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

School ..... Candidates signature .....

233/2 Date .....
CHEMISTRY
Paper 2
July/August 2016
Time : 2 Hours

WESTLANDS SUB-COUNTY JOINT EXAMINATION
Kenya Certificate of Secondary Education

CHEMISTRY
Paper 2
July/August 2016
Time : 2 Hours

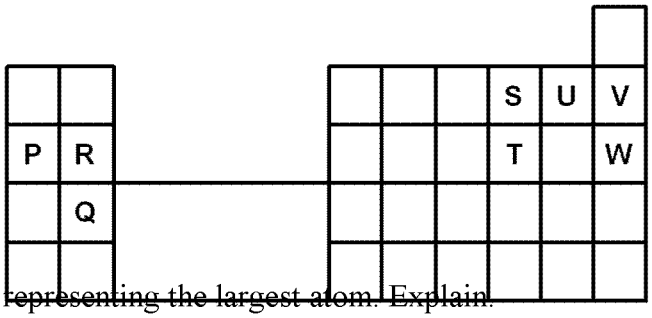
INSTRUCTIONS TO CANDIDATES

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

For Examiner's Use Only

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

1. The grid below shows part of the periodic table. Use it to answer the questions that follow. (The letters are not the actual symbols of the elements)



a) Identify the element ~~representing the largest atom. Explain.~~ (1 mark)

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b) Identify the most reactive non-metal. Explain. (1 mark)

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c) Give the oxidation state of element S. (1 mark)

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d) Explain why atom of element W is heavier than that of element V. (1 mark)

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e) Given that the atomic mass of W is 40, write down the composition of its nucleus. (1 mark)

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f) What name is given to the group of elements in which element U belongs ? (1 mark)

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.....

g) Write an equation for the decomposition of nitrate of element P. (1 mark)

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h) When 3 litres of chlorine gas were completely reacted with element Q, 11.88g of the product were formed. Determine the relative atomic mass of element D. (Atomic mass of chlorine = 35.5, molar gas volume = 24 litres) (3 marks)

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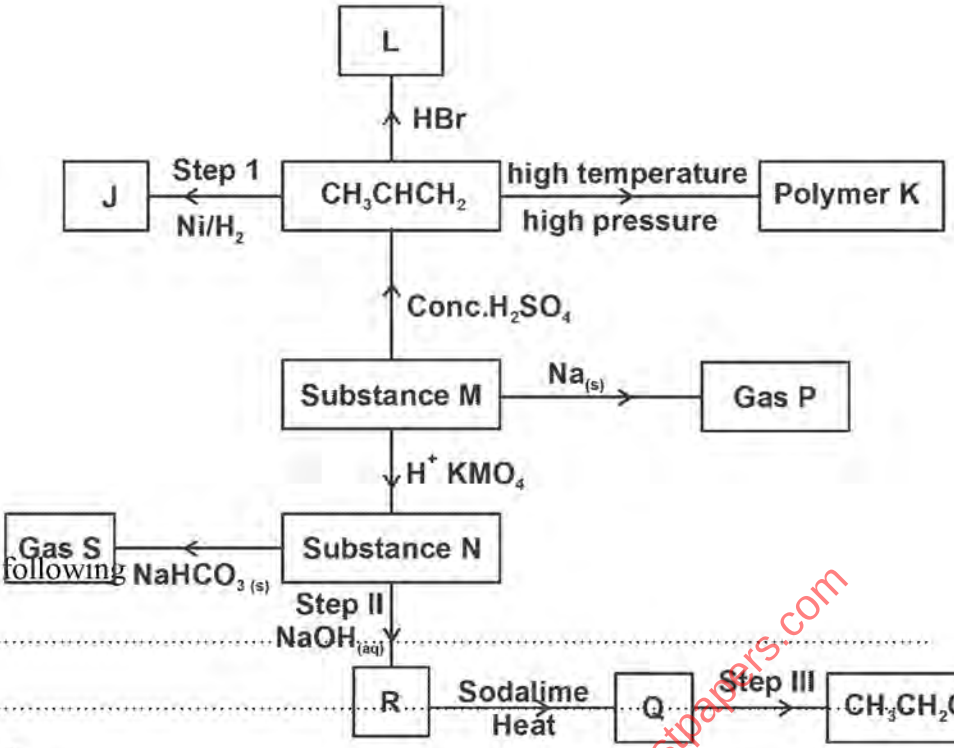
2. Use the flow chart below to answer the questions that follow.



a) Name the following

i) Gas S ..... (1 mark)

ii) Gas P ..... (1 mark)

iii) Substance J ..... (1 mark)

b) Name the process in

i) Step I (1 mark)

.....

ii) Step II (1 mark)

.....

iii) Step III (1 mark)

.....

c) Draw the structural formula of :

i) K (1 mark)

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.....

