NAME……..……INDEX NUMBER……..

CLASS……CANDIDATE'S SIGNATURE……..……

DATE…….

233/2
CHEMISTRY
THEORY
Paper 2
Time: 2 Hours

LANJET EXAMINATION- 2022

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CHEMISTRY
THEORY
Paper 2
Time: 2 Hours

INSTRUCTIONS TO CANDIDATES:

- *Write your **name** and **index number** in the spaces provided above.*
- ***Sign** and write the **date** of examination in the spaces provided.*
- *Answer **all** the questions in the spaces provided.*
- *All working **must** be clearly shown where necessary.*
- *Mathematical tables and electronic calculators may be used.*
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For Examiner's Use Only:

Question	Maximum score	Candidate's score
1	10	
2	11	
3	12	
4	14	
5	11	
6	11	
7	9	
Total	80	

*This paper consists of **13 printed pages**. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing*

1. 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.

						A		
	B		C		D		E	
F	G							
							H	

(a) Which element forms ions with charge of 2-? Explain (2mks)

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(b) What is the nature of the oxide formed by C. (1mk)

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(c) How does the reactivity of H compare with that of E. Explain? (2mks)

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(d)Write down a balanced equation between F and Chlorine. (1mk)

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(e) Explain how the atomic radii of B and C compare. (2mk)

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(f) If the oxides of F and D are separately dissolved in water, state and explain the effects of their aqueous solutions on litmus. (2mks)

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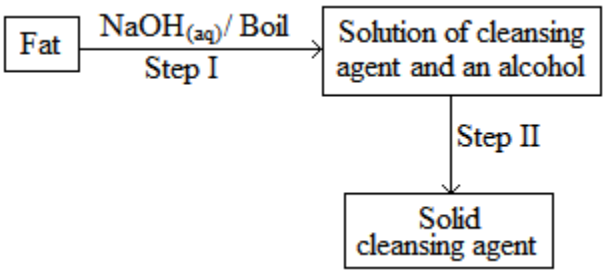
2 (a) The scheme below was used to prepare a cleansing agent. Study it and answer the questions that follow.



(i) What name is given to the type of cleansing agent prepared by the method above? (*1*mark)

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(ii) Name one chemical substance added in step II. (1 mark)

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(iii) What is the purpose of adding the chemical substance named in a (ii) above? (1 mark)

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(iv) Other than NaOH ,name any other suitable substance that can be used in step I. (1 mark)

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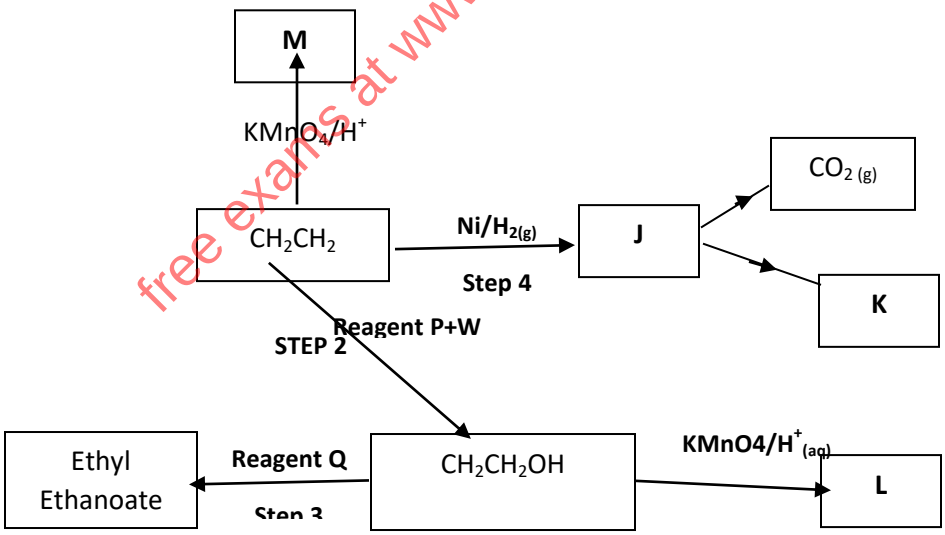
(b).Study the flow chart below and answer the questions that follow



(a) (i) Name the following organic compounds: **(2mks)**

M……..……..

