

Name.....

Index No.

School

233/2

CHEMISTRY

PAPER 2

(THEORY)

TIME: 2 HOURS

Kenya Certificate of Secondary Education (K.C.S.E)

Instructions to Candidates:

- Answer ALL questions in the spaces provided
- Mathematical tables or electronic calculators may be used.
- All working must be clearly shown where necessary.

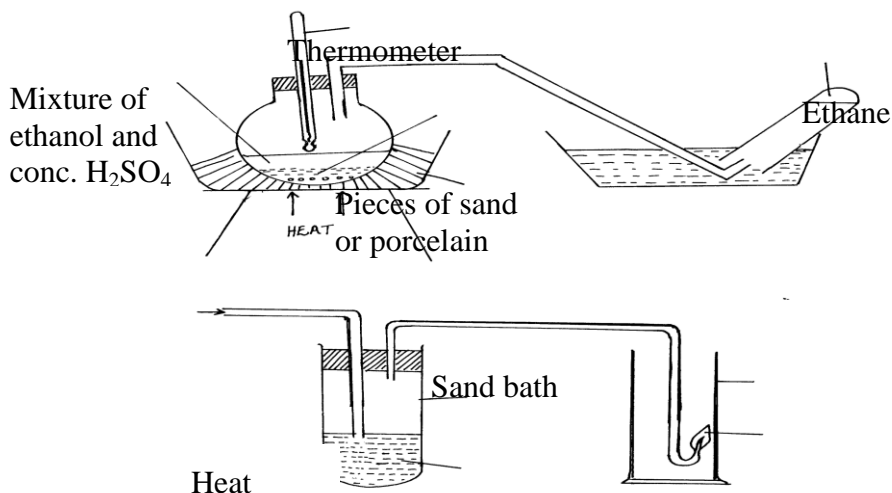
For examiner's use only.

QUESTION	MAXIMUM	SCORE
1	11	
2	11	
3	11	
4	13	
5	13	
6	10	
7	11	
TOTAL	80	

This paper consists of 12 printed pages.

Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

1. The diagram below is an arrangement for the preparation of ethane. Study the diagram and answer the questions that follow.



- a) Draw the structure / formula of ethanol. (1mk)

- b) State an important property of concentrated sulphuric (VI) acid useful in the preparation of ethane from ethanol. (1mk)

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- c) What is the purpose of the

- (i) Sand bath? (1mk)

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- (ii) Porcelain or sand? (1mk)

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- d) Name two other compounds that may be used in the place of concentrated sulphuric (VI) acid. (2mks)

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e) Write a full chemical equation of the reaction including the condition of temperature in the preparation of ethane. (2mks)

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f) What is observed when the gas collected in the gas jar is tested with acidified potassium manganate (vii)? (1mk)

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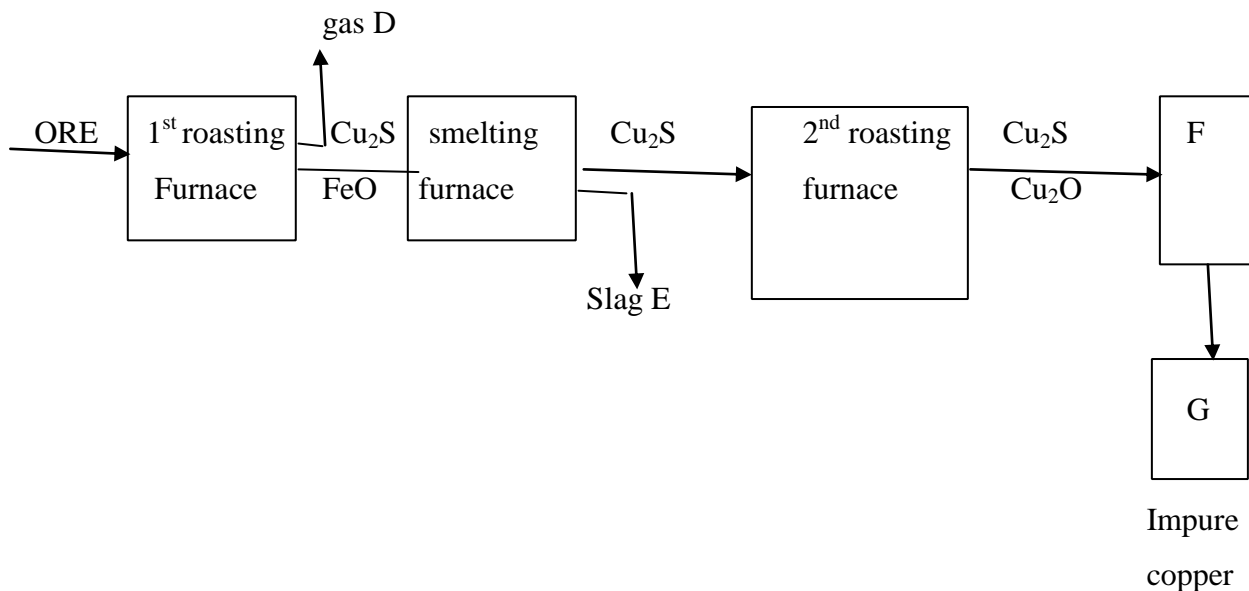
g) Write equations of the reactions in (f) (i) & (ii) above. (2mks)

