

NameClass..... Adm. No.....

233/1

CHEMISTRY

THEORY

PAPER 1

TIME 2 HOURS



**ALLIANCE HIGH SCHOOL
KENYA CERTIFICATE FOR SECONDARY EDUCATION
TRIAL EXAM SEPTEMBER 2022
CHEMISTRY PAPER 1**

Instructions

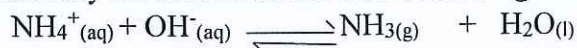
- Write your name and index number in the spaces provided above
- Answer **ALL** the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used.
- All working **must** be clearly shown where necessary.
- This paper consists of 11 printed pages

For Examiner's Use Only

Question	Maximum score	Candidate's score
1-27	80	

1. a) State and explain the observation made when sodium carbonate powder is added to Aluminum Chloride solution. (2 marks)

- b) Identify the acid in the forward reaction given the equation below explain. (1 mark)



2. Describe how you would prepare a sample of Barium Sulphate using the following reagents; Dilute Sulphuric (VI) acid, dilute Hydrochloric acid and Barium Carbonate. (3 marks)

3. Copper (II) Sulphate reacts with barium Chloride according to the equation below.



Calculate the temperature change when 900cm³ of 1M copper(II) Sulphate is added to 600cm³ of 1M barium Chloride. (C=4.2J·K⁻¹, density of solution 1g/cm³) (3 marks)

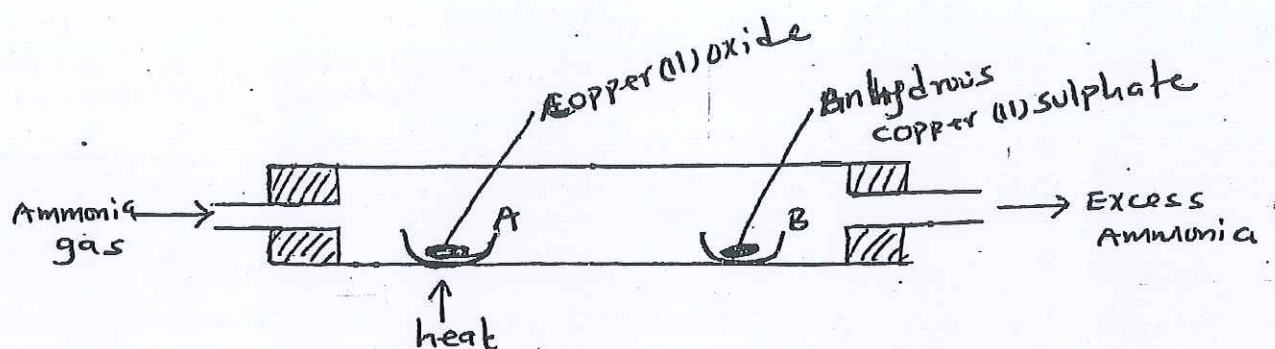
4. An element T forms a divalent cation with electronic arrangement of 2,8,8.

- a) i) To what period does it belong? (1 mark)

ii) Name the chemical family to which it belongs. (1 mark)

b) Write the formula of its Nitride. (1 mark)

5. The set-up below was used to investigate a property of ammonia gas.



a) Explain the observation made at B. (2 marks)

b) Write the chemical equation for the reaction at A. (1 mark)

6. Barium Sulphite was added to Equal volumes of equimolar monobasic acids L and M in separate test tubes.

The table below shows the volumes of gas produced after sometime.

Acid	Volume of gas (cm ³)
L	4
M	10

a) Define basicity. (1 mark)

b) Propose an explanation for the observations made. (1 ½ mks)

c) Give one possible identity of M. (½ mk)

7. A organic compound N with the molecular formula C₄H₁₀O reacted with a piece of sodium metal to produce hydrogen gas and a colourless solution.

