

Name: Index No.

Date..... Candidates Signature

233/2
CHEMISTRY
Paper 2
(THEORY)
July/Aug 2016
2HOURS

GATUND SUB-COUNTY EVALUATION EXAMINATION

Instructions to candidates:-

- a) Write your name and index number in the spaces provided above
- b) Sign and write the date of the examination in the spaces provided above.
- c) Answer all the questions in the spaces provided.
- d) KNEC mathematical tables and silent electronic calculators may be used.
- e) All working must be clearly shown where necessary.

For examiner's use only

Questions	Maximum Score	Candidate's score
1	10	
2	11	
3	11	
4	11	
5	11	
6	13	
7	13	
Total		

1. The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.

				Q				
O						R	S	
	T						U	
V							Z	

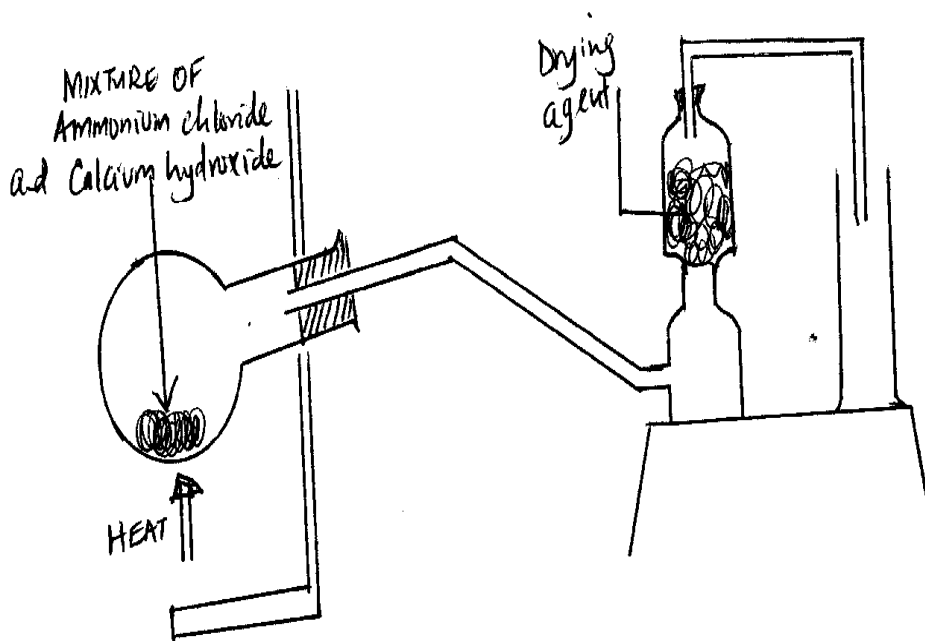
- a) (i) Which element will require the least amount of energy to remove one of its outermost electrons, explain. (1mark)
- (ii) Select the most reactive non-metal (1mark)
- (iii) What name is given to the family of elements to which T belong? (1mark)
- (iv) Between S and R, which element has a smaller atomic radius, explain. (2marks)
- (v) Which of the elements have a tendency of forming covalent bonds? Explain. (1mk)

(vi) Write the formula of the compound formed when U reacts with T, state the type of body formed.

Formula _____ (1mark)

Bond _____ (2marks)

2. (a) A student set up the apparatus as shown in the diagram below to prepare and collect dry ammonia gas.



(i) Identify one mistake in the set-up and give a reason. (2marks)

(ii) Name a suitable drying agent for ammonia. (1mark)

(iii) Write an operation for the reaction that occurred when a mixture of ammonium chloride and calcium hydroxide was heated. (1mark)

(iv) Describe one chemical test for ammonia gas. (2 marks)

(b) The first step in the industrial manufacture of nitric (v) acid is the catalytic oxidation of ammonia gas.

(i) What is the name of the catalyst used? (1mark)

(ii) Write the equation for the catalytic oxidation of ammonia gas. (1mark)

(iii) Nitric (v) acid is used to make ammonium nitrate, state two uses of ammonium nitrate.(1mk)

(c) Nitrogen forms many compounds in which its oxidation state varies:

(i) What is meant by oxidation state? (1mark)

(ii) What is the oxidation state of nitrogen in Ca_3N_2 . (1mark)

3. (a) Chlorine gas can be prepared in the laboratory by reacting Potassium Manganate (vii) with concentrated hydrochloric acid.

(i) Name another suitable reagent that can be used (1mark)

(ii) State the conditions necessary for (i) above. (1mark)

(iii) State and explain what would happen if a dry piece of red litmus paper was dropped in a gas jar of dry chlorine. (2marks)

(b) Chlorine is a strong oxidizing agent. Write down an equation for the reaction of Chlorine with

(i) Hydrogen sulphide gas. (1mark)

(ii) with iron (ii) chloride (1mark)

(c) Hydrogen Chloride gas is a colourless gas which dissolves readily in water forming hydrochloric acid.