L……..

(ii) Name the process in step **(2mks)**

Step 2 ……

Step 4 ……

(iii) Identify the reagent **P** and **Q** **(2mks)**

P ……..

Q…….

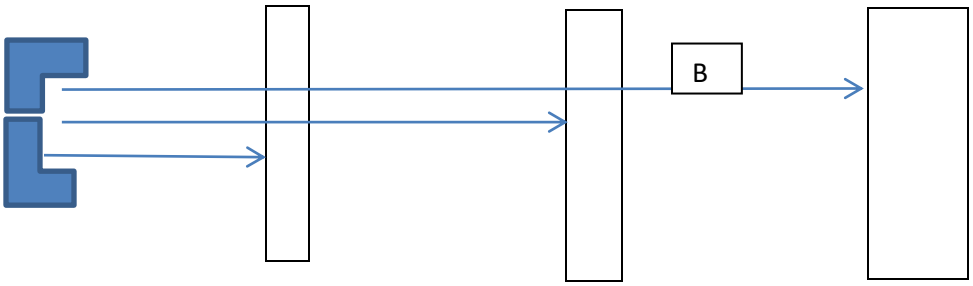
(iv) Write an equation for the reaction between $CH_3CH_2CH_2OH$ and sodium metal **(1mk)**

3. a) Define radioactivity (1mk)

b) Give two differences between chemical reactions and nuclear reactions. (2mks)

Chemical reactions	Nuclear reactions

c) Study the diagram below and answer the questions that follow



i) What property of radiations is being investigated by the illustration above (1mark)

ii) Give the name of the radiation B and give a reason. (2mks)

iii) Below is the radioactive decay starting with ^{214}Bi study it and answer the questions that follow.

214		214		210		210		210		206
Bl	Step I →	Tl	Step II →	Pb	Step III →	Bl	Step IV →	PO	Step V →	Pb
83		84		82		83		84		82

(a) Identify the particle emitted in step I and II. (2mks)

Step 1.....

Step 11.....

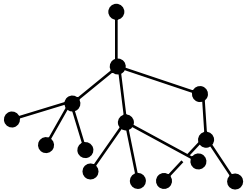
(b) Write the nuclear equation for the reaction which takes place in step V (1mk)

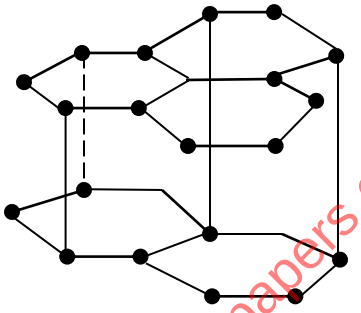
iv) State one danger associated with frequent exposure to radiations. (1mk)

v) The isotope *X-31* has a half life of 2.5 hours.Calculate the ramaining percentage (%) of the isotope left after 7.5 hours? (2mks)

4. The following diagrams show the structure of two allotropes of carbon. Study them and answer the questions that follow.

A **B**





(a)Name the allotropes. **(1mark)**

A .....

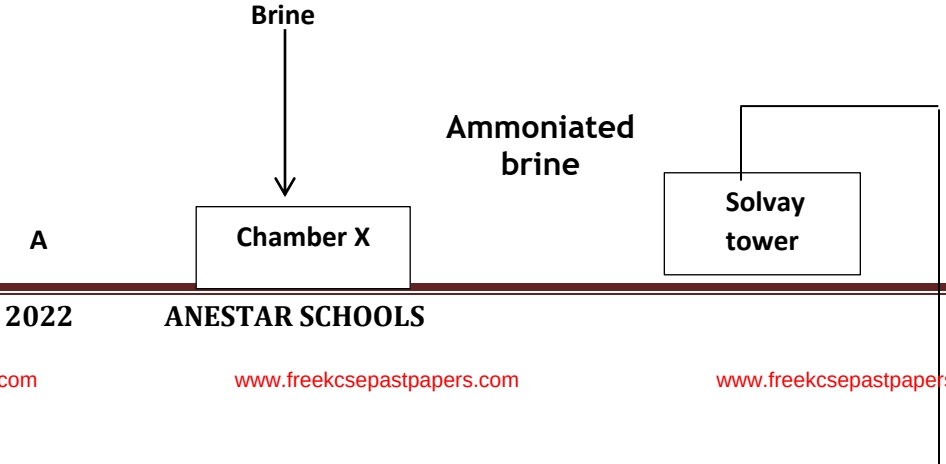
B .....

