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

School.. Date ....

Candidate's Signature...

233/2

CHEMISTRY PAPER 2

Time: 2 Hours

TOP NOTCH EXAM MERIT TWO (PRE-MOCK) 2016
KENYA CERTIFICATE OF SECONDARY EDUCATION.

INSTRUCTIONS TO CANDIDATES

- Write your name and index No. in the spaces provided above.
- Sign and write the date of the examination in space provided.
- Answer ALL the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used for calculations
- All working must be clearly shown where necessary

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	11	
2	11	
3	11	
4	13	
5	12	
6	10	
7	12	
TOTAL	80	

This paper consists of 12 printed pages.
Candidates should check the question paper to ascertain that all pages are printed as indicated and that no question is missing

1. a) The table below gives formulae and volumes occupied by 1g of some gases at STP, study it and answer the questions that follow:

Formulae of gas	Ne	C_2H_2	Ar	NO_2	SO_2	SO_3
Relative molecular mass	20	26	40	46	64	80
Volume occupied by 1g (cm^3)	1120	861	560	485	350	280

i). Plot a graph of volume of gas (Y-axis) against the relative molecular mass (3mks)
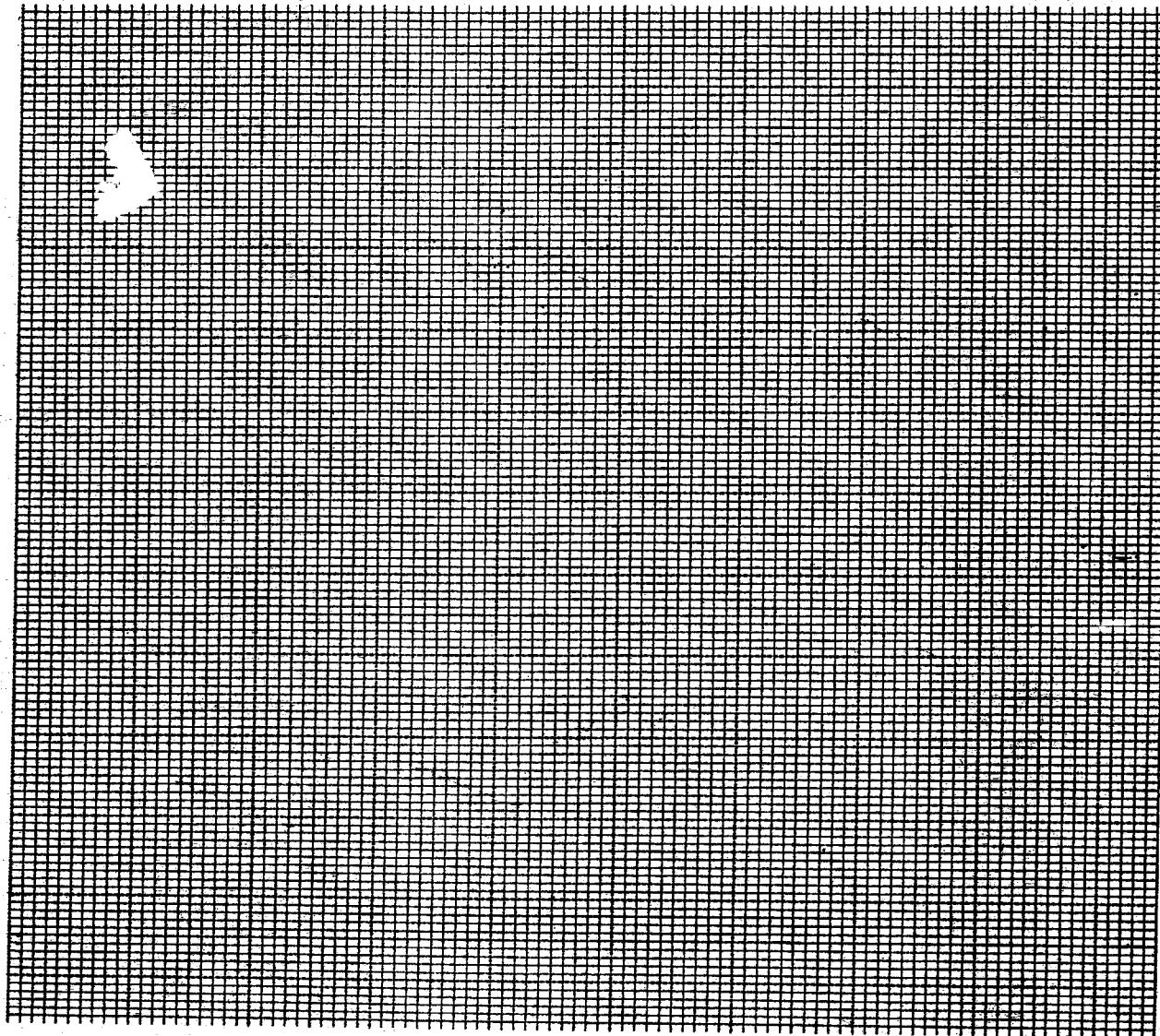
ii). Use the graph to predict the volume occupied by 1g of Carbon (ii) oxide and use your answer to calculate the molar gas volume at STP (C = 12, 0 = 16) (3 mks)

