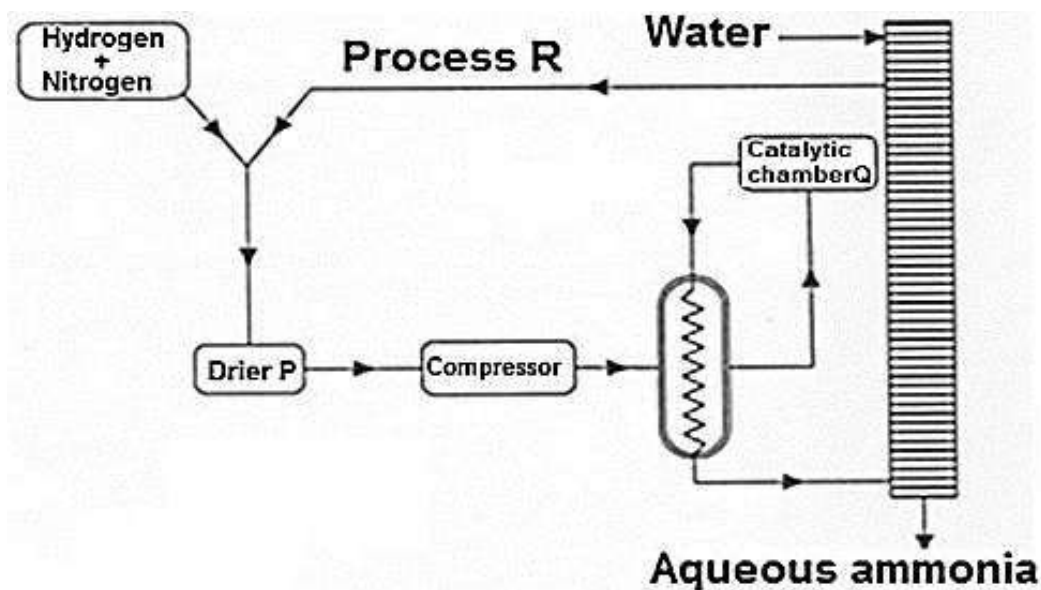


FORM FOUR CLUSTER KCSE MODEL 3

CHEMISTRY PAPER 2 QUESTIONS

SECTION 1 (80 Marks)

1. (a) The diagram below represents the Haber process for the production of ammonia. Study it and answer the questions that follow.



- i) Name a suitable substance that would be used in chamber P. (½mark)

.....

- ii) Name a suitable catalyst used in chamber Q. (½mark) .

.....

- iii) Write equation for the reaction in chamber Q. (1 mark)

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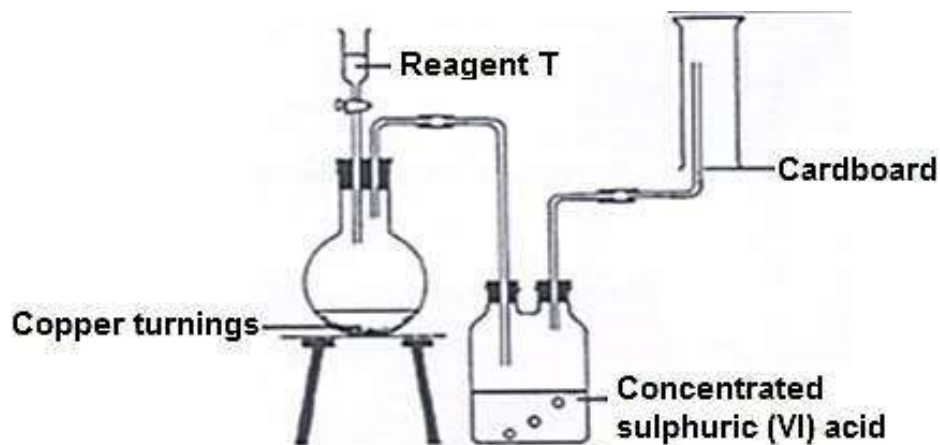
- iv) State the optimum conditions of temperature and pressure used for the industrial process. (1mark)

.....
.....

- v) Name process R. (½mark)

.....