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2. The flow chart below shows the extraction of copper metal from its ore. Study it and answer questions that flow.



a) Identify the ore used in the extraction. (1mk)

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b) Name

(i) gas D (1mk)

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(ii) Slag E (1mk)

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c) Write an equation for the reaction which is taking place in chamber F. (1mk)

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d) Explain how impure copper in chamber G can be purified. (2mks)

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e) In the industrial extraction of copper a steady of 8amps was used. Calculate the time taken in hours to deposit 24kg of copper. (Cu = 64, IF=96500C) (3mks)

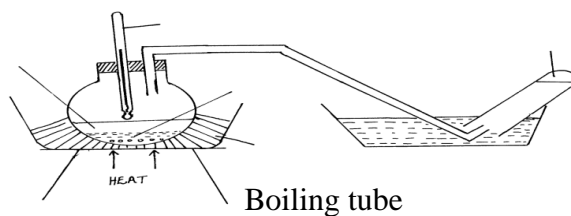
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f) Give two uses of copper. (2mks)

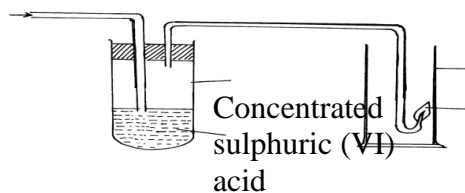
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3. a) Study the diagram below and answer the questions that follow.

Hydrogen sulphide



A gas jar



Pale blue flame of burning H₂S

(i) It is observed that a yellow solid is formed in the boiling tube. Explain this observation. (2mks)

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(ii) Name a substance that is used to dry Hydrogen sulphide. (1mk)

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(iii) State the observation to be made when hydrogen sulphide is burnt in a limited supply of air in the gas jar. (1mk)

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(iv) Write an equation for the burning of Hydrogen sulphide in the gas jar. (1mk)

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(v) List any two properties of hydrogen sulphide gas that are demonstrated in this experiment. (2mks)

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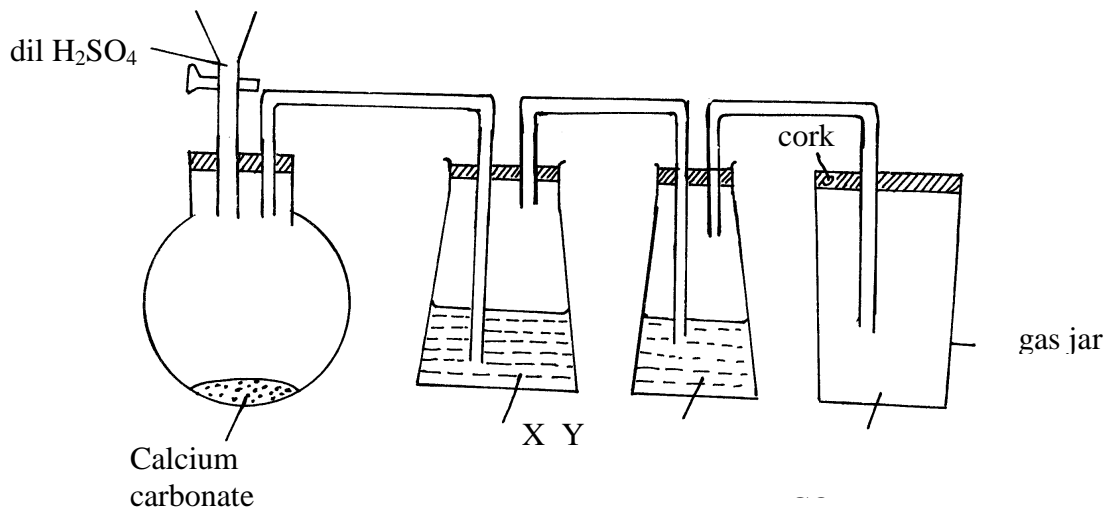
(vi) What precaution should be taken in carrying out this experiment? Give a reason. (2mks)