b)   A gas X diffuses through a porous plug in 60 seconds. An equal volume of gas Y diffuses through the same plug in 90 seconds.   (1 mark)

i)   What is meant by diffusion?

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ii)   Apart from density or mass of a gas state one other factor that affects the rate of diffusion   (1mark)

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    (1mark)

iii)   State Grahams law of diffusion

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....

iv)   Calculate the relative molecular mass of gas V (RMM of X = 34)   (2marks)

2.   The diagram below is of the action of heat on conc. nitric acid. Study it and use it to answer the questions that follow.
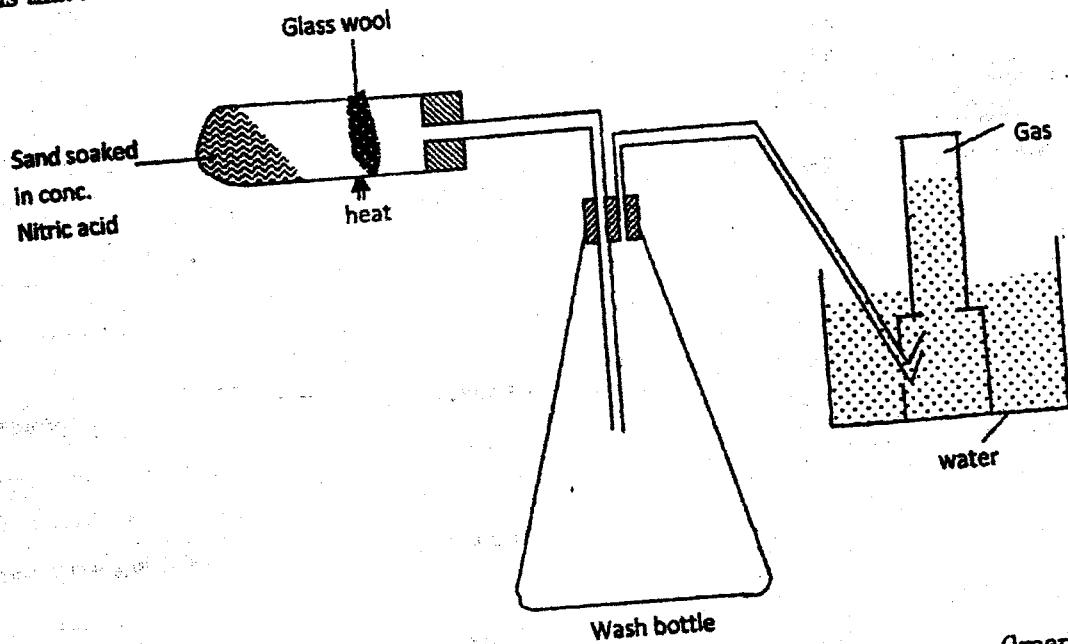
a) i)   What was observed in the wash bottle?   (1mark)

....

....

3

ii)   Explain why the colour of the gas in the wash-bottle was different from that collected in the test tube   (2marks)

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....

iii)   What would be the effect of the water on the litmus paper after the experiment?

