place in student's stomach after taking the tablets.
(c) If the normal acid content in the stomach is 150 millimolar and the stomach secrete 0.5 liters of gastric juice in a day, calculate the mass of tablets to be given to the student if the gastric juice had 210 millimolar hydrochloric acid.
(d) If each tablet of an antacid weighs 145 mg of magnesium hydroxide, how many tablets will the student be given?
(e) If a dose requires 1 tablet for every 12 hours, how many days should the students take to finish the full dose? **(@03 = 15 marks)**

11. Describe six (6) factors affecting the rate of chemical reactions. **(15 marks)**