(i) At room temperature and pressure, 1.00dm³ of water dissolves 432 dm³ of hydrogen chloride gas. How many moles of hydrogen chloride dissolves in 1dm³ water (1 mole at r.t.p. occupies 24.0dm³) (2marks)

(ii) The hydrochloric acid formed has a volume of 1.40 dm³; calculate the concentration of the acid in mol/dm³. (1mark)

(iii) In the solution, the molecules ionize as below



Describe a simple test to confirm presence of Cl⁻ ions in the solution. (2marks)

4. (a) Describe how a solid mixture of Zinc sulphate and lead (ii) Sulphate can be separated into Solid samples. (3marks)

(b) The table below shows the tests that were carried out on three portions of a compound and the results obtained. Study it and answer the questions that follow.

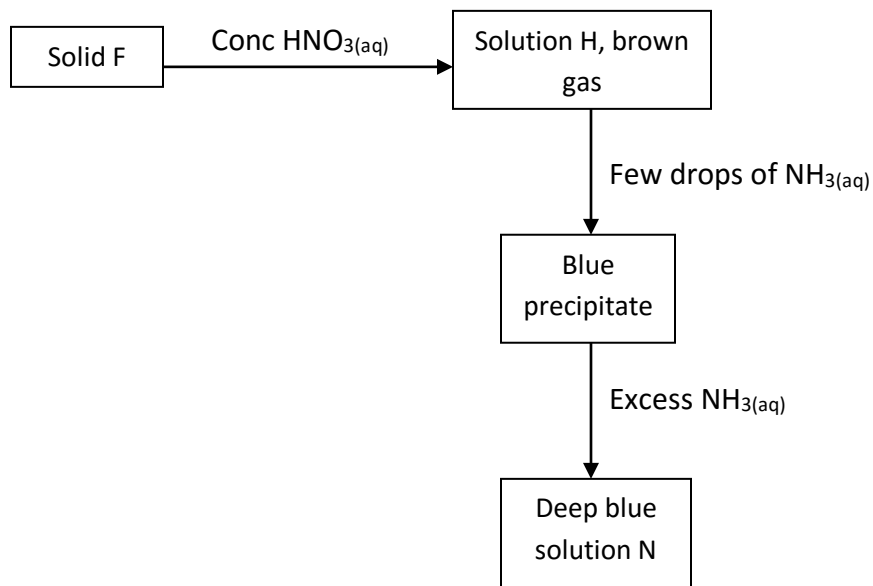
	Test	Observation
1.	Addition of few drops of ammonium hydroxide to the first portion until in excess	White precipitate soluble in excess
2.	Addition of few drops of acidified barium nitrate to the second portion	White precipitate formed
3.	Addition of few drops of Lead (ii) nitrate to the third portion.	White precipitate formed.

(i) Identify the cation and anions present in the compound;

Cation _____ (1 Mk)
Anion _____ (1 Mk)

(ii) Write an ionic equation for the reaction in the third portion. (1mark)

(c) Consider the flow chart below; use it to answer the questions that follow.



(i) State the most likely identity of solid F. (1mark)

(ii) Write the chemical equation for the reaction between solid F and concentrated nitric (v) acid. (1mk)

(iii) Name

(A) Solution N (1mark)

(B) Solution H (1mark)

(iv) Write the formula of solution N. (1mark)

5 (a) (i) What is an electrolyte? (1mark)

(ii) State how the following substances conduct electricity

I Molten Calcium Chloride (1mark)

II Graphite (1mark)

(b) the standard electrode potentials for certain half cell reactions are shown below.



- (i) Identify the strongest oxidizing agent. (1 Mk)
- (ii) Write the cell equation for a cell formed by connecting W and X cells. (1 Mk)
- (iii) Calculate the e.m.f of cell in a(ii) above. (1 Mk)