(1mark)

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....

iv)   How would you tell the identity of the gas in the test tube?   (2marks)

....

....

v)   Write an equation for the thermal decomposition of nitric acid   (1mark)

....

....

b). i) Explain why nitric acid is kept in brown bottles   (1mark)

....

....

ii)Explain why sulphuric acid is used in the preparation of nitric acid rather than
     hydrochloric acid
                                                                                 (1mark)

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....

iii) Give two major uses of nitric acid   (2marks)

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3.a) The flow chart below shows the preparation of carbon (II) oxide and its reactions
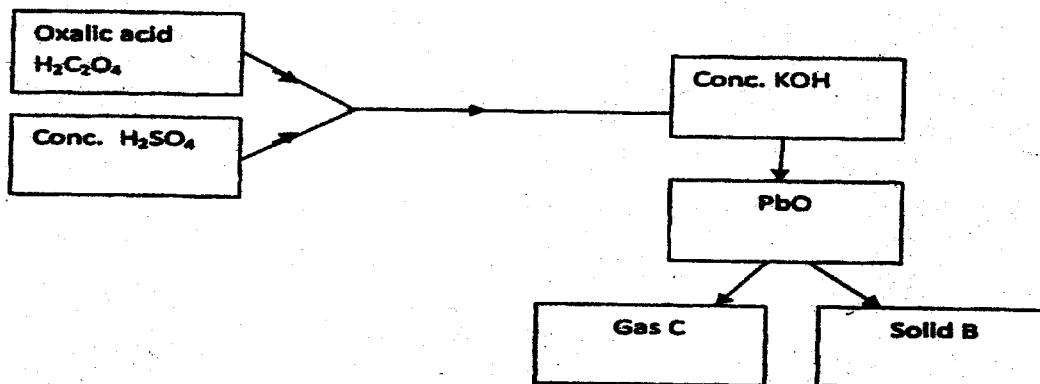
i.)   Name the type of reaction taking place between $H_2C_2O_4$ and Conc. H_2SO_4 (1mark)

....

....

ii).   Why is gaseous mixture passed through Conc. KOH?   (1mark)

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iii).   Write an equation for the production of B and C   (1mark)

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b) The figure below is used to investigate the effect of carbon (ii) oxide on copper (ii) oxide. Study it and answer the questions that follow Copper (ii) oxide
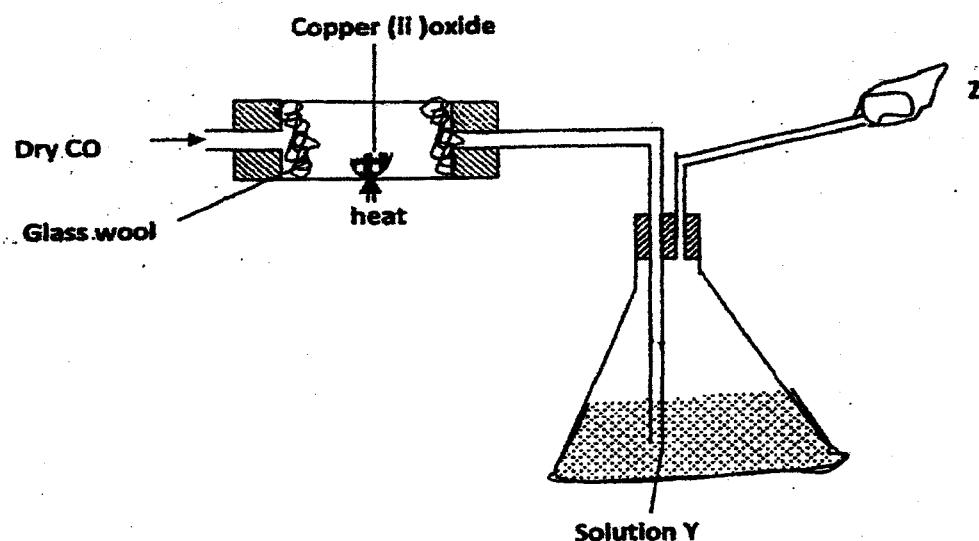
i)   What will be observed in the combustion tube at the end of the experiment? (1mk)

....