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b) In another experiment, a gas jar containing moist sulphur (IV) oxide is inverted over another gas jar containing hydrogen sulphide gas. State and explain the observation that is made. (2mks)

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4. a) A student set up the apparatus below to prepare and collect carbon (IV) oxide gas.



(a) Identify two mistakes in the set up. (2mks)

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(b) Name liquid y. (1mk)

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(c) What is the purpose of liquid x. (1mk)

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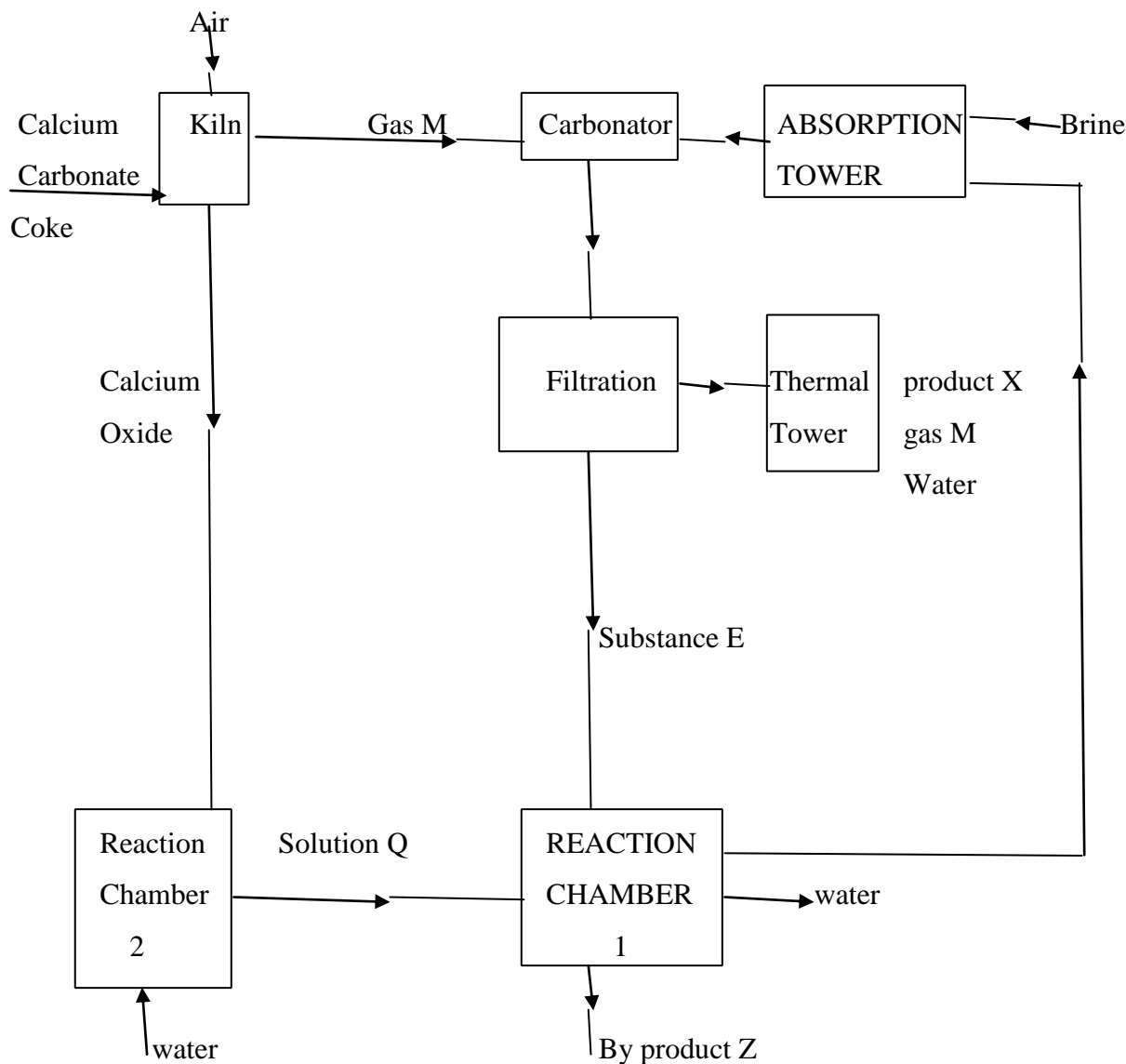
(d) State one use of carbon (IV) oxide related to the collection method shown above.