.....

ii) L (1 mark)

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.....

d) Write a chemical equation for complete combustion of substance M. (1 mark)

.....

e) Name the reagent and condition in step III

i) Reagent ..... (½ mark)

ii) Condition (½ mark)

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3. Iron is extracted from its ore in a blast furnace.

a) Name two chief iron ores that are used for extraction of iron. (2 marks)

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b) Give the main reducing agent in the blast furnace and write the equation for its formation. (2 marks)

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c) Using equations describe the processes which lead to formation of iron in the blast furnace. (3 marks)

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d) State two impurities found in molten iron from the blast furnace and explain how they are removed. (3 marks)

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e) Explain the main difference between pig iron and cast iron. (1 mark)

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4. **a)** The following are standard electrode potentials for some electrodes.

$A^{2+}_{(aq)} + 2e^-$	$A_{(s)}$	$E^\theta = -2.92V$
$B^{2+}_{(aq)} + 2e^-$	$B_{(s)}$	$E^\theta = -2.38V$
$½C^{2+}_{(aq)} + e^-$	$C_{(s)}$	$E^\theta = 0.00V$

$D^{2+}_{(aq)} + 2e^-$ $D_{(s)}$ $E^\theta = +0.34V$

$\frac{1}{2}E^+_{(aq)} + e^-$ $E_{(s)}$ $E^\theta = +2.87V$

i) Which is the strongest reducing agent ? Explain. (2 marks)

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.....

ii) Write the cell representation for the electrochemical cell obtained by combining the half cells B and D. (1 mark)

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iii) Calculate the e.m.f of the cell in (ii) above. (2 marks)

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b) i) During electrolysis processes, graphite electrodes are preferred to platinum. Explain. (1 mark)

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ii) Magnesium sulphate solution was electrolysed using graphite electrodes for 1 hour and 20 minutes. Given that a current of 2.5A was passed, calculate the volume of gas produced at the anode. (1F = 96500C, molar gas volume at r.t.p = $24dm^3$) (3 marks)

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5. A student set up the apparatus below to prepare and collect a dry sample of carbon (IV) oxide.

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

i) .....

ii) .....

iii) .....

b) $30cm^3$ of carbon (II) oxide gas were reacted with $10cm^3$ of oxygen gas. The resulting mixture of gases was bubbled through an alkali. Determine the volume of the residual gas. (2 marks)

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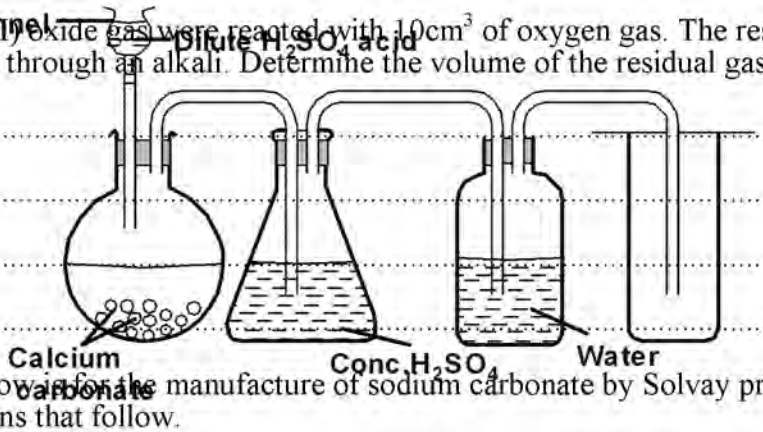

c) The flow chart below is for the manufacture of sodium carbonate by Solvay process. Use it to answer the questions that follow.

