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

Candidates signature .....

233/2

Date .....

CHEMISTRY
Paper 2
THEORY
July/August 2013

Time 2 hours

MERU COUNTY EVALUATION TEST

Kenya Certificate of Secondary Education

CHEMISTRY

THEORY Paper - 233/2

July/August 2013

Time: 2 hours

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Answer all the questions in the spaces provided.
- All working must be clearly shown.
- Non-programmable electronic calculator and mathematical tables may be used.

FOR EXAMINER'S USE ONLY

Questions	Max Score	Candidate's Score
1	12	
2	11	
3	11	
4	12	
5	12	
6	12	
7	10	
Total	80	

This paper consists of 12 printed pages

Candidates should check the question paper to ensure that all the printed pages are printed as indicated and no questions are missing.

1. Use the following electrode potentials to answer the questions below.

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(S)}$ $E^0 = -0.76V$

$Pb^{2+}_{(aq)} + 2e^- \rightarrow Pb_{(S)}$ $E^0 = -0.13V$

$Ag^{2+}_{(aq)} + e^- \rightarrow Ag_{(S)}$ $E^0 = +0.8V$

$Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(S)}$ $E^0 = 0.34V$

a) From the list above, identify

i) the strongest oxidising agent. (1 mark)

.....

ii) the strongest reducing agent. (1 mark)

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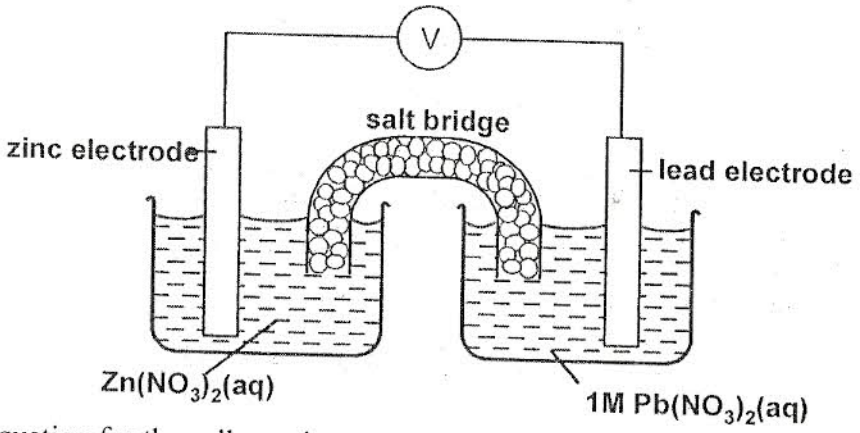
b) A cell using zinc and lead was set up as shown.



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

.....

ii) Calculate E^0 for the cell. (1 mark)

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.....

iii) What is a suitable salt bridge for this cell. (1 mark)

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.....

iv) Explain how the salt bridge helps to maintain the charge balance in each half-cell as the reaction continues. (2 marks)

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c) i) Using a labelled diagram, explain how a copper spoon can be electroplated with silver. (2 marks)

ii) Calculate the amount in grammes of silver that would be deposited on the spoon in two hours using a current of 0.03 amperes. (Charge of 1 mole of electrons = 96500 coulombs) (Ag = 108) (2 marks)

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d) Select two elements from the list in (1) above that would make a cell with the minimum electromotive force. (1 mark)

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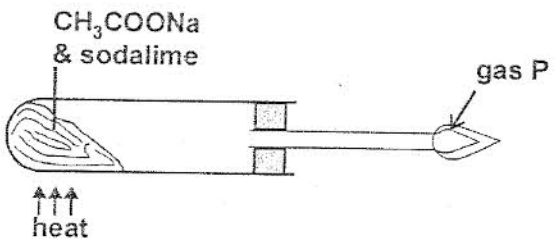
2.a) Study the diagram below and answer the questions that follow.



i) Write an equation for;

I. The reaction between CH_3 COONa and NaOH. (1 mark)

.....

.....

II. The complete burning of gas P. (1 mark)

.....

.....

ii) Give a reason why sodium hydroxide is mixed with calcium oxide to make sodalime. (1 mark)

.....