(1mk)

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b) The flow chart below shows the steps in the manufacture of sodium carbonate (Solvay process). Study it and answer questions that follow.



a) Name substances labelled X and E. (1mk)

X

E

b) Write a chemical equation for the reaction taking place in the carbonator (2mks)

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c) The carbonator is usually cooled by running cold water in metallic pipes. Why is this cooling necessary? (1mk)

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d) Give one commercial use of sodium carbonate. (1mk)

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e) (i) Name the by-product Z. (1mk)

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(ii) State one use of Z. (1mk)

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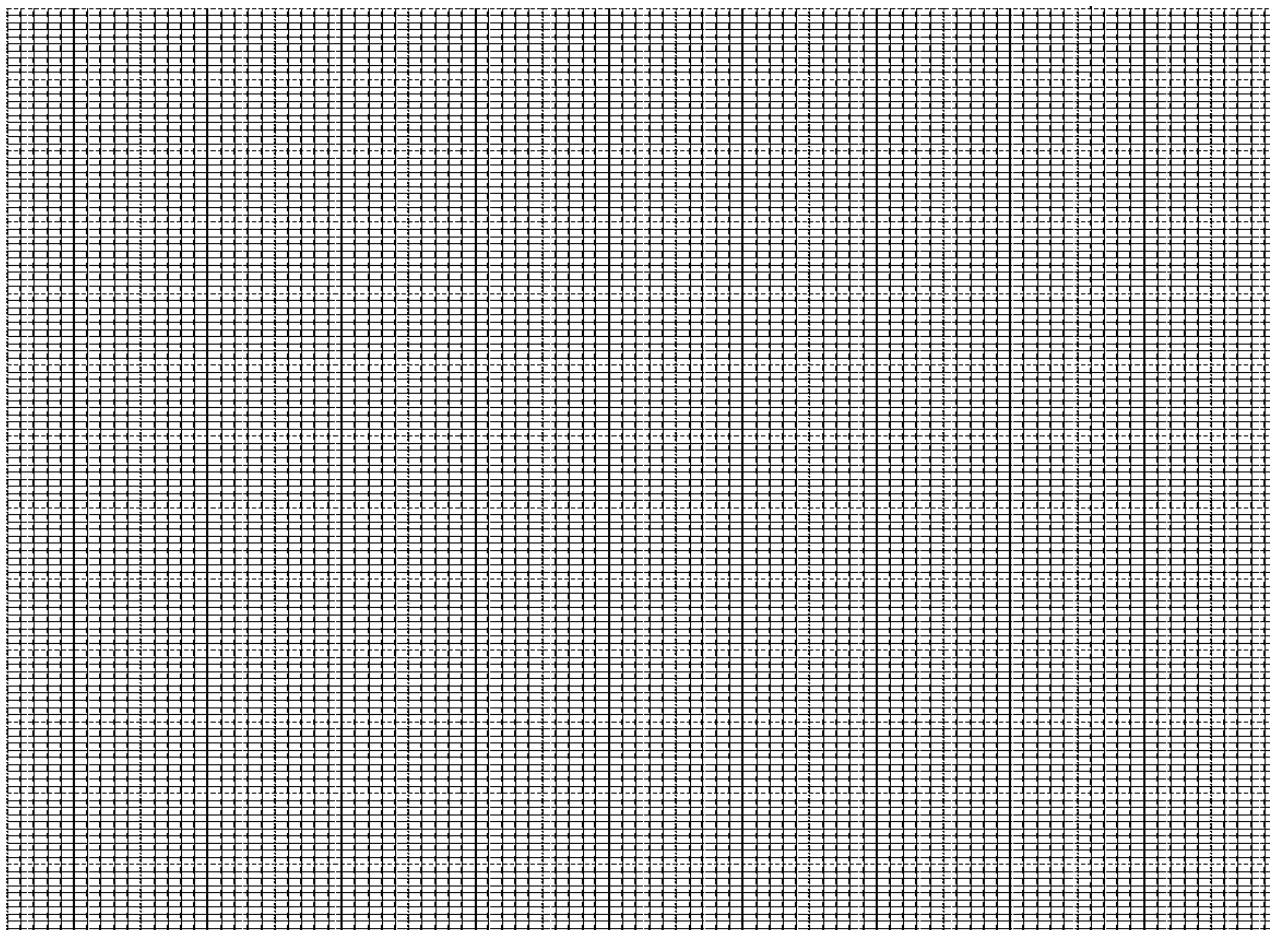
(f) Identify two gases which are recycled in the process. (1mk)