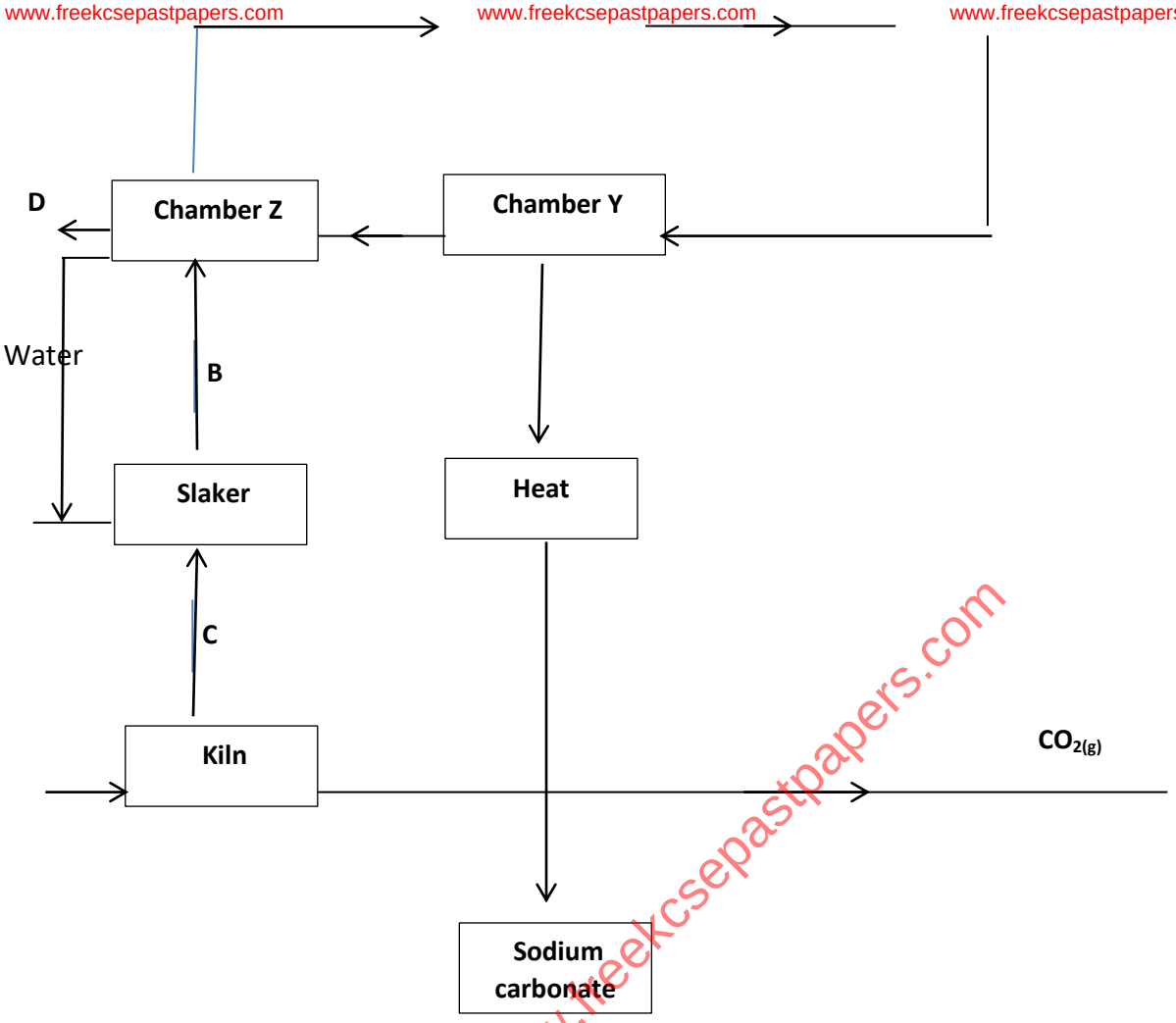
(b) Give **one** use of **A**. **(1mark)**

.....