- (b) The set up below was used by a student to prepare Sulphur (IV) oxide gas in the laboratory. Study it and answer the questions that follow.



i) Name reagent T. (½mark)

.....

ii) Write an equation between reagent T and copper turnings. (1mark)

.....

iii) State any two mistakes in the set up. (1mark)

iv)

.....

v) State the role of concentrated sulphuric

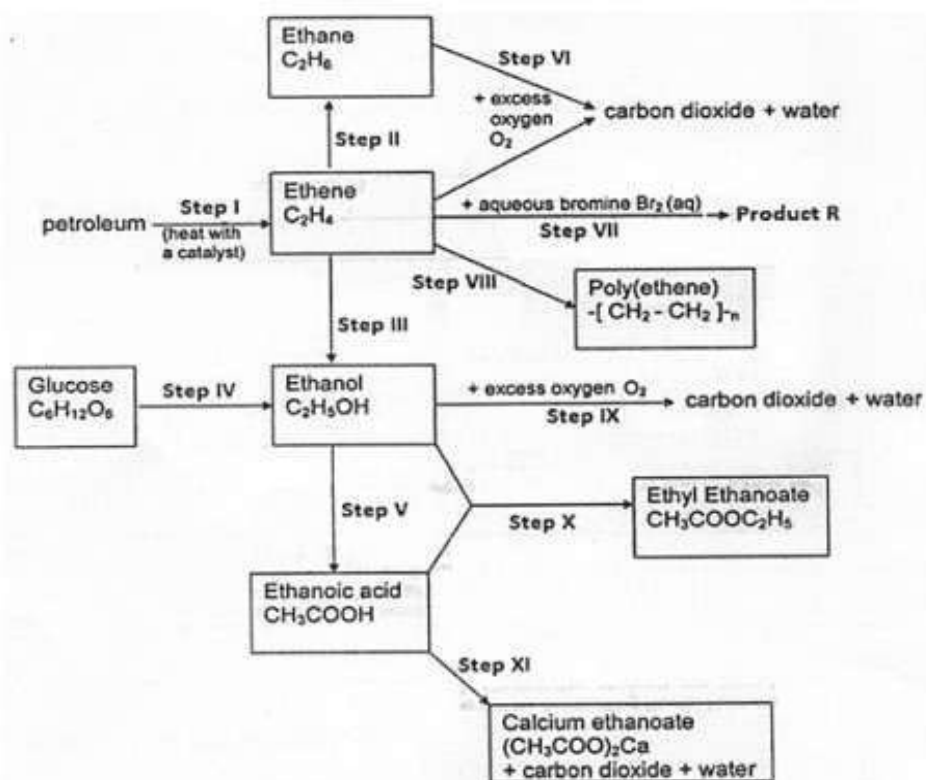
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(VI) acid (1mark) .

.....

2. . The flow chart below are some reactions in organic chemistry. Study the flow chart and answer the questions that follow.

3.



(a) Name the process in step 1 and the catalyst used in the process.

.....

(b) State the conditions and reagents for the reaction in step II.

.....

(c) (i) Name the reaction in step III. (½mark)

.....

ii) Suggest a reagent that could be used in this reaction.

.....

(iii) Give two conditions that would be necessary for this reaction to occur.

.....

(d) Describe step IV under the following headings.

(i) Name of reaction

.....

(ii) Conditions.

.....

(iii) Equation.

.....
.....

(e) (i) With reference to steps V and X. Complete the table below.

Step	Name of reaction	Reagents	Conditions
IV			
X			

(ii) Explain the likely observations during step V.

.....
.....

(f) Write equations for the reactions in:

(i) Step V.

.....
.....

(ii) Step VII.

.....
.....
.....

(iii) Step X.

.....
.....
.....

(g) State the observations made in step VII.

.....

.....
.....
(h) State the type of reaction in each of the reactions marked:

(i) Step VII.

.....
.....

(ii) Step IX.

.....
.....

(iii) Step XI

.....
.....

(i) State one use of the product in step VIII.

.....
.....

3.(a) A current of 3A was passed through fused aluminium oxide for 10 minutes. Calculate the mass of aluminium obtained at one electrode.(Al =27.0, IF=96500C).

(b) Below is a list of potential differences obtained when metals P, Q, R, S, T are used in the following electrochemical cells: Metal/metal ions//copper (II) ions/copper solid.

Metal	Potential difference (V)
P	-0.10
Q	-0.46
R	0.00
S	+0.45
T	+1.16

(i) Arrange the elements in order for reactivity starting with the strongest reducing agent.

.....
.....

(ii) Write the representation for the cell in which T is used.

.....

(iii) The standard reduction potential of copper is +0.34 volts. Calculate the standard reduction Potential of S.

.....
.....
.....

4. The grid below shows part of the periodic table. Study it and answer the questions that follow. The letters do not represent the true symbols of the elements.

						A					
	B							C	D	E	F
G	H										
							I		J		

(a) Which of the elements from ions with a charge of -2? Explain.

.....

(b) What is the true nature of the oxide formed by C?

.....
.....
.....

(c) How does reactivity of J compare with that of E? Explain

.....
.....

.....
(d) Write a balanced equation for the reaction between B and chlorine.

.....
.....
(e) Explain how the atomic radii of the following compare.

i) G and H.

