

NAME:.....

INDEX NO.....

SCHOOL.....

SIGN.....

DATE.....

233/2

CHEMISTRY THEORY

PAPER 2

FORM 4

MARCH/APRIL 2013

TIME: 2 HOURS

PENTAGON JOINT EXAMINATIONS WARENG DISTRICT

The Kenya Certificate of Secondary Education

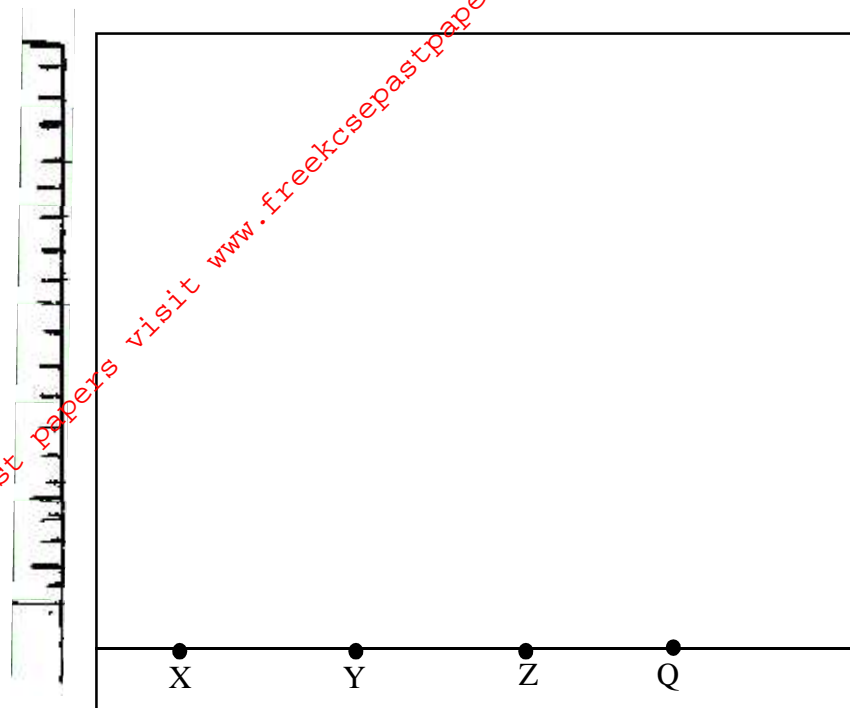
INSTRUCTIONS TO CANDIDATES

- Write your **name**, **Index number**, **school** and **sign** on the spaces provided.
- Answer **ALL** the questions in the spaces provide in the question paper.
- Mathematical table and silent electronic calculators may be used.
- All working **MUST** be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	11	
2	12	
3	11	
4	12	
5	13	
6	12	
7	9	
	80	

1. a) The diagram below shows spot of pure substances X, Y and Z on a chromatography paper. Spot Q is that of a mixture.



After development X, Y and Z were found to have moved 8cm, 3cm and 6cm respectively Q had separated into three spots which had moved 5cm, 6cm and 8cm.

- i) On the diagram,
 I. Label the baseline. (1mark)
 II. Show the positions of all the spots after development. (3marks)
 ii) Identify the substances present in the mixture Q. (2marks)
- b) Describe how solid ammonium chloride can be separated from a solid mixture of ammonium chloride and anhydrous calcium chloride. (2marks)

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

Liquid	A	B
C	Miscible	Miscible
D	Miscible	Immiscible

Use the information given to answer the questions that follow:

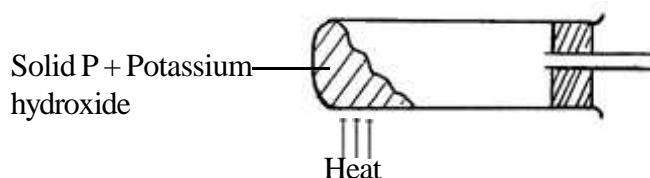
- i) Name the method that can be used to separate A and C from a mixture of the two. (1 mark)
-
- ii) Describe how a mixture of B and D can be separated. (2marks)
-

2. a) Sodium hydroxide pellets were accidentally mixed with sodium chloride-18.2g of the mixture were dissolve in water to make one liter of solution. 100cm³ of the solution was neutralized by 50cm³ of 0.45M Sulphuric acid.

