Name: .... Index No. ....

School: ....Date: .... Candidate's Sign ....

233/2
CHEMISTRY
PAPER 2 (THEORY)
FORM 4
MARCH / APRIL 2013
TIME: 2 HOURS

BARINGO NORTH TRIAL EXAMINATIONS - 2013
The Kenya Certificate of Secondary Education (K.C.S.E)

Instructions to candidates

- Write your name and index in the spaces provided.
- Sign and write the date the examination is done.
- Answer all questions in the spaces provided.
- Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

Question	Maximum Score	Candidate's Score
1	08	
2	14	
3	09	
4	11	
5	12	
6	10	
7	07	
8	09	
Total	**80**	

Study the table below and answer the questions that follow. The letters are not the actual symbols of the elements.

Element/ion	Electronic configuration	Atomic radius (nm)	Ionic radius (nm)
P^{2+}	2.8.8	0.197	0.099
X	2.8.8	0.099	0.181
U	2.8.2	0.160	0.065
S^{3+}	2.8	0.143	0.050
Q	2.8.7	0.072	0.136

a) Which of the elements are non-metals? Give a reason for your answer. (2marks)

b) Which of the elements belong to the same group? Explain. (2marks)

c) Give the name of the group to which the elements named in (b) above belong. (1mark)

d) Write a balanced equation for the reaction between S and Oxygen. (1mark)

e) Explain why the ion of Q is bigger than its atom. (2marks)

2. a) State two uses of solubility curves. (2marks)

b) Solubility of salt A at different temperature are shown below.

| Temp ^0C | 60 | 100 |
| Solubility g/100g H_2O | 40 | 48 |

i) What mass of salt would saturate 150g of H_2O at 60^0C. (1mark)

ii) Calculate the mass of salt A that crystallizes out when 150g of a saturated solution of A cooled from 100^0C to 60^0C. (2marks)

c) Name and write the formula of the complex ion formed when:
   i) Lead (II) hydroxide dissolves in excess sodium hydroxide.   (1mark)

   ii) Copper hydroxide dissolves in excess ammonia solution.   (1mark)

d) Describe the chemical tests that can be used to distinguish between the following ions in solution.   (2marks)

Test	Ion	Observation
	CO_3^{2-}	
	HCO_3^-	

e) i) Concentration of Ca^{2+} in water from a well was found to be 0.001M. Calculate the mass of sodium carbonate needed to soften 2000 litres of water from the well.
    $(Na = 23, C = 12, O = 16)$ (3 marks)

   ii) State one disadvantage and one advantage of the presence of calcium ions in water.   (2marks)

3.   Study the following diagram and answer the questions that follow.
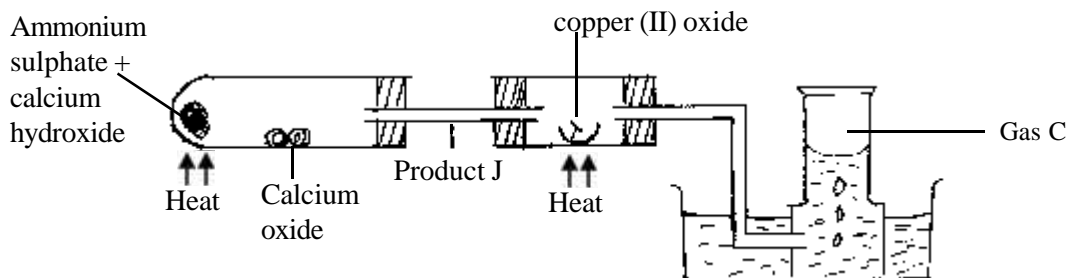
a) What is the purpose of calcium oxide in the set-up.   (1mark)

b) Identify product J (1mark)

c) State the observations made in the combustion tube. (2marks)

d) Name gas C. (1mark)

e) How is the pH of water in the trough affected? Explain. (2marks)

f) Write equations for the reactions involving
   i) Production of J (1mark)

   ii) Reaction between product J and copper (II) oxide. (1mark)

4. a) Draw a simple diagram to show how molten lead bromide can be electrolyzed using graphite electrodes. (3marks)

    b) Use half equations to show what happens to each electrode. (2marks)

    c) What is observed at each electrode during the electrolysis of lead (II) bromide (2marks)

d) Why are carbon (graphite) electrodes used   (2marks)

e) Why is the experiment done in a fume chamber?   (1mark)

f) What is the general name of such salts?   (1mark)