.....

iii) State and explain the observations made when gas P is bubbled through bromine water under normal laboratory conditions. (2 marks)

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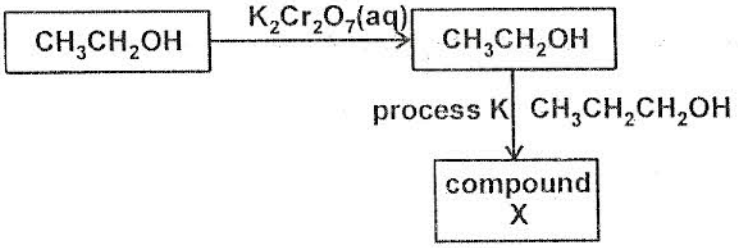
iv) Name the homologous series to which gas P belongs. (1 mark)

.....

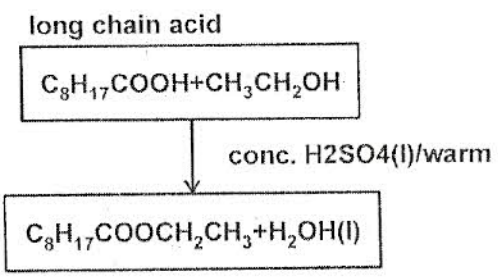
b) Study the flow chart below and answer the questions .



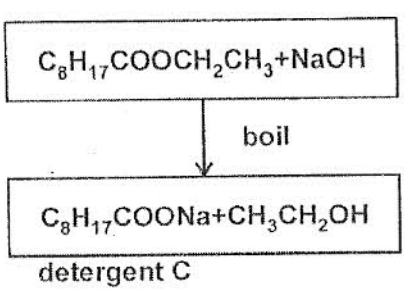
Draw and name compound X. (2 marks)

c) Below are two reactions showing how a lung-chained carboxylic acid can be converted to detergent C.

I.



II.



ii) Name each of the types of reactions.

I. .....

II .....

ii) State one disadvantage of using detergent C in washing cloths with hard water. (1 mark)

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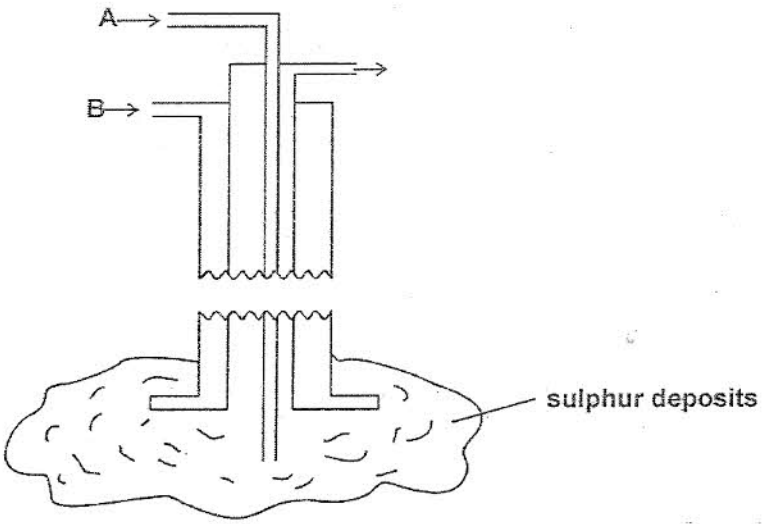
3. The diagram below shows the extraction of sulphur from underground.



a) State the substances which are passed through A and B and explain how each assist in the extraction of sulphur.

A. .....(1 mark)

Explain. (1 mark)

.....

.....

B. .....(1 mark)

Explain (1 mark)

.....

.....

b) A sample of the extracted sulphur is heated in air.

I. Write an equation for the reaction when sulphur burns. (1 mark)

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II. State and explain the observations made when wet blue litmus paper is dropped in a gas jar containing product in b(I) above. (2 marks)

.....

.....

c) i) Name two reagents used to prepare hydrogen sulphide gas. (1 mark)

.....

.....

ii) Name two physical properties of hydrogen sulphide gas. (1 mark)

.....