- i) Write an equation for the reaction that took place. (1mark)
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- ii) Calculate the;
- I. Number of moles of the substance that reacted with sulphuric acid. (1mark)
-
.....
- II. Number of moles of the substance that would react with sulphuric acid in the one litre of solution. (1mark)
-
.....
- III. Mass of the unreacted substance in the one litre of solution. (2marks)
- (H = 1.0, Na = 23.0, Cl = 35.5, O = 16.0)
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- b) The diagram below shows an incomplete set-up used to prepare and collect ammonia gas.



- i) Name solid P. (1mark)
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- ii) Complete the diagram to show how a dry sample of ammonia gas can be collected. (3marks)
- c) In an experiment, excess ammonia gas was passed over heated copper (II) oxide in a combustion tube.
- i) State the observation that was made in the combustion tube at the end of the experiment. (1mark)
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- ii) What property of ammonia is shown in the above reaction? (1mark)
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- iii) Give one use of ammonia. (1mark)
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3. a) An atom Z can be represented as



What does the number 39 represent? (1mark)

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- b) Study the information in the table below and answer the questions that follow. (Letters are not the actual symbols of the elements).

Element	Electron arrangement of stable ion	Atomic radius (nm)	Ionic radius (nm)
L	2.8	0.072	0.136
M	2	0.152	0.068
N	2.8	0.186	0.095
O	2.8	0.160	0.065
P	2.8.8	0.099	0.181
Q	2.8.8	0.197	0.099

i) Write the formula of the compound formed when P reacts with Q Atomic numbers are; (P = 17, Q = 20) (1mark)

ii) Identify the elements which belong to the third period of the periodic table. Explain. (2marks)

iii) Which of the elements identified in b(ii) above comes first in the third period? (2marks)

iv) Select two elements which are non-metals. (1mark)

c) The table below gives some properties of substances A, B, C and D. study it and answer the questions that follow;

Substance	Electrical conductivity		MP ($^{\circ}$ C)	BP ($^{\circ}$ C)
	Solid	Molten		
B	Does not conduct	Conducts	701	1320
B	Conducts	Conducts	550	1100
C	Does not conduct	Does not conduct	1600	2100
D	Does not conduct	Does not conduct	113	440

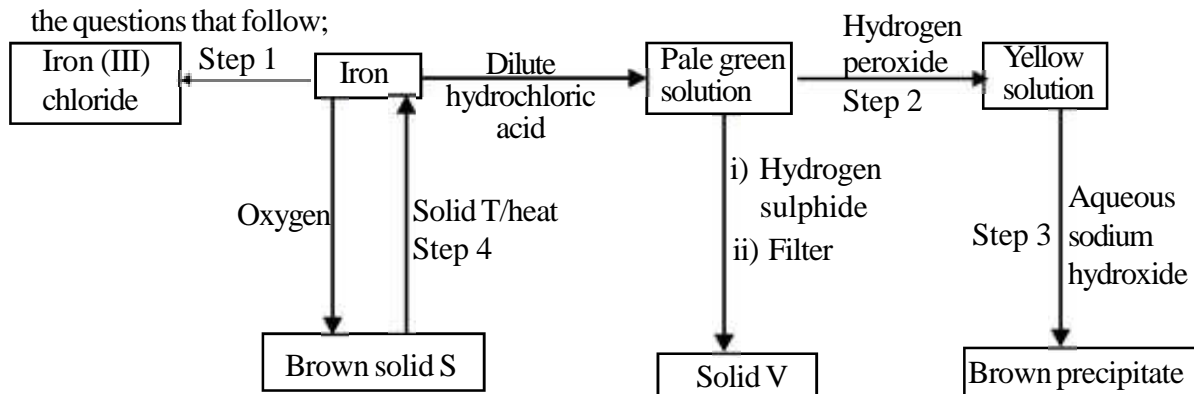
i) What type of bonding exists in substances A and B? (2marks)

A

B

ii) Which substance is likely to be sulphur? Explain (2marks)

4. a) The flow chart below shows a sequence of reactions starting with iron. Study it and answer the questions that follow;



i) Name the reagents and state the condition for the reaction in Step 1. (2marks)

Reagent

Condition

ii) Give the names of the following. (3marks)

I. Solid S

II. Solid V

III) Solid T

iii) Give reasons for the colour change in step 2. (2marks)

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iv) Write an ionic equation for the reaction which takes place in step 3. (1mark)

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v) Name one other substance that could be used instead of sodium hydroxide in Step 3.

