Name:……..……..……Adm No……...

Signature:…….……

CHEMISTRY
THEORY Date:…….....
PAPER 2

2017
Chemistry
1 ¾ hours

INSTRUCTIONS TO CANDIDATES

- Write your name and admission number in the spaces provided.
- Mathematical tables and non-programmable calculators may be used.
- Attempt all the questions in the spaces provided.
- ALLOW working MUST be clearly shown.

For Examiner's Use Only:

Question	Maximum score	Candidate's score
1	**10**	
2	**10**	
3	**11**	
4	**09**	
5	**10**	
6	**08**	
7	**12**	
Total	**70**	

This paper consists of 9 printed pages. Students should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. The table below shows the atomic numbers and boiling points of element U, V, W, X and Y (not their actual symbols). Study it and answer the questions that follow.

Element	Atomic number	Boiling point (°C)
U	3	1330
V	13	2470

W	16	445
X	18	-186
Y	19	774

a) Select the elements which belong to the same

i) Group (1 mark)

……..

ii) Period (1 mark)

……..

b) Which element :

i) Is gaseous at room temperature ? Explain (room temperature = 298K) (2 marks)

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……

ii) Does not form an oxide (1 mark)

……..

c) Write the

(i) formula of the sulphate of element V. (1 mark)

ii) equation for the reaction between Y and W. (1 mark)

d) What type of bond exists in the compound formed between U and W ? Give a reason for your answer. (2 marks)

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e) An aqueous sulphate of element V was electrolysed using carbon electrodes. Name the products at the :

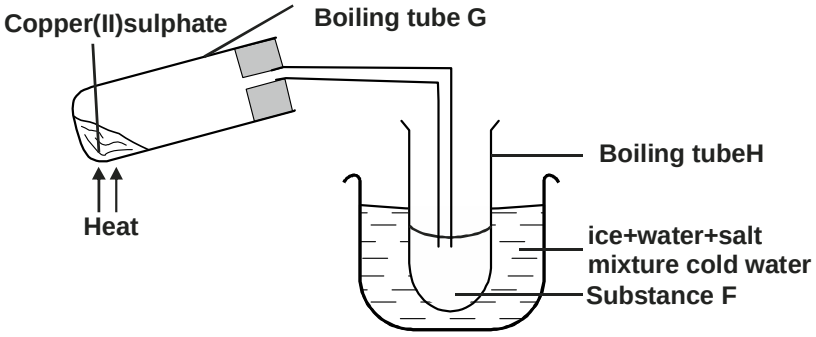
(i) Cathode (1 mark)

……..

(ii) Anode (1 mark)

……..

2. The copper below shows the effect of heat on hydrated copper (II) sulphite.



I. (a) State the observations made in tube G. (2 marks)

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……...

(b) Identify substance F. (1 mark)

……...

(c) Explain the use of the following in the above set up

(i) Ice cold water. (1 mark)

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……...

(ii) Salt in ice cold water. (1 mark)

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……...

(iii) Boiling tube G kept at a slanting position. (1 mark)

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……...

(d) Describe a chemical test for substance F. (1 mark)

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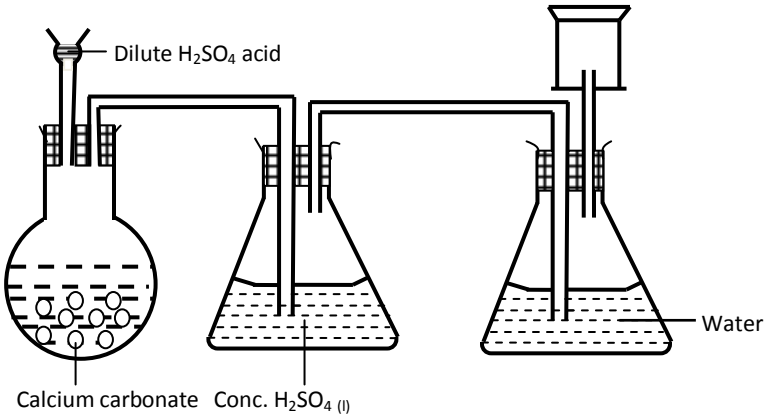
II. 12.5g of hydrated copper (II) sulphide were heated to constant mass 8.0g of solid residue was formed Determine the formula of the hydrated salt. (Cu=63.5, S=32.0, O=16.0, H=1.0) (3marks)

3. A student set up the apparatus shown below to prepare and collect dry carbon (IV) oxide gas.



(a) State a correction for three mistakes in the set up above. (3 marks)

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(b) Give two reasons why carbon (IV) oxide is used as a fire extinguisher. (1 mark)

