Name: _____ **Adm No:** _____**Class**: _____

Candidate's Signature: _____ **Date**: _____

CHEMISTRY (233/1)
PAPER 1
FORM THREE
END TERM 3 2024
Time: 2 HOURS

Instructions to Candidates

(a) ***Write your name class and class number in the spaces provided above***

(b) Sign and write the date of the examination in the spaces provided above

(c) Answer ALL questions in the spaces provided.

(d) Mathematical tables and electronic calculators may be used.

(e) All working must be shown clearly where necessary.

(f) This paper consists of 7 printed pages

(g) Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are mis*sing*

FOR EXAMINER'S USE ONLY

Questions	Maximum score	Candidates score
1 – 27	**80**	

1(a) State one difference between a proton and a neutron apart from their location. (1mark)

(b)Lithium has two isotopes with mass number 6 and 7.If the relative atomic mass of lithium is 6.94, determine the percentage abundance of each isotope (2marks)

2)3.1g of an organic compound containing carbon, hydrogen and oxygen only produced 4.4g of carbon (iv) oxide and 1.8g of water on complete combustion. Determine its molecular mass if its formula mass is 60 (C=12, H=1, O=16) (3marks)

3(a) Define allotropy (1mark)

(b)State two elements that exhibit allotropy giving and example in each case (2marks)

4. Magnesium chloride dissolves in water to form a neutral solution while aluminum (iii) chloride forms an acidic solution. Explain. (3marks)

5. Using a dot (.) and cross(x) diagram show bonding in (2marks)
(a)Hydroxonium ion (H_3O^+)

(b)Ammonium ion (NH_4^+)

6. The first step in the manufacture of nitric (v) acid from ammonia is the catalytic oxidation of ammonia.
(a)Write the equation for the reaction (1mark)

(b)Predict qualitatively the conditions of temperature and pressure for maximum yield of nitrogen (ii) oxide in the equilibrium mixture of the reaction in (a) above (1mark)

7) 25cm3 of 0.1M potassium hydroxide solution was neutralized by 30cm3 of a solution of a dibasic acid containing 3.15g per 500g of solution. Calculate;

(a)Molarity of the acid solution (3marks)

(b)Molar mas of the acid (1mark)

8. Carbon reduces steam to form hydrogen gas and carbon (ii) oxide (water gas).

(a)State the condition (1mark)

(b) Write the equation (1mark)

9. (a) State the Avogadro's law (1mark)

(b) $100cm_3$ of hydrogen was mixed with $300cm_3$ of chlorine and the mixture allowed to react. Determine the maximum volumes of hydrogen chloride gas that would form. (2marks)

10. State what is observed when concentrated sulphuric acid (vi) acid is added to;

(a)Sugar crystals (1mark)

(b)Cobalt (ii) chloride crystals (1mark)

11. In terms of structure and bonding explain why water is a liquid at room temperature while hydrogen sulphide is a gas. (2marks)

12. When anhydrous calcium chloride is exposed to the atmosphere it forms a solution.
(a)Name the process that takes place (1mark)

(b)State the use of the process displayed by anhydrous calcium chloride (1mark)

13. During electrolysis of molten lead bromide, bromine gas is produced at one electrode and lead metal in the other electrode.
(a)Define;
(i)Electrolysis (1mark)

(ii)Electrolyte (1mark)

(b)At which electrode does reduction occur (1mark)

14. State one use of each of the following apparatus in the laboratory
(i)Desiccator (1mark)

(ii)Crucible (1mark)

(iii)Deflagrating spoon (1mark)

15. In the laboratory hydrogen sulphide gas is prepared by the action of hydrochloric acid on a metal sulphide.
(a)Name a suitable metal sulphide that can be used to prepare the gas. (1mark)

(b)Write down the equation for the reaction between the metal sulphide in (a) above with hydrochloric acid (1mark)

(c)State one chemical test for hydrogen sulphide (1mark)

16(a) During preparation of copper (ii) sulphate excess copper (ii) oxide is used. Give a reason (1mark)

(b)Starting with sodium hydroxide describe how you can obtain dry sodium hydrogen carbonate (3marks)

17. If it takes 30 seconds for $100cm_3$ of carbon (iv) oxide to diffuse across a porous pot. How long will it take $150cm_3$ of nitrogen (iv) oxide to diffuse across the same pot under similar conditions. (C=12, O=16, N=14)(3marks)

18. Given sodium carbonate solid, lead (ii) nitrate solid and water, explain how a sample of lead (ii) carbonate can be obtained. (3marks)

19. In an experiment to determine the percentage purity of sodium carbonate produced in the Solvay process, 2.15g of the sample reacted with exactly $40.0cm_3$ of 0.5M sulphuric (vi) acid. Determine the percentage purity of sodium carbonate in the sample. (4marks)

20. A colorless liquid was suspected to be water. State two ways to confirm;
(a)Purity of the water (1mark)

(b) That the liquid is water (2marks)

21. In an experiment ammonium chloride was heated in a test tube. A moist red litmus paper was placed at the mouth of the test tube. The paper changed to blue then red.Explain (3marks)

22. Hot concentrated nitric (v) acid oxidizes sulphur and carbon. Write the chemical equations for the reactions (4marks)

23. Excess sulphur (iv) oxide gas was bubbled through a solution of sodium hydroxide containing phenolphthalein.

(i)State what is observed (2marks)

(ii)Write the equations for the reaction in (a) above. (2marks)

24. Describe using equations the action of heat on the following nitrates. (3marks)

(i)Copper (ii) nitrate

(ii)Silver nitrate

(iii)Sodium nitrate

25(a) A piece of burning magnesium was lowered into a gas jar containing nitrogen (ii) oxide. State and explain the observations made (2marks)

(b)Write the equation for the reaction above (2marks)

26. Explain why potassium is kept under paraffin while phosphorous is kept under water (3marks)

27. Dry ice is preferred as a refrigerant to ordinary ice.Explain (2marks)