(1mark)

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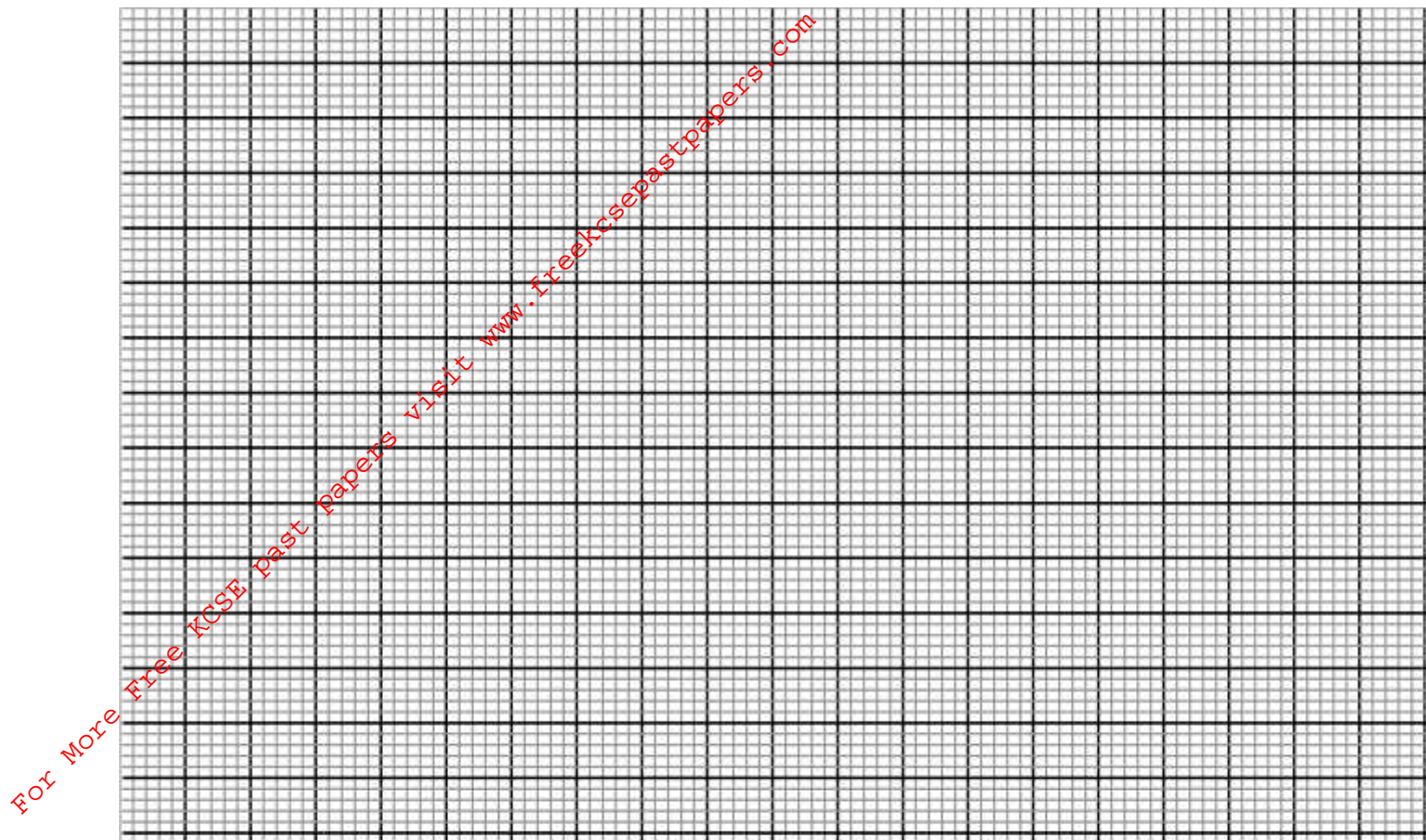
b) In an experiment, 3.36g of iron filings were added to excess aqueous copper (II) sulphate, Calculate the mass of copper that was deposited. (Cu = 63.5, Fe = 56.0) (3marks)

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5. The table below shows the variation of solubility of substances P and Q in g/100gH₂O with temperature (°C).