5.   Study the flow chart below and answer the questions that follow.
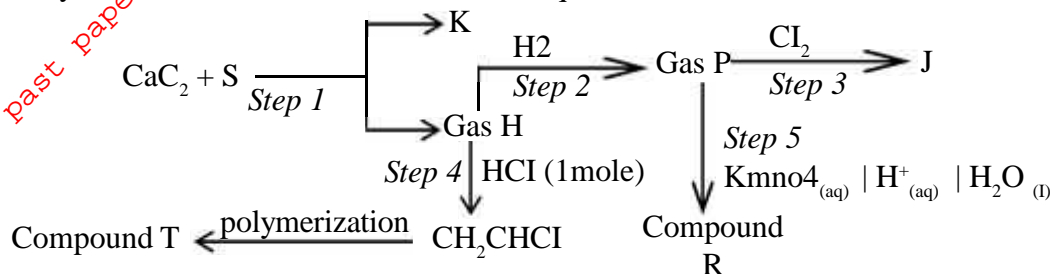
a) Identify reagent S.   (1mark)

b) Write the equation for the reaction taking place in step 1.   (2marks)

c) Identify substance K.   (1mark)

d) What names are given to processes below?   (2marks)
      i)   Process in step 2

      ii) Process in step 3

      iii) Process in step 4

      iv) Process in step 5

e) State the conditions necessary for step 2   (1mark)

f) Draw and name the structural formulae of substance T and R. (2marks)
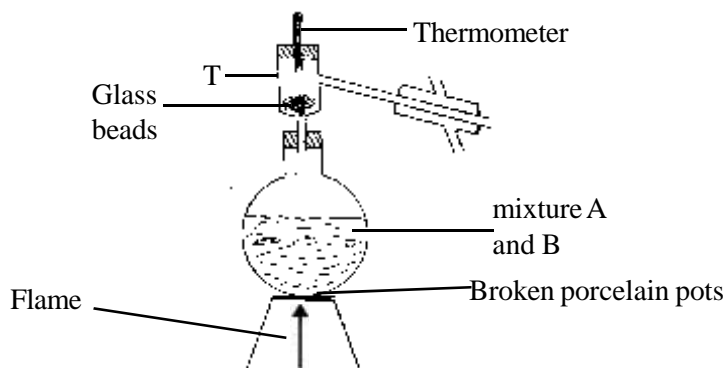
    i) Substance T

    ii) Substance R

g) Write equation for the reaction in step 3. (1mark)

h) State one use of product T. (1mark)

i) Draw the structural formula of gas H. (1mark)

6. The diagram below represents an arrangement of apparatus used to separate substance A (B.pt 78^0C) and substance B (B.pt 100^0C) mixture.
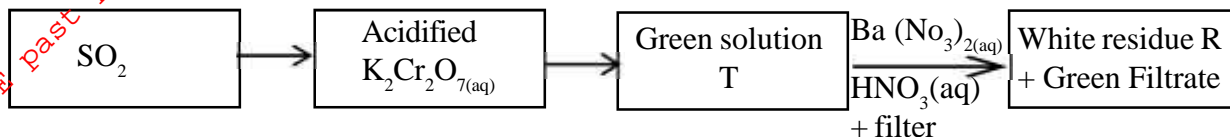

a) Name the process (1mark)

b) Why is a round bottomed flask preferred for the experiment instead of a flat bottomed flask? (1mark)

c) Name the substance collected first. Explain (2marks)

d) How would one test for the purity of the substance collected. (1mark)

e) On the diagram indicate with arrows the direction of water. (2marks)

f) Name apparatus labeled T and give its role. (2marks)

g) What is the purpose of broken porcelain pots. (1mark)

7. a) Define bond energy (1mark)

b) Explain why the reactants and products contain different amount of treat (2marks)

c) Hydrogen and chlorine gas react to form hydrogen chloride.

   i) Write the equation for the reaction. (1mark)

   ii) Which bonds are broken (1mark)

   iii) Which bonds are formed (1mark)

   iv) Use the bond energies in the following table to calculate ΔH for the reaction and identify the reaction as exothermic or endothermic. (3marks)

Bond	Bond energy KJ/mol
H – H	432
CI – CI	239
H – CI	428

v) Write the thermochemical equation for the reaction (1mark)

8. Study the reaction scheme below and answer the questions that follow

| SO_2 | → | Acidified $K_2Cr_2O_{7(aq)}$ | → | Green solution T | $\xrightarrow[\text{+ filter}]{\text{Ba (No}_3)_{2(aq)} \text{ HNO}_3\text{(aq)}}$ | White residue R + Green Filtrate |

a) Identify the cation present in the green solution T. (1mark)

b) What property of sulphur (iv) oxide is illustrated by the above experiment? (2marks)

c) Write an ionic equation for the formation of the white residue (1mark)

d) Explain how sulphur (iv) oxide bleaches. (2marks)

e) State and explain one major effect of sulphur (iv) oxide to the environment. (2marks)

f) How can the problem in (e) above be minimized. (1mark)