....

ii)   Identify Y and give its use   (2mks)

....

....

iii)   Why is it necessary to burn the excess gas at Z   (1mk)

....

....

iv) Write the equation for the reaction taking place at Z   (1mk)

....

....

v) What is the use of glass wool?   (1mark)

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vi. Give two uses of carbon (II) oxide

(2marks)

4. The table below shows elements with their atomic numbers, mass numbers and their melting points. Study it and answer the questions that follow. Letters do not represent actual symbols of the elements.

Element	B	C	D	E	F	G	H	I	J	K
Atomic No	7	8	19	15	2	9	6	16	12	11
Atomic mass	14	16	39	31	4	19	12	32	24	23
Melting point	—	—	63.7	44	-272	-223	vary	113	669	98

a, Select two elements with oxidation states of -2

(1mk)

b) Which element represents:

i) The most powerful oxidizing agent?

(½ mark)

(ii) The most powerful reducing agent?

(½ mark)

c) Which element has the highest ionization energy? Explain

(1mark)

d) Select two elements, when reacted form a compound that conducts electricity both in molten and aqueous state.

(1mk)

e) Select any two elements when reacted form a compound that dissolves in water to form acidic solution.

(1mk)

f) Using dots (.) and crosses (x) to represent electrons; draw diagrams showing bonding between B and J.

(2marks)

g) Explain why for some elements the atomic mass is not twice the atomic number   (1mk)

....

....

h) Explain why the melting point of element K is higher than that of element D.   (2marks)

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i) Describe how a solid mixture of the Sulphate of element D and lead II Sulphate can be

   Separated   (3marks)

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...   .

5.   The list below shows the formulae of some organic compounds. Use letters T1 to T6 to answer
       the questions that follow.

           $T_1 - CH_3CH_2CH_2CH_2CH_3$

           $T_2 - CH_3CH_2CH_2COOC_2H_5$

           $T_3 - CH_3CH_2CH_2CH_2CH_2OH$

           $T_4 - CH_3CH_2CH_2COOH$

           $T_5 - CH_3CH_2CHCH_2$

           $T_6 - CH_3CCCH_3$
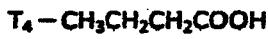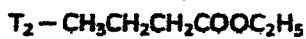
   a)   Select two compounds which:

           i)   Are not hydrocarbons   (1mk)

   ....

   ....

   ii) Would decolourise both bromine water and acidified potassium manganite (VII).   (1mk)

   ....

   ....

   iii) Would produce hydrogen gas when reacted with potassium metal.   (1mk)

   ....

   ....

b) Select a compound which would produce bubbles of a gas when reacted with sodium

   carbonate.   (1mk)

....
....

c)   i)   Identify the compound that is likely to undergo polymerization. Give a reason for your answer. Using two molecules show how polymerization occurs.

         I.   Compound   (1mk)

....

....

         II.   Reasons   (1mk)

....

....

         III.   Polymerization   (1mk)

....

....

   ii)   Name the process by which compound T_2 is formed and identify the compounds that were used to form it.

         I.   Process   (1mk)

....

....

         II.   Compounds

                 i)   .... (1mk)

                 ii).   ....

c)   Compound T_3 can be converted to T_4 as shown by the equation below:

$$C_4H_9OH_{(l)} + O_{2(g)} \longrightarrow C_3H_7COOH_{(aq)} + H_2O_{(l)}$$

Given the following information:

ΔH_c for C_4H_9OH = -4910kJmol⁻

ΔH_c for C_3H_7COOH = -4090kJmol⁻

Determine the heat change for the reaction above.   (3mks)

6.   Solubilities of potassium nitrate and copper II sulphate were determined at different temperatures. The following data was obtained.

Temperature (°C)		0	20	40	60	80	100
Solubility of	KNO₃	12	30	75	125	1S5	250
/100g of water	CuSO₄	15	20	35	45	65	80

a)   On the graph paper provided; plot solubility curves for both salts, where solubility (vertical axis) is plotted against temperature.