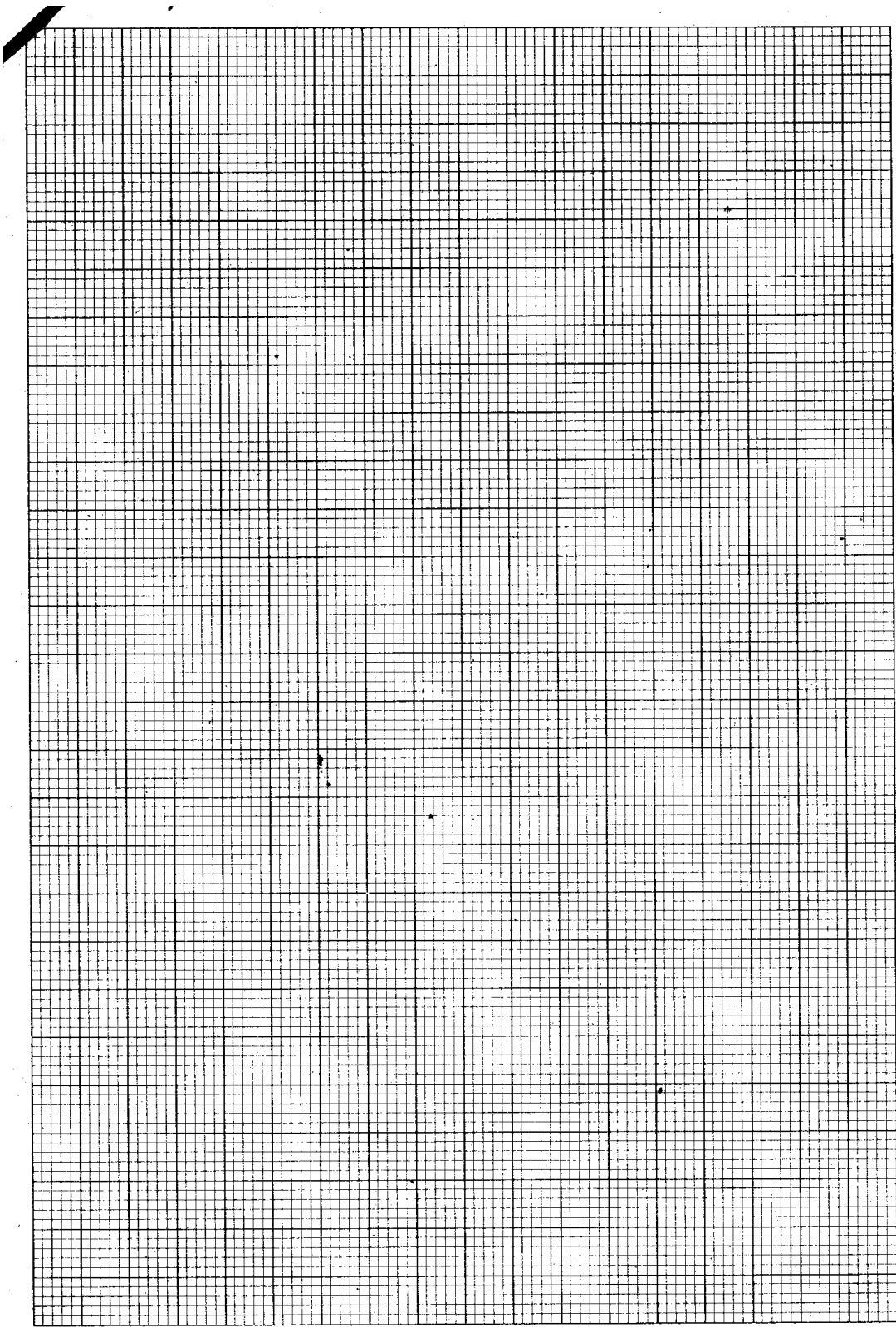
(c) During electrolysis of silver nitrate, a current of 0.5A was passed through the electrolyte for 3 hours.

- (i) Write the equation for the reaction which took place at the anode. (1 Mk)
- (ii) Calculate the mass of silver deposited. (Ag = 108, IF = 96500C) (2 Mks)
- (iii) Give two reasons why it is necessary to electroplate iron with silver. (2 Mks)

Q6.

Volume of NaOH	0	5	10	15	20	25	30	35
Volume of acid + NaOH mixture in cm ³	20	25	30	35	40	45	50	55
Temperature (°C)	21.0	22.0	23.0	24.0	25.0	25.0	24.0	23.0

(a) Plot a graph of temperature (y-axis) against volume of sodium hydroxide. (3 Mks)



(b) From the graph determine the:

(i) Highest temperature reached. (1 Mk)

(ii) Lowest temperature. (1 Mk)

(iii) Change in temperature (ΔT) (1 Mk)

(c) Determine the volume of sodium hydroxide required to neutralize 20cm^3 of 0.5M ethanoic acid.
(1 Mk)

(d) Calculate the heat change given specific heat capacity = 4.2KJ/g/K and the density of solution mixture = 1g/cm^3 . (2 Mks)

(e) Calculate the number of moles of ethanoic acid used in the experiment. (2 Mks)

(f) Calculate the molar heat of neutralisation for the above reaction. (2 Mks)

7. (a) Draw the structural formula of the following compounds:-

(i) 2 – methylhex –1-ene (1 Mks)

(ii) Butan –1-ol (1 Mk)

(b) Two methods of preparing alkenes are shown by the following general equations.

(i) Alkanol $\xrightarrow{\text{Al}_2\text{O}_3, 400^\circ\text{C}}$ Alkene

(ii) Alkane $\xrightarrow[\text{heat}]{\text{Catalyst}}$ Alkene

What type of reactions are described by equations;

(i) and (ii) (2 Mks)

(c) Which of the two methods is used on a large scale. (1 Mk)

(d) Pentanoic acid reacts with butan – 1 – Ol to form an organic compound.

(i) Write an equation to show the above reaction. (1 Mk)

(ii) What is the name given to the above type of reaction? (1 Mk)

(iii) A few drops of a certain catalyst must be added to the mixture to increase the rate of the reaction.

(A) Name the catalyst. (1 Mk)

(B) Explain the role of the catalyst in the above reaction. (1 Mk)

(e) Draw the structure of;

(i) Soapless detergent. (1 Mk)

(ii) Soapy detergent. (1 Mk)

(f) Differentiate between a monomer and polymer. (2 Mks)