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5. The table below gives the solubility's of two salts; A and B at various temperature.

Temp ⁰ C	0	20	40	60	80	100
Solubility of A g/100g water	10	20	40	65	100	160
Solubility of B g/100g water	20	32	43	60	79	112

(a) (i) On the grid provided, plot a graph of solubility of A and B (y-axis) against temperature. (4mks)



(ii) A solution containing 68g of salt B in 100g of water is cooled from 100⁰c. At what temperature will the crystals of salt B first form? (1mk)

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(iii) Find the mass of crystals formed when the solution in (ii) above is cooled to 30⁰C. (1mk)

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(iv) From your graph; state the temperature at which both salts have the same solubility. (1mk)

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(v) Calculate the total mass of the solution at temperature obtained in (iv) above. (2mks)

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b) Use the information below on solubility to answer questions that follow.

Salt	Solubility at	
	70 ⁰ C	35 ⁰ C
CuSO ₄	38	28
Pb(NO ₃) ₂	78	79

A mixture of 38g of copper (II) sulphate and 78g of lead nitrate in 100g of water at 70⁰C is cooled to 35⁰C.

(i) Which of the two salts will crystallize? Explain. (1mk)

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(ii) Calculate the mass of the crystals formed. (1mk)

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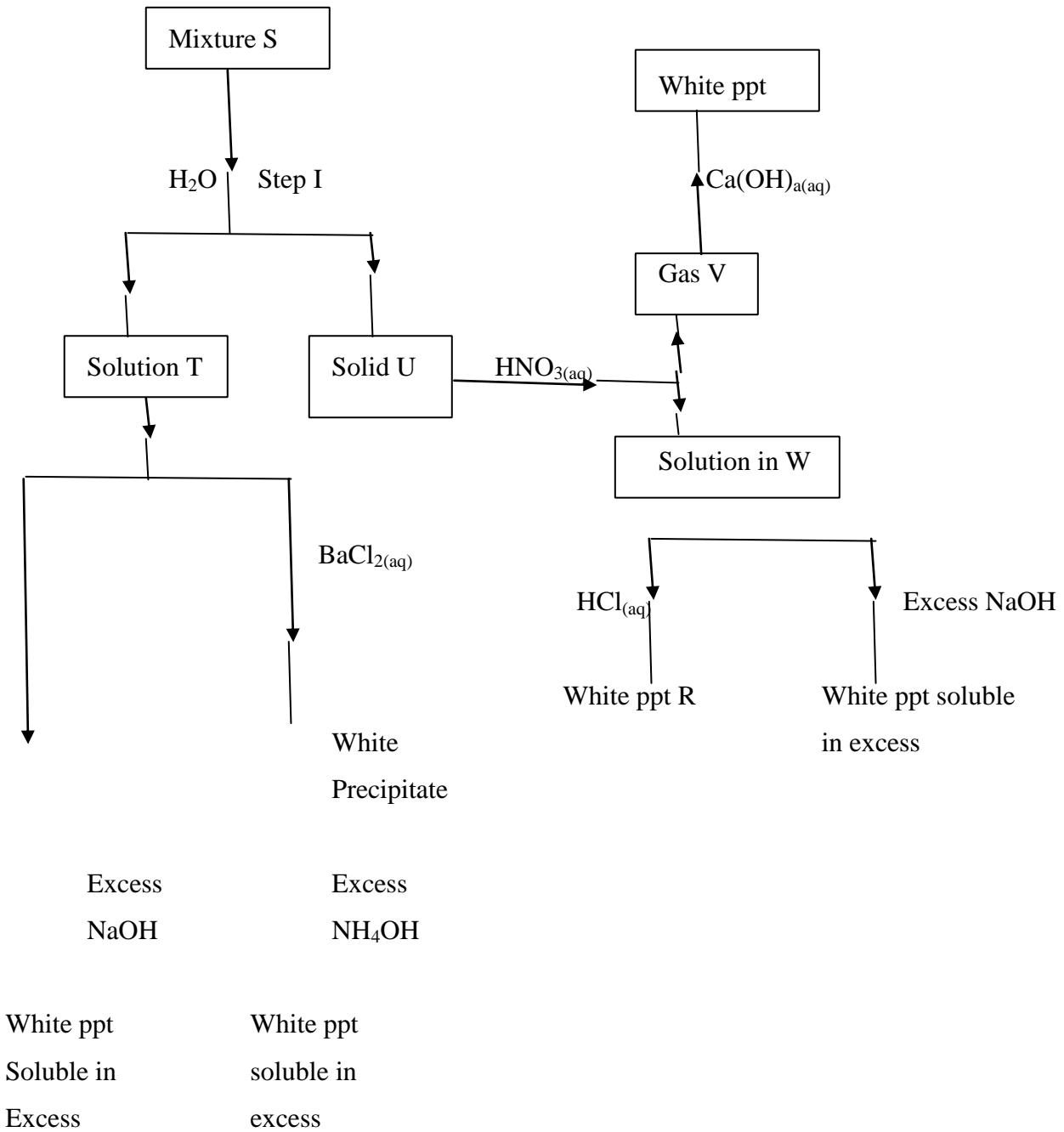
(iii) State the salt that will be unsaturated at 35⁰C. (1mk)

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(iv) How much of the salt in (iii) above would be required to make a saturated solution at 35⁰C. (1mk)

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6. Study the scheme below and answer the questions that follows.



(a) What property of mixture S is shown in step 1. (1mk)