(c)Which allotrope conducts electricity? Explain **(2 marks)**

b) The flow below represents the main steps in the manufacture of sodium carbonate





(a) Identify the substance labeled. **(2marks)**

A ……

B……

C ……

D ……

(b) Cold water is made to circulate around solvay tower. What does this suggest about the reaction between **A** and brine. **(1mark)**

(c) What process takes place in chamber **Y**? **(1mark)**

(d) Name **two** by-products that are recycled in this process. **(2 marks)**

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(e) Why is recycling important? (**1mark)**

(f) Write the equation for the reaction that takes place in the Solvay tower. **(1mark)**

(g) Give **two** industrial uses of sodium carbonate **(2marks)**

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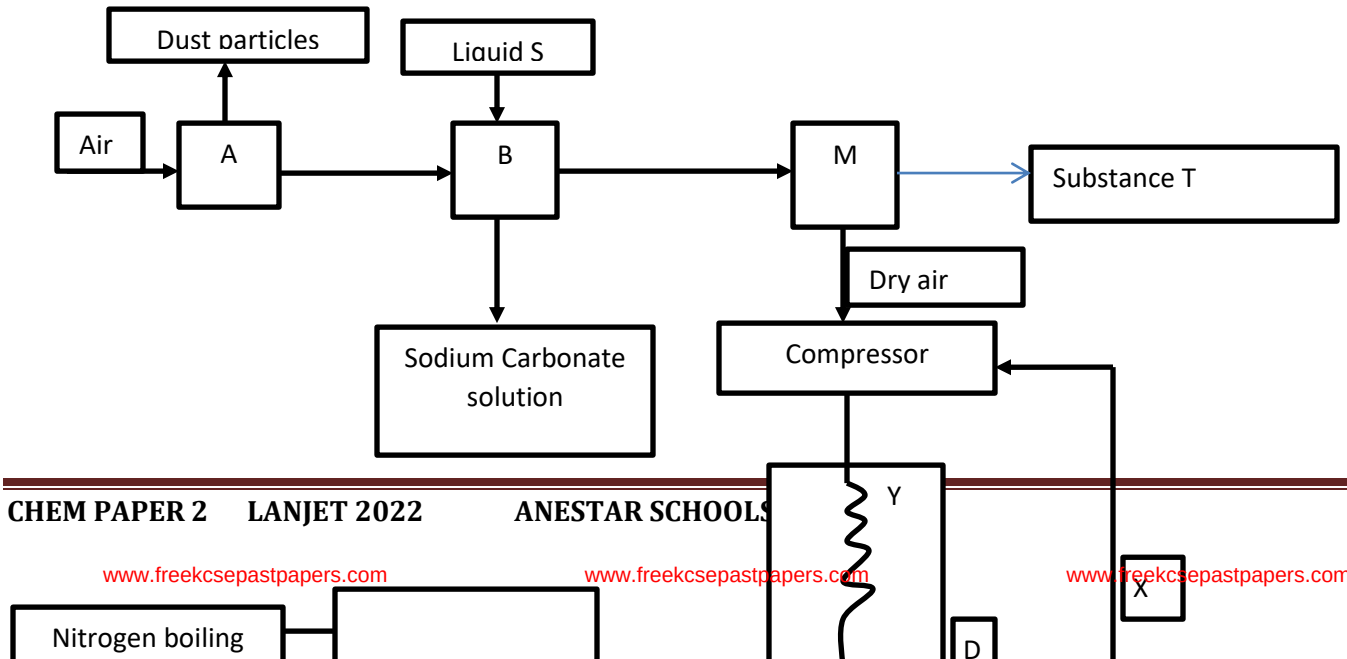
5 Fractional distillation of air is used in the industrial isolation of oxygen. The diagram below shows the process.



a) What processes are taking place in chamber A,B,M and D **2marks**

A……

B……

M……

D

……

b) Name;

(i) Liquid S (1mk)

……

(ii) Substance T (1mk)