.....

iii) State and explain the observations made when dry hydrogen sulphide gas is passed through a tube containing dry sulphur (IV) oxide. (2 marks)

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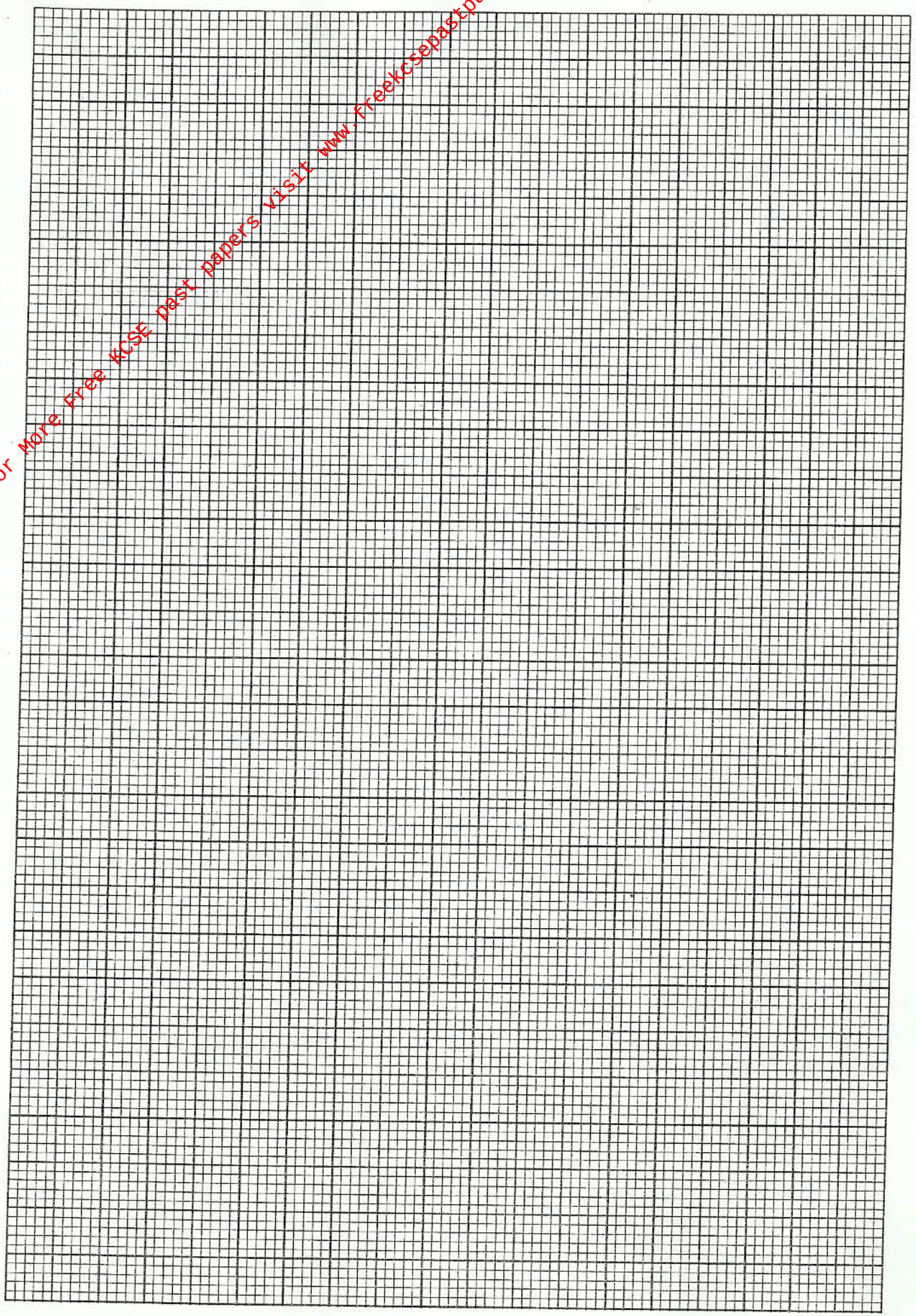
4. In an experiemnt, 5.0cm³ portions of 1.0M potassium hydroxide were added to 20.0cm³ of 0.5m oxalic acid solution in a beaker. The mixture was stirred with a thermometer and temperature taken after each addition of potassium hydroxide. The readings obtained were recorded as shown in the table below.

Volume of 1M KOH (cm³)	0	5	10	15	20	25	30	35	40
Temp. of mixture (°C)	25.0	25.8	27.0	28.0	29.0	29.0	26.5	23.0	21.5

a) Plot a graph of temperature (y-axis) against volume of potassium hydroxide on the grid provided. (3 marks)



b) From the graph determine;

i) volume of potassium hydroxide required to completely neutralize 20.0cm³ of the 0.5M oxalic acid, a dibasic acid $H_2C_2O_4$. (1 mark)

.....