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(b) Identify the following.

Solid U

Gas V

Solution T

Write precipitate R

(c) Identify the ions present in solution T. (1mk)

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(d) Write an ionic equation for the reaction between.

(i) Solution T and Barium chloride solution. (1mk)

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(ii) Solution W and Hydrochloric acid. (1mk)

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(e) Identify mixture S. (2mks)

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7. Study the table below. The letters do not represent the actual symbols of the elements.

Element	Atomic Number	Boiling point (K)
A	3	1603
B	13	2743
C	16	718
D	18	87
E	19	1047

a) Select the elements to which belong to the same: (1mk)

(i) Group

(ii) Period

b) Which element

(i) is in gaseous state at room temperature. Explain. (Room temperature taken as 25⁰C) (2mks)

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(ii) does not form an oxide. (1mk)

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c) Write the:

(i) formula of the Nitrate of element. (1mk)

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(ii) Equation for the reaction between element B and oxygen gas. (1mk)

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d) What type of bond would exist in the compound formed when elements A and C react? Give a reason. (2mks)

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e) Using dots (.) and crosses (x) to represent outermost electrons, show bonding in the compound formed between elements E and C. (1mk)

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f) Explain why the boiling point of element B is greater than that of element E. (1mk)

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g) Write a balanced equation when A reacts with cold water. (1mk)

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