i) Name substance N ..... (1 mark)

ii) Explain the use of water in chamber E. (1 mark)

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.....

iii) Name the two raw materials required in the starting chamber A for manufacture of sodium (1 mark)

.....

iv) Write an equation for the reaction taking place in tower C. (1 mark)

.....

v) Name the major process taking place at G. (1 mark)

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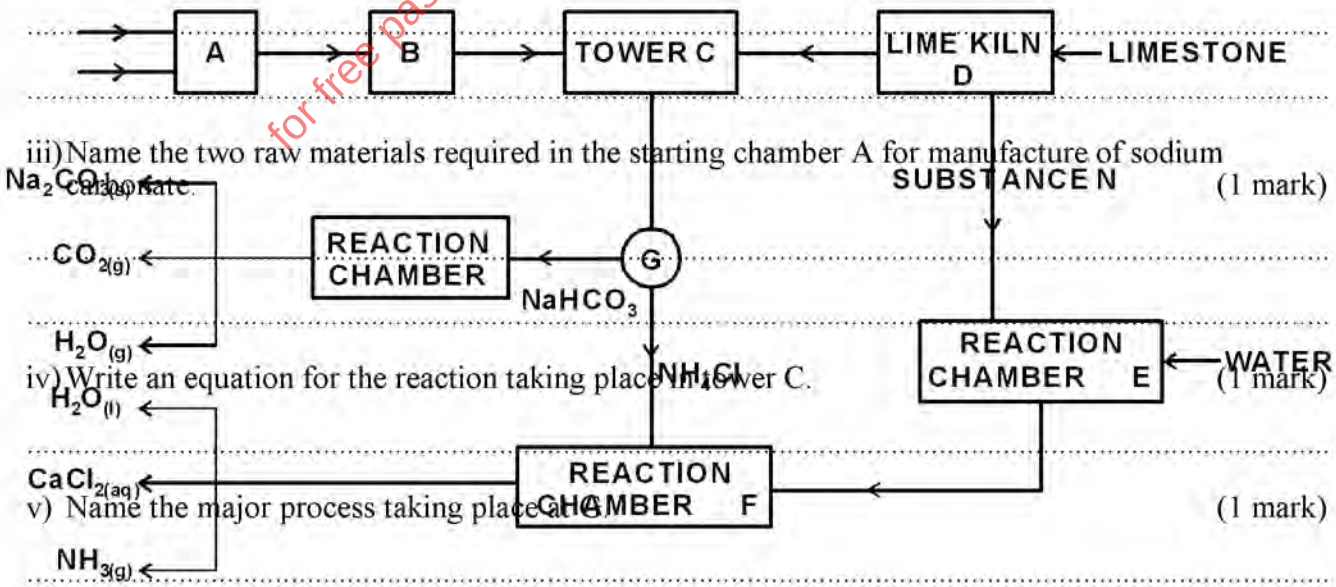

6. a) Nitrogen is obtained by fractional distillation of liquid air.

i) Name two other gases obtained during the distillation according to their order of collection. (2 marks)

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ii) State one property that makes it possible for the components of liquid air to be separated by fractional distillation. (1 mark)

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b) In an experiment to separate a mixture of two miscible liquids P (b.p = 83°C) and Q (b.p = 114°C) a student set up the apparatus shown below. Study it and answer the questions that follow.

i) Name the apparatus labelled J. (1 mark)

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ii) Solids labelled K were included in the mixture. State the role of these solids. (1 mark)

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iii) A round bottomed flask is usually preferred when carrying out fractional distillation of miscible liquids. Explain. (1 mark)

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iv) Identify the second distillate. (1 mark)

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v) The distillates collected are not pur[illegible]xplain. (1 mark)