……

c) Explain why part Y in chamber D is curved? (**1mark)**

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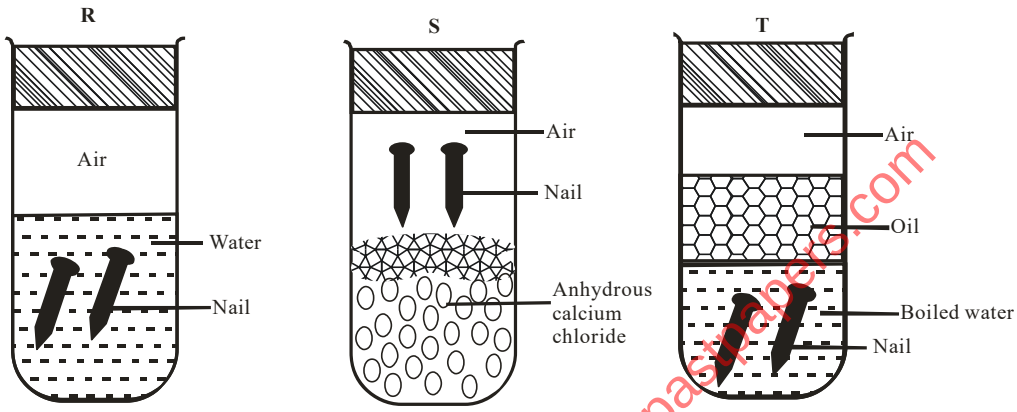
d) Give two industrial uses of oxygen gas? (**2marks)**

……

……

e) In the laboratory preparation of oxygen, manganese (iv) oxide and hydrogen peroxide are used. Write an equation to show how oxygen gas is formed. (**1mark)**

f) An investigation was carried out using the set-up below. Study it and answer the questions that follow.



(i)State and explain what will happen in the three test-tubes R, S and T after seven days. (**2marks)**

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(ii)Give one reason why some metals are electroplated. (**1mark)**

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6. a) Define the following terms

(i)Saturated solution (1mk)

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(ii)Fractional crystallization (1mk)

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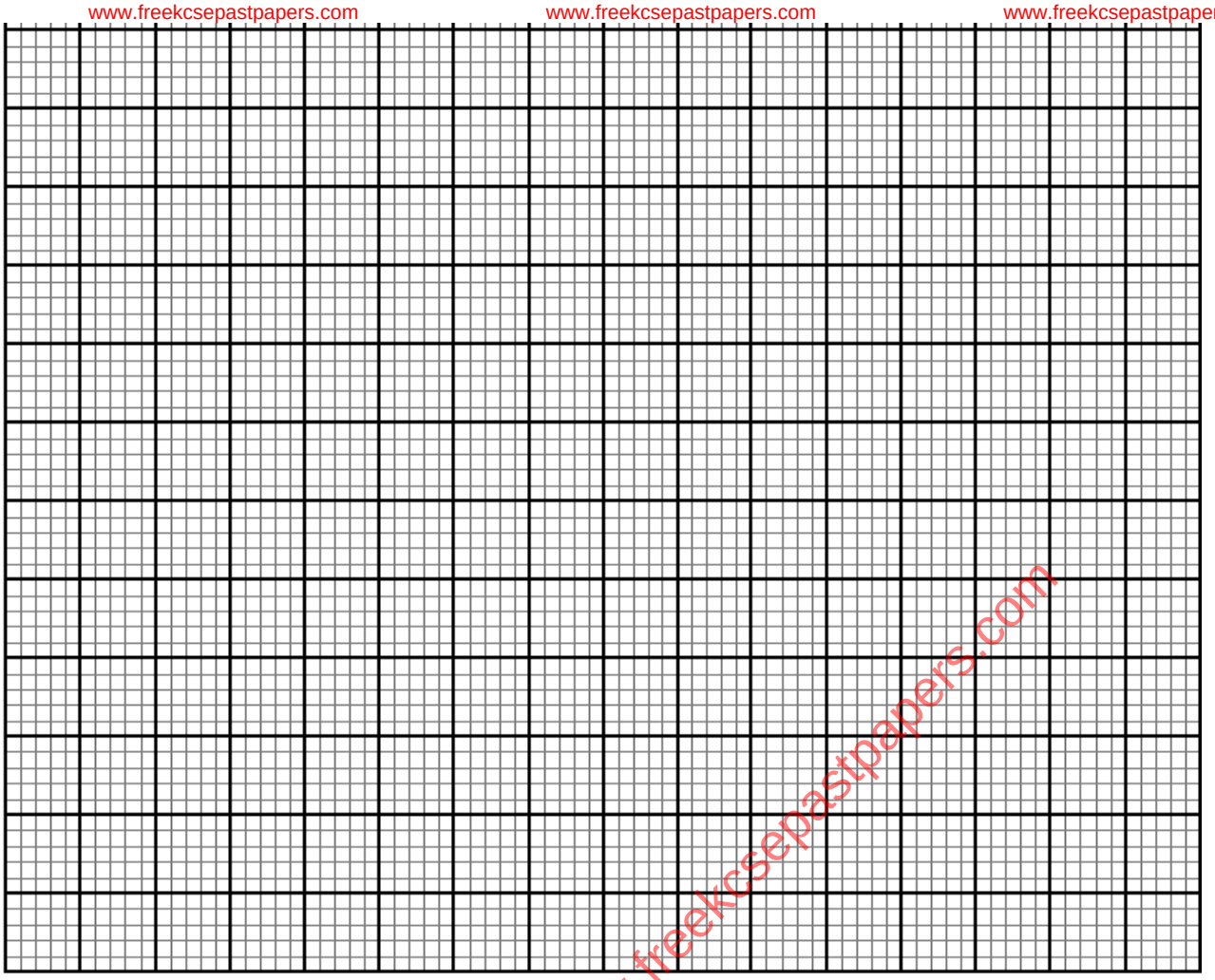
b). Solubility of salt X and Y were determined at different temperatures as shown in the following data.