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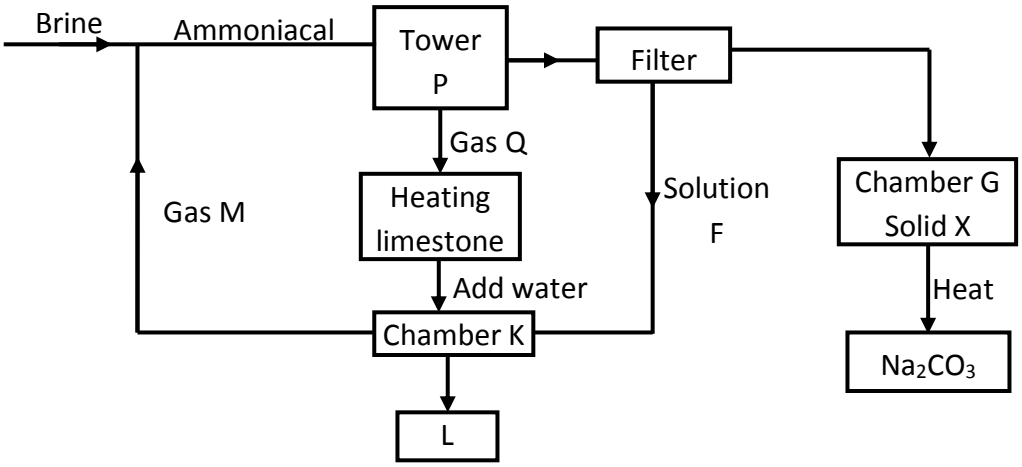
(c) The flow chart below is for the manufacture of sodium carbonate by the Solvay process. Use it to answer the questions that follow.



(i) Name gas M and Q (1mark)

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……...

(ii) Name solution F and solid X (1 mark)

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……...

(iii) Name the product L formed and give one of its uses (2 marks)

……

……...

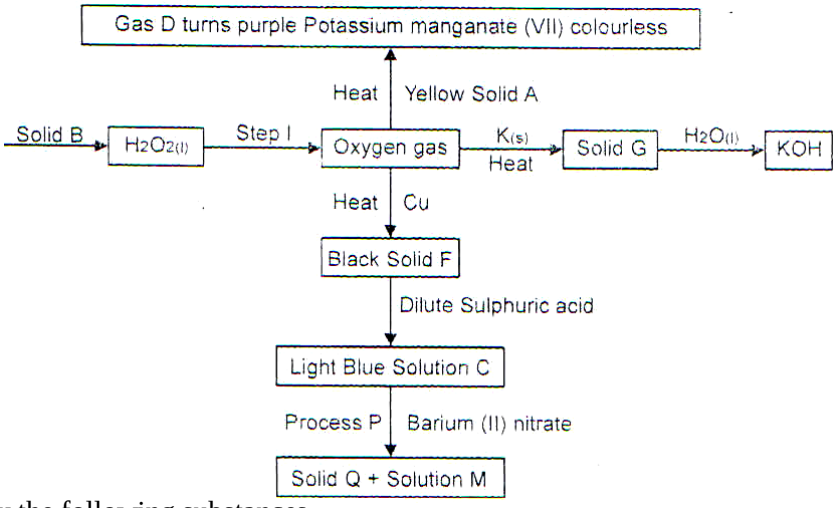
(iv) Write equations of the reactions in (2 marks)

Tower P

Chamber K

(v) Name the two raw materials required in the manufacture of sodium carbonate. (1 mark)

4. The flow chart represents preparation and properties of oxygen gas. Study it and answer the questions that follow.



i) Identify the following substances. (2 marks)

a) Solid A ……

b) Gas D ……

c) Solid Q ……

d) Solution M ……

ii) Write a chemical equation for the reaction in step I. (1 mark)

iii) Write the chemical equations for the formation of the following compounds. (3 marks)

a) Solid G

b) Gas D

c) Light blue solution C

i) State the confirmation test for oxygen gas. (1 mark)

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ii) Write the ionic equation for reaction taking place in process P. (1 mark)

iii) State one industrial use of oxygen. (1 mark)

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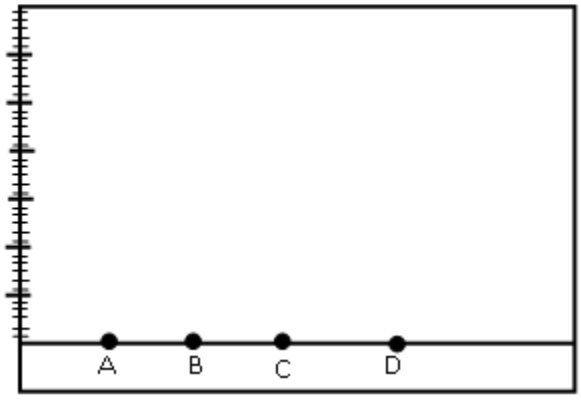
5. (a) The diagram below shows spots of pure substances A, B and C on a chromatography paper. Spot D is that of a mixture.



After development A, B and C were found to have moved 7cm, 3cm and 5cm respectively. D had separated into two spots which moved 5cm and 7cm.