.....

ii) the highest temperature change. (1 mark)

.....

.....

c) Calculate the heat change for the reaction (Take specific heat capacity of the solution to be $4.2Jg^{-1}k^{-1}$ and density to be $1.0g/cm^3$. (2 marks)

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d) Calculate the moles of oxalic acid used in the reaction. (1 mark)

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e) Calculate the molar heat of neutralization of oxalic acid. (2 marks)

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f) Apart from heat loss to the surrounding, give two other source errors that may have affected the actual molar heat of reaction. (2 marks)

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5. The grid below is part of the periodic table of elements. The symbols used are not the actual symbols of the elements. Study it and answer the questions that follow.

							A
B			G			E	
		L					C
D							
Y						F	

i) What name is given to the family of elements to which A and C belong. (1 mark)

.....

ii) Write the chemical formula of sulphate of L. (1 mark)

.....

iii) The ionic radius of Element E is bigger than its atomic radius. Explain. (2 marks)

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.....

.....

iv) The oxide of G has lower melting point than oxide of L. Explain. (2 marks)

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v) Among element B, G, E which one has the highest 1st ionisation energy. Explain. (2 marks)

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vi) Which letter from the table represents.

a) The strongest oxidizing agent (1 mark)

.....

b) The strongest reducing agent. (1 mark)

.....

vii) State and explain one commercial use of element C. (2 marks)

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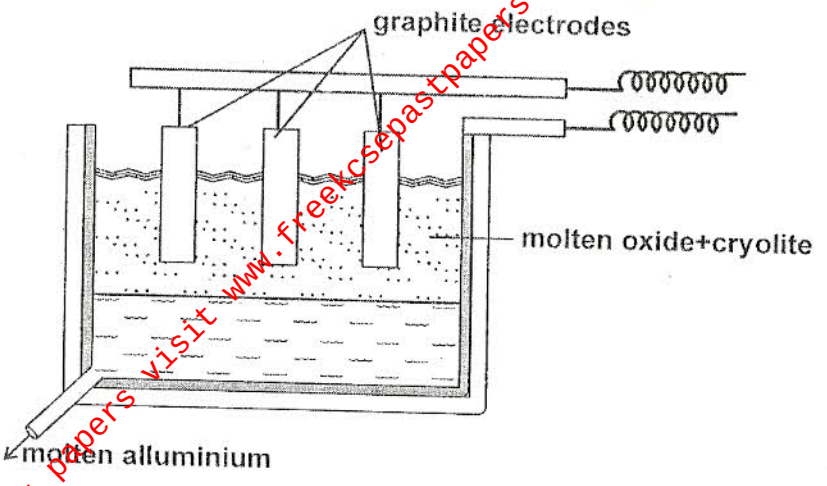
6. The diagram below illustrates the hall-herdt cell used in electrolysis of aluminium oxide during the extraction of aluminium metal. Study it and answer the questions that follow.



a) What is the name of the ore from which aluminum is extracted? (1 mark)

.....

b) Name any two impurities found in the ore. (1 mark)

.....

.....

c) State role of cryolite added to aluminium oxide. (1 mark)

.....

.....

d) High temperatures must be maintained during the electrolysis process. State a disadvantage caused by the high temperature. (2 marks)

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.....

.....

e) Other than density state one other property of aluminium that makes it possible to be collected as shown in the diagram. (1 mark)

.....

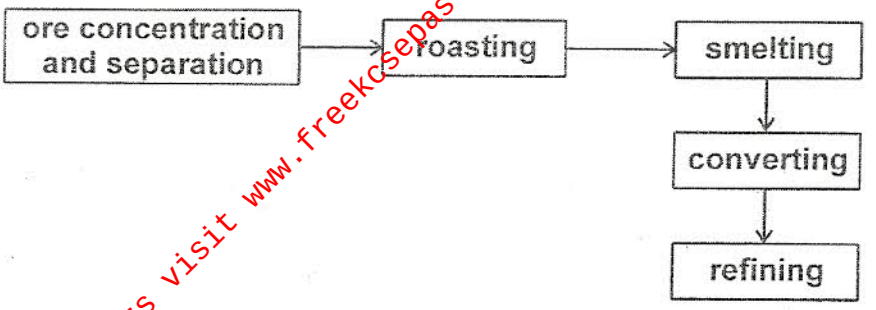
.....

f) Why is it cheaper to recycle aluminium other than extracting it using the method shown above. (1 mark)

.....