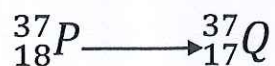
a) To which homologous series does N belong? (1 mark)

b) State the observations made. (1 mark)

c) Write a chemical equation for the reaction that occurred. (1 mark)

8. 48cm³ of methane was ignited with 212cm³ of oxygen and the mixture allowed to attain room temperature. Determine the total volume of the resultant gaseous mixture. (3 marks)

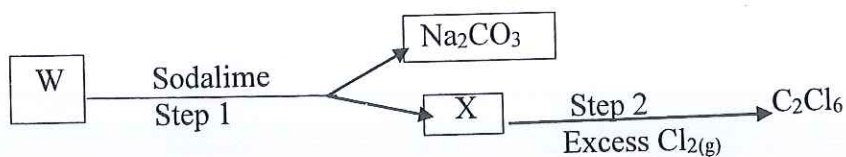
a) Complete the nuclear equation for the reaction below. (1 mark)



b) i) State one use of radioisotopes in agriculture. (1 mark)

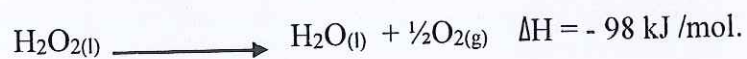
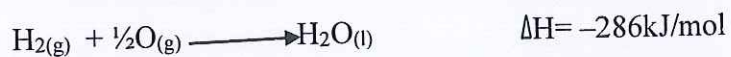
- ii) Give one danger associated with exposure of humans to radioisopes. (1 mark)

10. Study the flow chart below and answer the questions that follow.

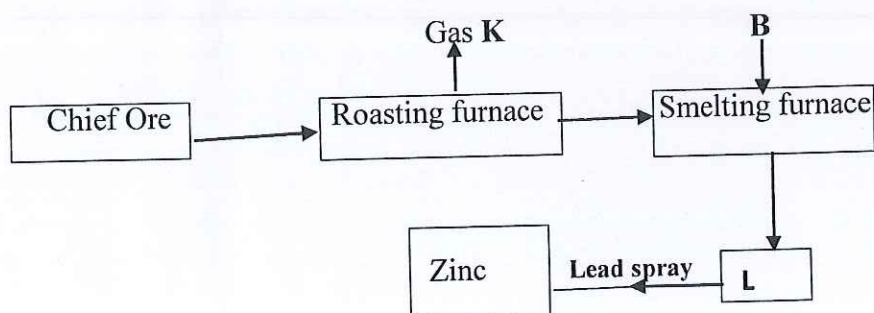


- a) Identify the type of reaction in step 1 _____ (½ mark)
 b) Identify _____ (1 mark)
 W _____
 X _____
 c) State the condition necessary in step 2 and write the equation for the reaction that occurs (1 ½ marks)

11. Given the following thermochemical equations, use an energy level diagram to determine the enthalpy of formation of hydrogen peroxide. (3 marks)



12. The flow chart below shows the extraction of Zinc metal from its chief ore. Study the flow chart and answer the questions that follow.



a) Name and write the formula of the chief ore. (1 mark)

b) Identify A and B. (1 mark)

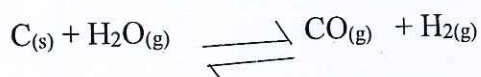
c) Write the equation for the reaction in the roasting furnace. (1 mark)

d) State the functions of the lead spray. (1 mark)

13. When 10g of a mixture of potassium chloride and anhydrous sodium sulphate is dissolved in water and excess barium chloride solution added. 6.9g of barium sulphate is precipitated. Calculate the composition of the mixture.
(K = 39, Cl = 35.5, Na = 23, S = 32, O = 16, Ba = 137)

14. In an experiment, a student placed equal volumes of mixtures of ethanoic acid in water (tube A) and ethanoic acid in hexane (tube B). In each test tube, 1g of solid sodium hydrogen carbonate was added. State and explain the observations made. (2 marks)

15. The following reaction is in equilibrium in a closed system.



a) What is a chemical equilibrium?

(1 mark)

b) State L Chatelier's Principle.

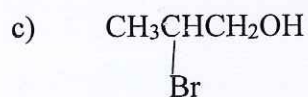
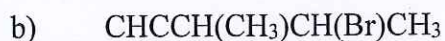
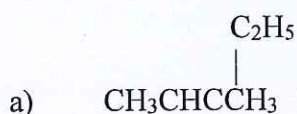
(1 mark)

c) Explain how an increase in pressure would affect the amount of hydrogen gas in the system.