Temperature	0	20	40	60	80	100
Solubility of P (g/100g of water)	10	15	20	40	63	100
Solubility of Q (g/100g of water)	30	34	37	40	44	48

a) i) Using the information above plot a graph of solubility of P and Q against temperature on the graph paper provided. (5marks)



ii) What is observed when a solution containing 30g of P in 100g of water is cooled from 80°C to 10°C. (1mark)

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iii) Calculate the mass of substance P that saturate 25g of water at 92°C. (2marks)

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b) i) At what temperature do substances P and Q have the same solubility? (1mark)

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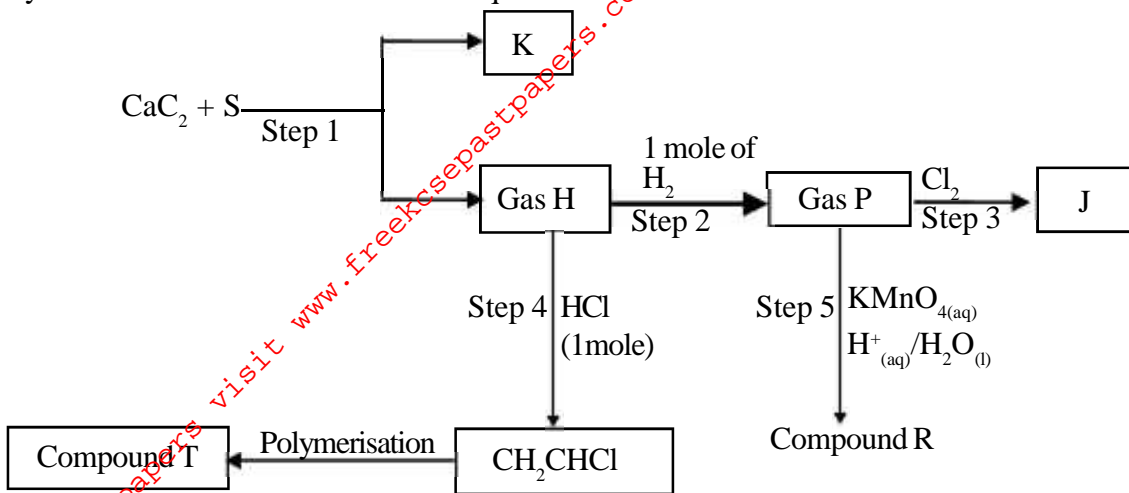
ii) How would you make a saturated solution containing 35g of substance Q? (2marks)

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c) Given a mixture containing 45g of P and 45g of Q dissolved in 100g of water, how would you obtain a pure sample of substance Q? (2marks)

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6. Study the flow chart below and answer the questions that follow.



a) Identify reagent S. (1mark)

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b) Write the equation for the reaction taking place in Step 1. (1mark)

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c) Identify substance K. (1mark)

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d) What name are given to processes below;

i) Process in Step 3. (1mark)

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ii) Step 2. (1mark)

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e) State two conditions necessary for step 2. (2marks)

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f) Write the equation for the reaction in Step 3. (1mark)

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g) Draw the structural formula of gas H. (1mark)

h) Describe one chemical test that can differentiate gas H from ethane gas. (3marks)

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7. a) Define enthalpy change. (1mark)

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b) Use the following bond energies to answer the questions that follow;

Bond	Bond energy kJ/mol
C – H	413
Cl – Cl	239
C – Cl	346
H – Cl	428

i) Write a balanced equation for the reaction between chlorine and methane to give chloromethane. (1mark)

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ii) Calculate the enthalpy change for the reaction leading to formation of chloromethane from chlorine and methane. (3marks)

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iii) Write the thermochemical equation for the reaction. (1mark)

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iv) List three factors to consider when choosing a fuel. (3marks)

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