.....

g) The scheme below shows the stages of extraction of copper metal from its ore (Copper pyrites).



i) Write an equation for the reaction taking place at the roasting stage. (1 mark)

.....

ii) The copper from the converter is not pure. Draw a labelled diagram to show the set-up you would use to refine the copper by electrolysis. (3 marks)

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.....

iii)State two properties of copper which make it suitable for use in making currency coins. (1 mark)

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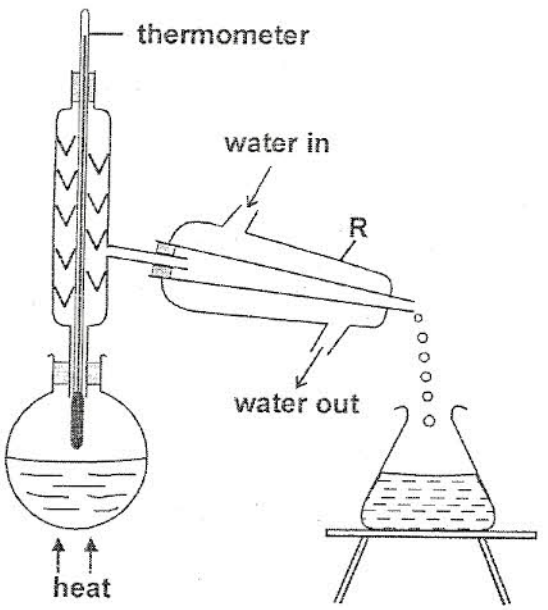
7.a) The diagram below shows a set-up by a student for the separation of liquid P and Q whose boiling points are 35°C and 91°C respectively. Liquid P is very inflammable.



i) State one error the student made in setting up the experiment. (1 mark)

.....

ii) Name apparatus R. (1 mark)

.....

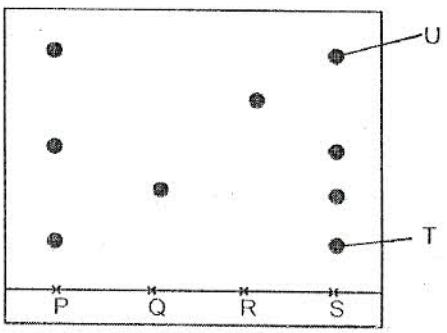
iii) What method of separation is used by the student? (1 mark)

.....

iv) Why is it possible to use the method named in (iii) above to separate P and Q ? (1 mark)

.....

b) The chromatogram below represents the results of an experiment done with certain plant pigment. Study it and answer the questions below.



i) Name two pure pigments. (1 mark)

.....

ii) Which two pigments shown above can be mixed to form pigment S? (1 mark)

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iii) State two reasons which makes substance U cover a longer distance on the chromatogram than T. (1 mark)

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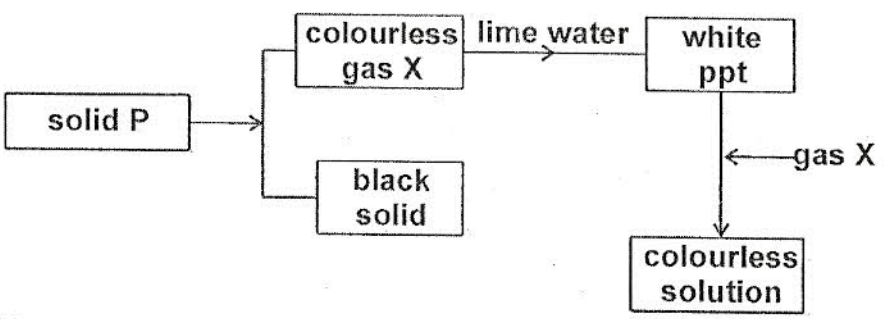
c) Study the flow chart below and answer the questions below it.



i) Identify gas X. (1 mark)

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ii) Write an equation for the reaction between the white precipitate and excess gas X. (1 mark)

.....

iii) State a possible identity of solid P. (1 mark)

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