(3mks)
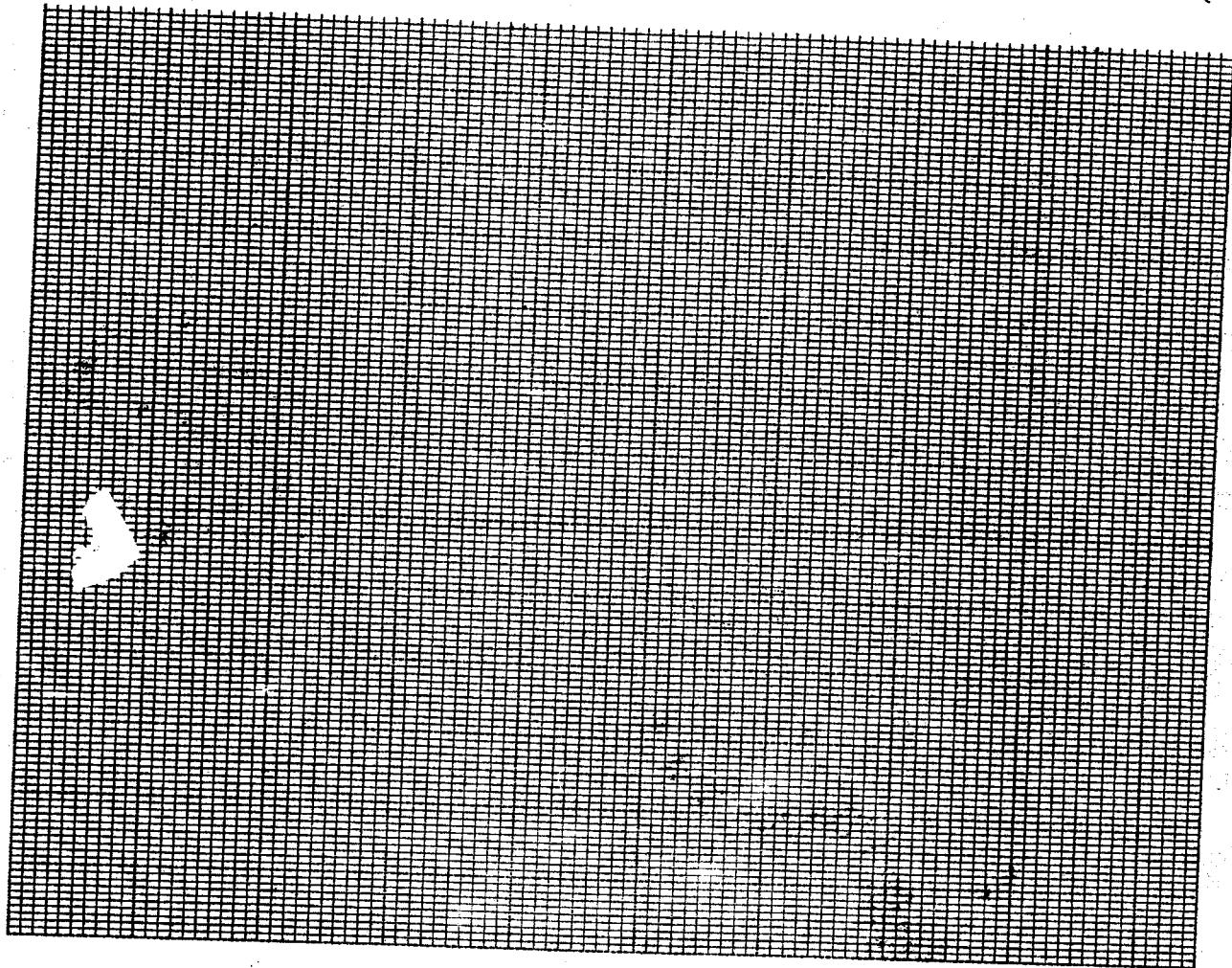
ii)   Determine from the graph the solubility of each salt at 50°C.

I. KNO_3

(1mk)

....

II. $CuSO_4$

(1mk)

....

iii)   At what temperature was the solubility of both salts equal?   (1mk)

....

iv)   Saturated solution of potassium nitrate at 70°C was cooled to 20°C. What mass of the crystals will be deposited?

(1mk)

....

....

b)   i)   What is permanent hardness of water?   (1mk)

....

ii)   State two chemical substances that can be used to remove permanent hardness. (1 mk)

....