Temperature (ºC)		0	20	40	60	80	100
Solubility of 100g of water	X	12	30	75	125	185	250
	Y	15	20	35	45	65	80

(i)On the grid provided, plot a graph of solubility (vertical axis) against temperature. (4mks)



ii. From the graph determine the solubility of each at 50ºC.

X …….. (1mk)

Y …….. (1mk)

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

……

……

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

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(ii)Saturated solution of salt X at 70^0C was cooled to 20^0C. What mass of the crystal were deposited. (1mk

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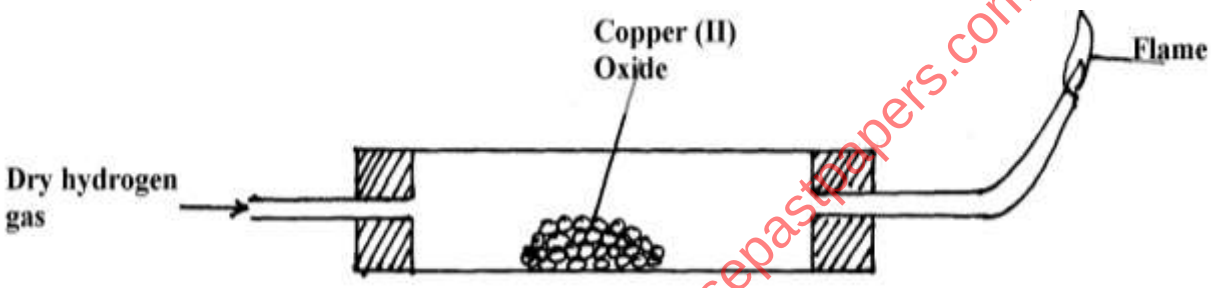
7. a) The set-up below is used to investigate the properties of hydrogen.



(i)On the diagram, indicate what should be done for the reaction to occur (1mk)

(ii)Hydrogen gas is allowed to pass through the tube for some time before it is lit. Explain (2mks)

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(b)Write an equation for the reaction that occurs in the combustion tube (1mk)

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(c) When the reaction is complete, hydrogen gas is passed through the apparatus until they cool down . Explain (2mks)

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(d)What property of hydrogen is being investigated? (1mk)

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(e)What observation confirms the property stated in (**v)** above? (1mk)

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(f) Why is zinc oxide not used to investigate this property of hydrogen gas? (1mk)

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