.....
.....
.....
(ii) B and H.

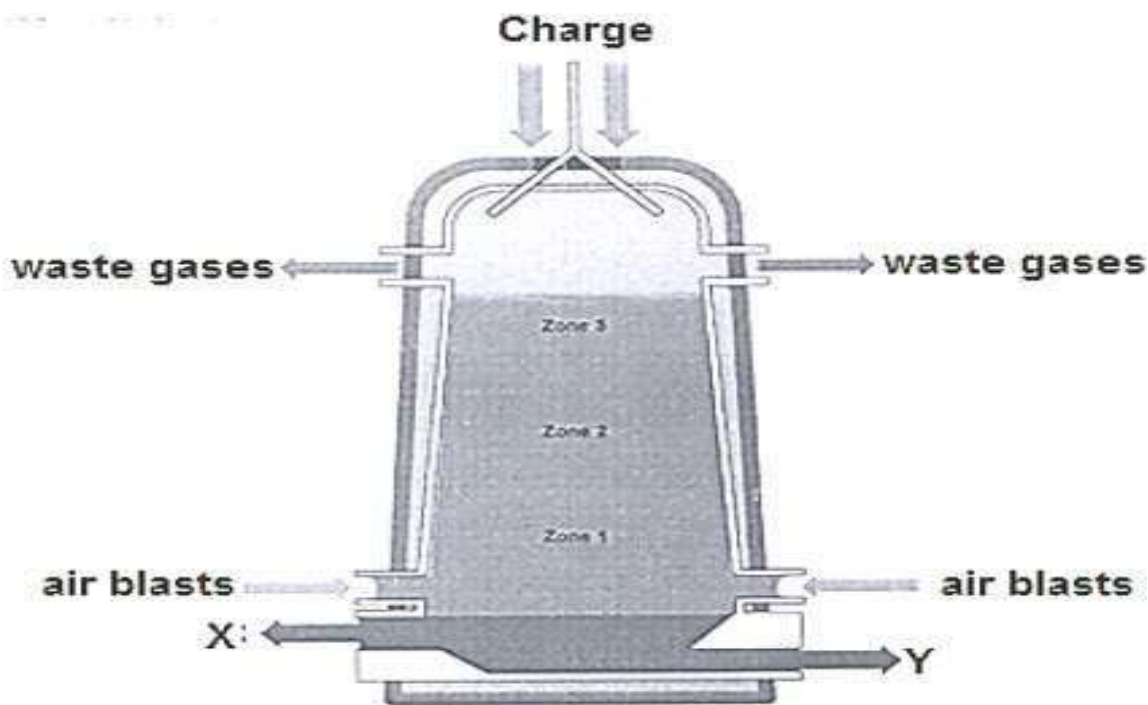
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.....
.....
(f) If the oxides of B and D are separately dissolved in water, what effects will their aqueous solutions have on litmus?

.....
.....
.....
(g) Which element has the highest tendency of forming covalent compounds? Explain.

.....
(h) What is the trend in the ionic radius of E and J? Explain.

.....
.....

5. The diagram below shows a blast furnace in the extraction of iron haematite.



(i) Name the components of charge.

(ii) Name two components of waste gases. (1mark)

.....
.....

(iii) Give the identity of X and Y

X.....

Y.....

iv) Using equations only explain the formation of X.

.....
.....
.....

v) In this process haematite is reduced to iron metal.

(a) Explain how the main reducing agent is generated.

.....
.....
.....

(b) Write the chemical equation for the reduction of haematite to iron metal.

.....
.....

vi) The iron from the blast furnace is less than 80 % pure.

(a) Name two impurities likely to be in the iron.

.....
.....

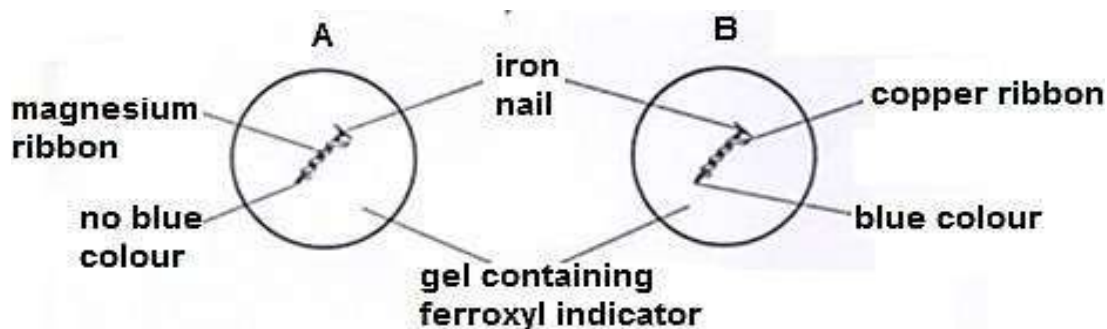
(b) Explain how the percentage purity of this iron can be increased.