....

c)   Explain why aluminum sulphate solution is acidic   (1 mark)

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7.   The chart below represents the extraction of iron and some of its uses.
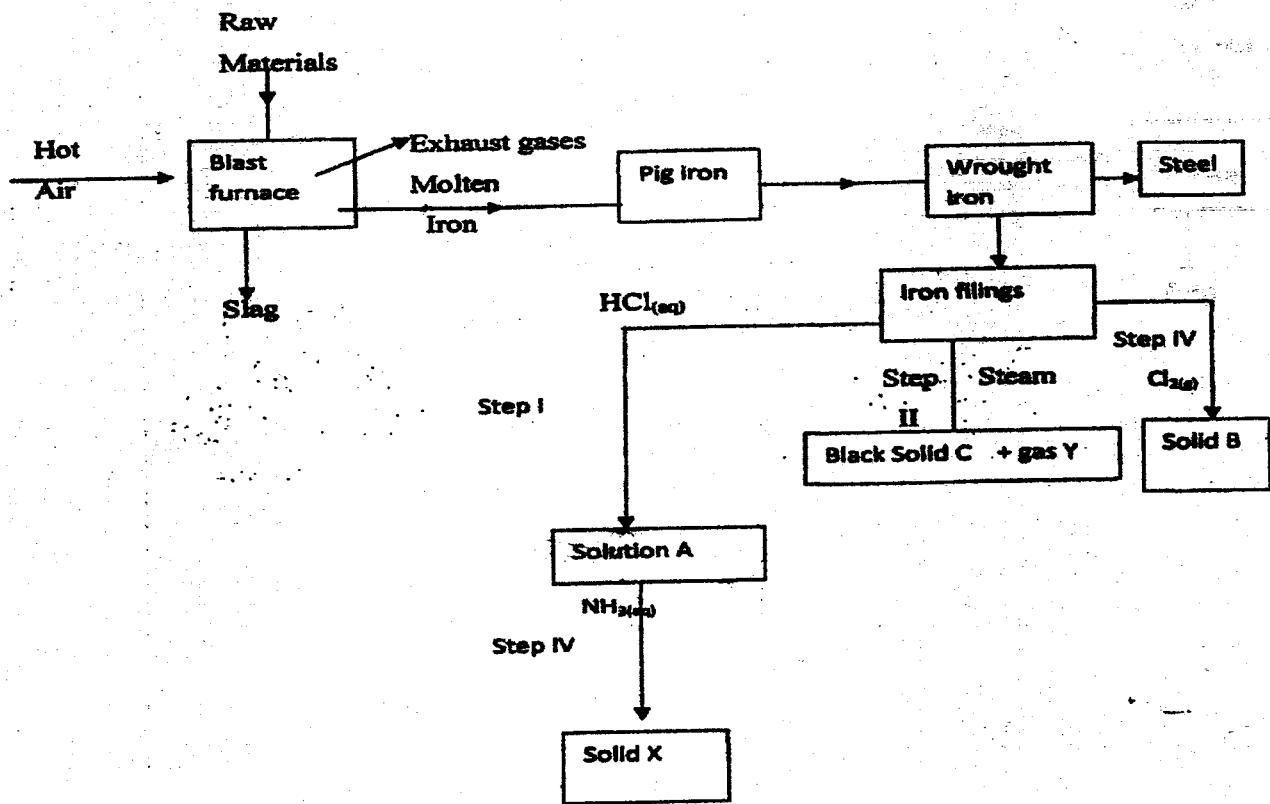
a)   Name the raw materials fed into the blast furnace.   (2 mks)

....

....

b)   Name 3 exhaust gases emitted from the blast furnace.   (2mks)

....

....

c)   i)   Why is it necessary to convert pig iron into wrought iron   (1mk)

....

ii)   State one commercial use of iron.   (1mk)

....

d)   Name substances   (3 mks)

A   ....

B ....

C ....

X ....

Y ....

e) Write equations for reactions in steps

i) II ....

III ....   (1mk)

ii) Write an ionic equation for the reaction in step I.

....
....   (2mks)

iii) What observations are made in steps?

I ....

II ....