(i) On the diagram

(I) Label the baseline (1 mark)

(II) Show the position of the all the spots after development (2 marks)

(ii) Identify the substances present in mixture D. (1 mark)

……...

(b) Describe how solid ammonium chloride can be separated from a solid mixture of ammonium chloride and sodium chloride. (2 marks)

……...

……

(c) The table below shows liquids that are miscible and those that are immiscible.

Liquid	Y	Z
W	Miscible	miscible
X	Miscible	Immiscible

Use the above information to answer the questions that follow.

(i) Name the method that can be used to separate W and Y of a mixture of the two (½ mark)

……...

……

(ii) Describe how a mixture of X and Z can be separated. (2 marks)

……...

……

(d) Crude oil is a source of many compounds that contain carbon and hydrogen only.

(i) Name the processes used to separate components of crude oil. (½ mark)

……...

(ii) On what physical property of the above components does the separation depend? (1 mark)

……...

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6. (a) State the Graham's law of diffusion. (1 mark)

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(b) In an experiment to prepare hydrogen gas in the laboratory, 4 gms of magnesium ribbon was reacted with $50cm^3$ of 0.1M hydrochloric acid.

(i) Identify the reactant that was in excess and by how many moles. (1 mark)

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……..……...

(ii) Calculate the volume of hydrogen gas that was collected at room temperature and pressure. (Molar gas volume at r.t.p =24 L) (2 marks)

(c) State two uses of hydrogen gas. (2 marks)

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……..……...

(d) When ammonium chloride solid was heated in a test tube, a moist red-litmus paper placed at the mouth of test tube turned first blue, then to red. Explain these observations. (2marks)

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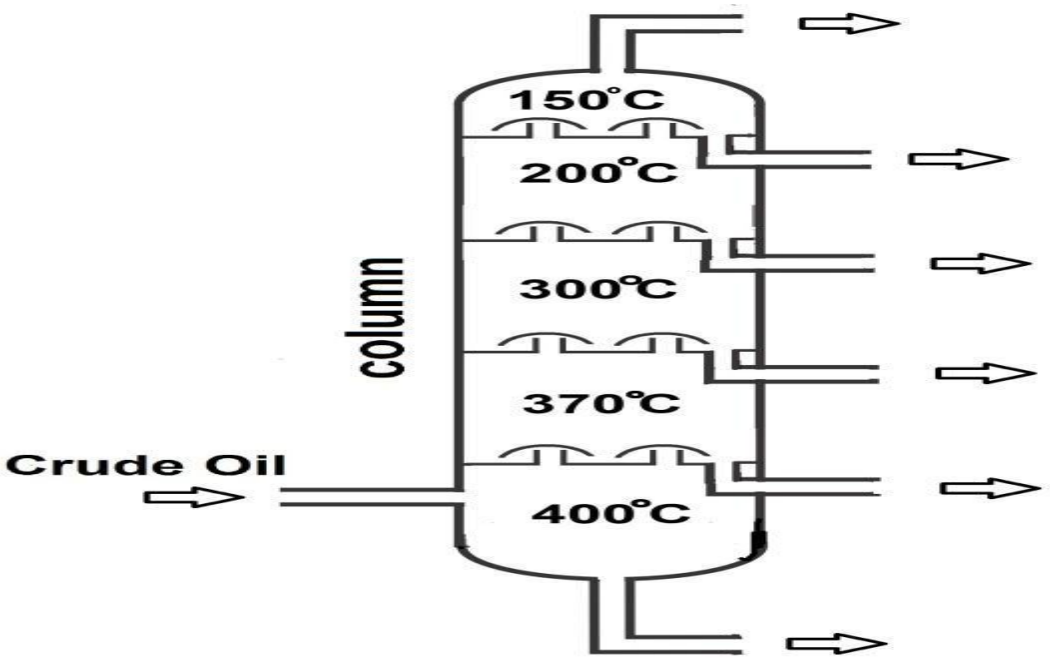
7. a) Study the diagram below and answer the questions that follow.



(i) Name the method of separation above. ……..…….. (1 mark)

(ii) Bitumen has a boiling point of more than 500oC. Indicate on the diagram where bitumen can be collected. (1 mark)

(iii) State one use of bitumen. ……..……. (1 mark)

(iv) Explain how the column works. (1 mark)

……..…….

……..…….

(v) Give one town in Kenya where crude oil is refined. …….. (1 mark)

b) The apparatus below shows the setup used to determine the percentage of oxygen in air.

The air was slowly and repeatedly passed through the copper turnings until a constant volume was obtained.

(i) Explain why air was passed slowly and repeatedly. (1 mark)

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(ii) State the observation made at the end of the experiment. (1 mark)

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(iii) Is it advisable to use potassium in this experiment? Give a reason. (1 mark)

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c) (i) What is rust? (1 mark)

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(ii) Give the chemical formula of rust …….. (1 mark)

(iii) Define the term galvanisation. (1 mark)

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