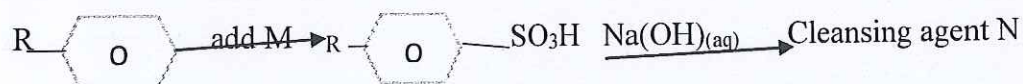
(1 mark)

16. Give the IUPAC names of the following.

(3 marks)



17. The scheme below represents the manufacture of a cleansing agent N.



a) Name reagent M. _____ (1/2 mark)

b) What type of cleansing agent is N. _____ (1/2 mark)

c) Draw the structure of N. _____ (1 mark)

d) State one advantage of using N as a cleansing agent. _____ (1 mark)

18. The table below shows properties of some chlorides. Study it and answer the questions that follow.

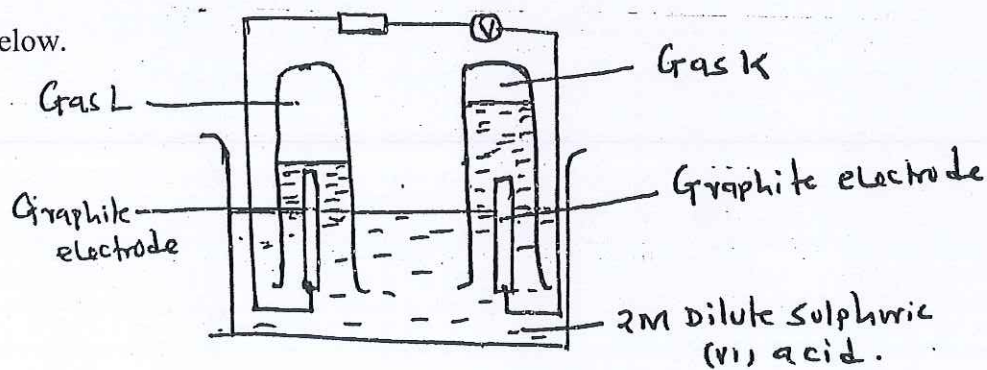
Chloride	Mpt (°C)	Bpt (°C)	Electrical conductivity in aqueous solution	pH of solution
AlCl ₃	-	183	Good	3
NaCl	860	1420	Good	7
PCl ₅	32	75	Good	3
HCl	-146	-29	Good	1

19. a) Explain the high melting and boiling points of sodium chloride. (1 mark)

- b) Draw the dot (.) and cross (x) diagram to show the bonding in HCl. (1 mark)

- c) Explain the electrical conductivity of the aqueous solutions. (1 mark)

20. 100cm³ of 2M sulphuric (vi) acid was electrolyzed using the set up represented by the diagram below.

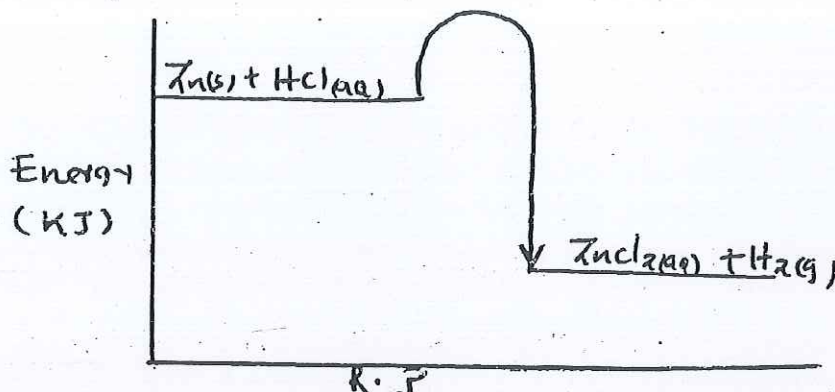


- a) Label the anode and the cathode. (1 mark)

b) Write the equation for the reaction at the anode. (1 mark)

c) Comment on the concentration of the electrolyte as electrolysis continues. (1 mark)

21. The diagram below is a sketch of the energy level diagram of the non-catalyzed reaction of zinc powder with dilute hydrochloric acid.



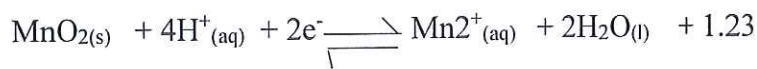
a) State whether the reaction above is exothermic or endothermic. (1 mark)

b) i) On the same axis, sketch the graph for the reaction when copper (II) Sulphate crystals are added. Explain. (2 marks)

22. a) State Graham's Law of diffusion. (1 mark)

b) 100cm^3 of Sulphur (IV) Oxide takes 20 seconds to diffuse through a porous plate. What volume of oxygen gas would diffuse through the same plate in 30 seconds under similar conditions. (S=32, O=16) (2 marks)

23. Below is a list of standard reduction potentials for two half-cells in acidic conditions. Use them to answer the questions that follow.