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.....

(vii) Give one difference between cast iron and wrought iron.

.....
.....

II. A student carried out an experiment to investigate the rusting of iron.



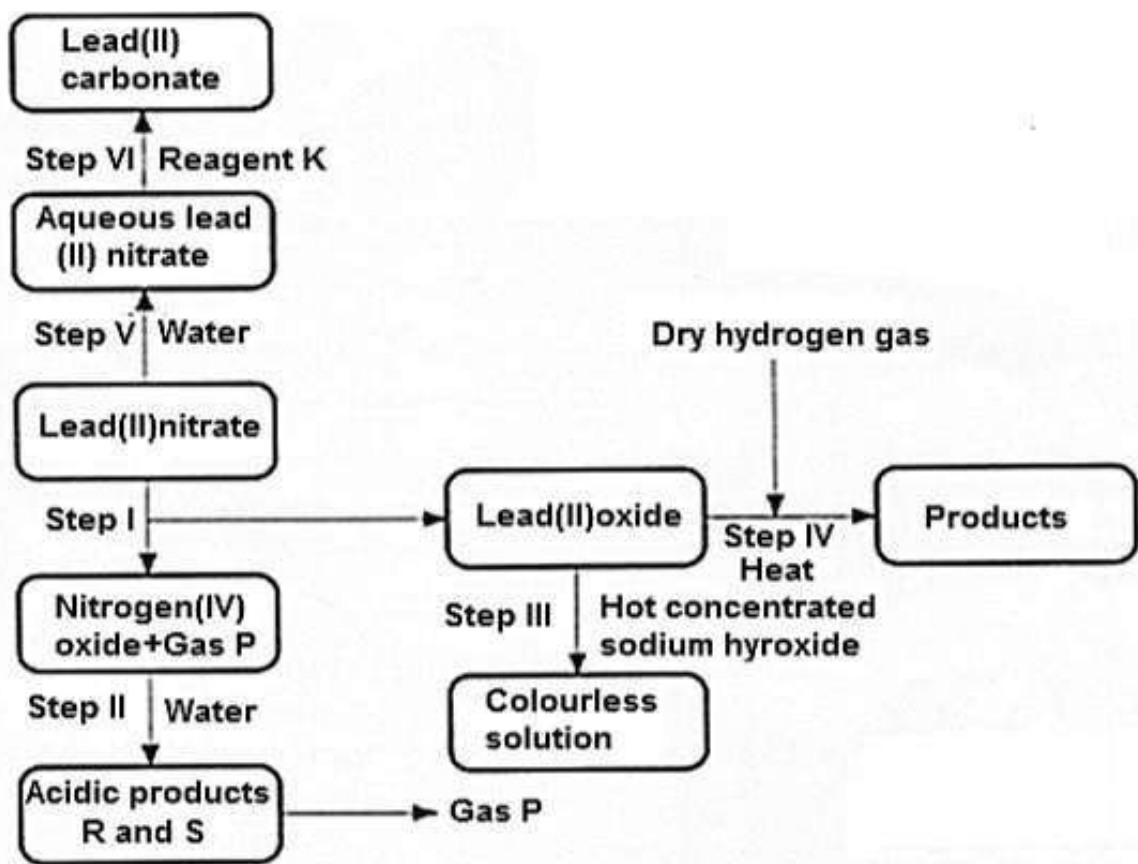
(a) Write the formula for the iron which turns ferroxyl indicator blue

.....
(b) Name the ion formed from water and oxygen, when they accept electrons during rusting.

.....
(c) Explain how magnesium prevents iron from rusting.

.....
.....
.....
(d) Salt, which is spread on roads in winter, speeds up rusting. Ethylene glycol is used instead of salt on the roadways of iron bridges because it does not speed up rusting. Suggest the type of bonding present in ethylene glycol.

.....
6. The flow chart below shows some reactions starting with lead (II) nitrate. Study it and answer the questions that follow.



(a)(i) State the conditions necessary in step 1

.....

.....

(ii) Identify I. reagent K

.....

II. gas P.

.....

III. acidic products S and R.

.....

(iii) Write:

I. The formula of the complex ion formed in step III.

.....
.....

I. The equation of the reaction in step IV.

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.....
.....

(a) (i) The reaction between lead (II) nitrate and concentrated sulphuric (VI) acid starts but stops immediately.

Explain

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(ii) Name one suitable reagent that can be reacted with concentrated sulphuric (VI) acid to produce nitric (V) acid.

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