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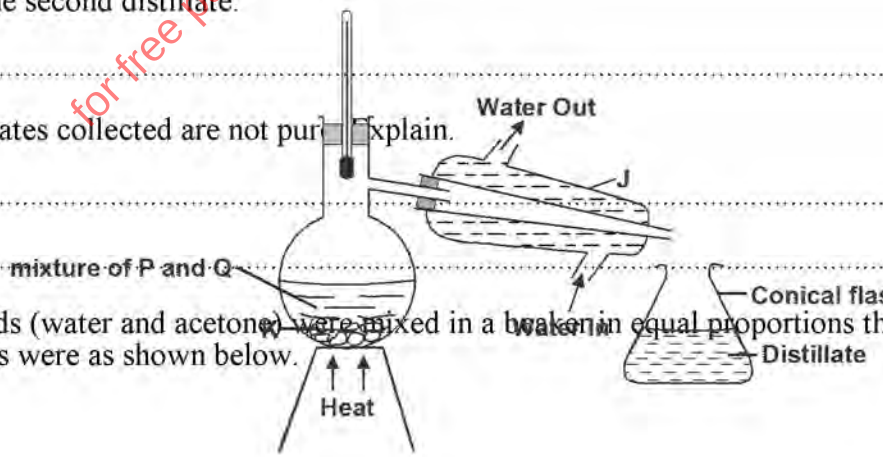

c) Two liquids (water and acetone) were mixed in a beaker in equal proportions then left to settle. The results were as shown below.

i) Name the best method that can be used to separate these liquids. (1 mark)

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ii) What name is given to two liquids which behave in this manner when mixed ? (1 mark)

.....

iii) Solid V dissolves in acetone but not in water. Name the type of bond that exists in solid V. (1 mark)

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7. **a)** Chlorine can be prepared by using the following three reagents. Solid sodium chloride, concentrated sulphuric (VI) acid and potassium manganate (VII).

i) What is the role of each of the following in the reaction ? (2 marks)

I. Concentrated sulphuric (VI) acid

.....

II. Potassium manganate (VII)

.....

ii) Name the bleaching agent formed when chlorine gas is passed through cold dilute sodium hydroxide solution. (1 mark)

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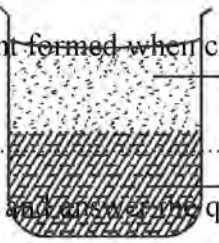
b) Study the scheme below and answer the questions that follow



i) Write the formula of the cation present in the yellow solution F. (1 mark)

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ii) What property of chlorine is shown in step I ? (1 mark)

.....

iii) Identify the brown solid G. (1 mark)

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iv) Write an equation for the reaction in step III. (1 mark)

.....

v) What name is given to process X. (1 mark)

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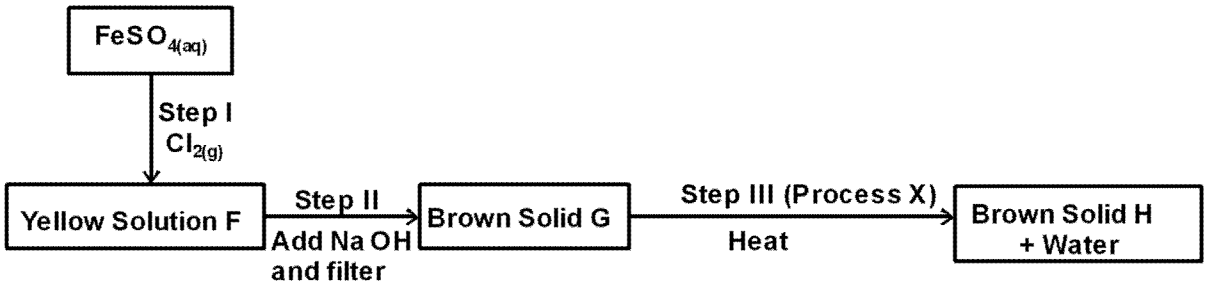
8. The flow chart below shows various reactions involving sulphur.



a) Identify the following substances :

i) Q ..... (1 mark)

ii) R ..... (1 mark)

iii) S ..... (1 mark)

iv) T ..... (1 mark)

b) Write an equation for the reaction that takes place when sulphur is roasted in excess air. (1 mark)

.....

c) What observations would be made when dilute hydrochloric acid is added to sodium sulphite. (1 mark)

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d) Write an equation for the formation of Q. (1 mark)

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e) How can the presence of P be confirmed. (1 mark)

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f) Write an equation for the formation of substance R. (1 mark)

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g) Sulphur (IV) oxide is a bleaching agent. Explain the differences in the bleaching action of sulphur (IV) oxide and that of chlorine. (use equations) (2 marks)

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