Predict whether manganese (IV) Oxide would oxidize hydrochloric acid to chlorine gas.

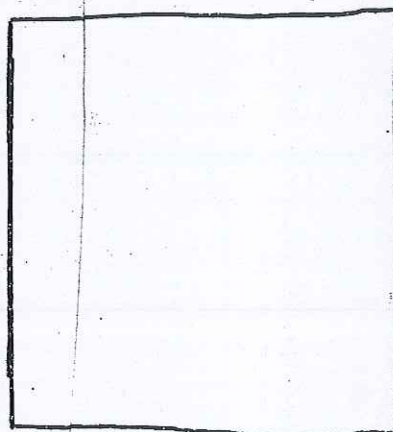
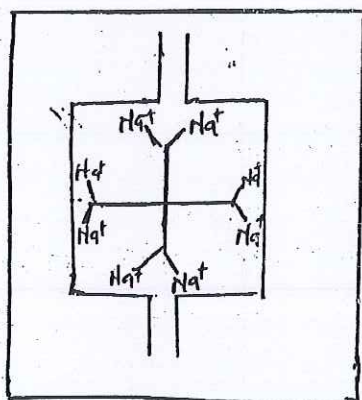
(2 marks)

24. Sulphur (IV) Oxide gas was bubbled into water containing litmus solution.

i) State the observation made. (1 mark)

ii) Explain the observation in (i) above with the Grid of equations. (2 marks)

25. Ion exchange is a method used to remove water hardness. Study the diagram below and answer the questions that follow.



Card A: ion exchange

Card B: Ion exchange column

Column before hard

after hard water is passed

Water is passed through

through

a) What causes water hardness

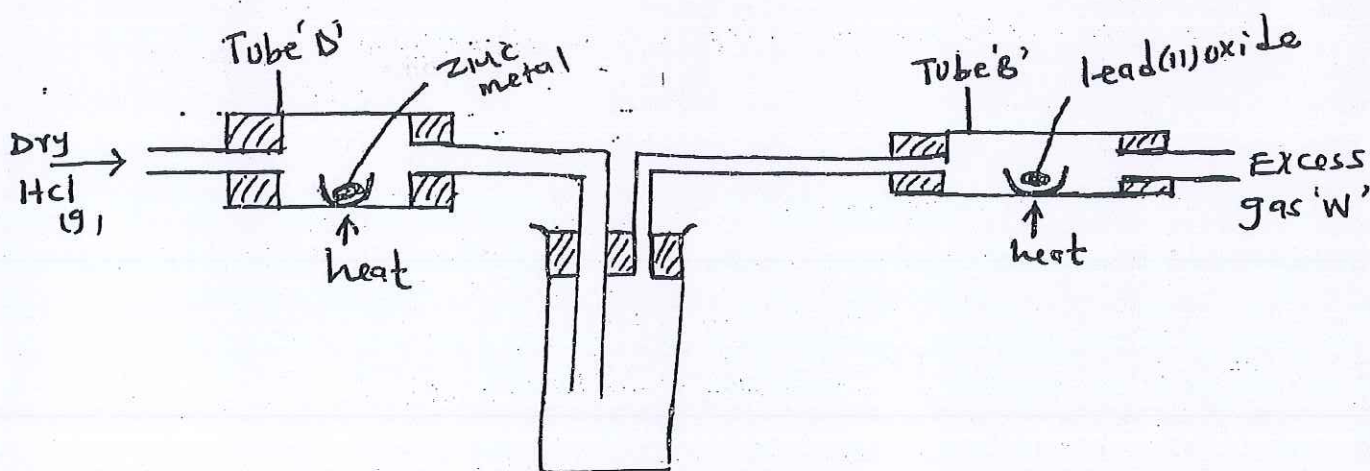
(1 mark)

- b) Fill in carb B. _____ (1 mark)
 c) Other than Ion exchange, state two methods used to remove both temporary and permanent water hardness. (1 mark)

26. a) Describe how carbon (IV) Oxide can be distinguished from carbon (II) Oxide using calcium hydroxide solution. (2 marks)

b) What is the role of carbon (IV) Oxide in fire extinguishing. (1 mark)

27. In an experiment, dry hydrogen chloride gas was passed through heated zinc turnings as shown in the diagram below. The gas produced was then passed through heated lead (II) Oxide.



i) State the function of the water in the flask. (1 mark)

ii) Write the equations for the reactions that took place in tube D and B. (2 marks)