

NAME: \_\_\_\_\_

ADM NO: \_\_\_\_\_

**2020 FORM 4 TERM 1 ENRTY EXAMS**

CHEMISTRY THEORY

PAPER 2

TIME: 2HRS

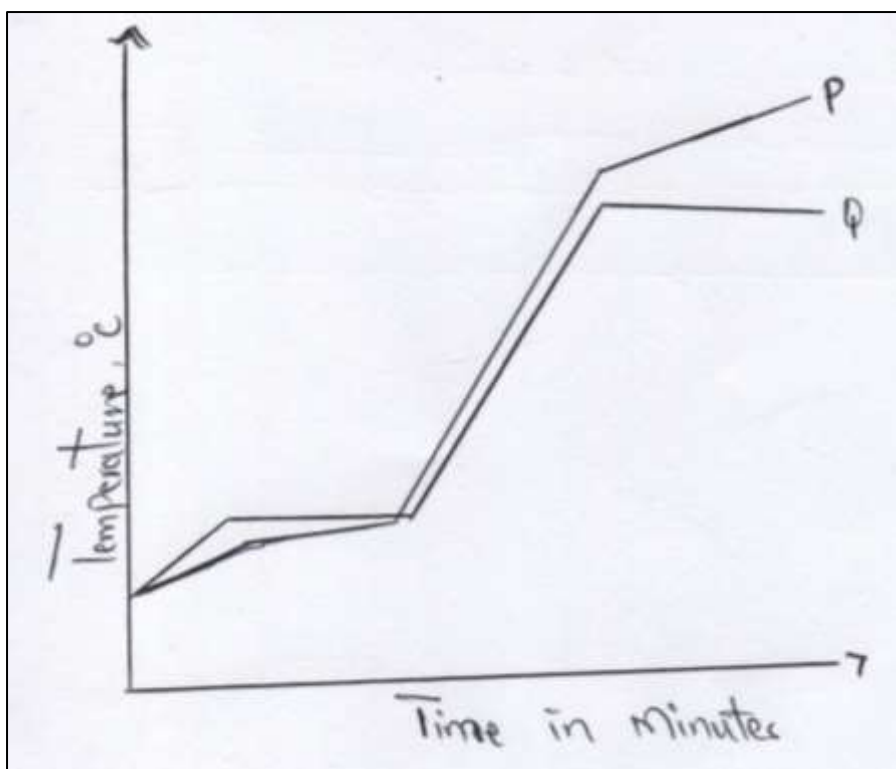
**INSTRUCTIONS TO CANDIDATES**

1. Write your name and admission number in the spaces provided above
2. Electronic calculators may be used.
3. All working must be clearly shown where necessary
4. Answer ALL the questions.

**FOR EXAMINERS USE ONLY**

QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1	9	
2	10	
3	12	
4	12	
5	13	
6	11	
7	13	
	<b>80MARKS</b>	

1. (a) The curves below represent the variation of temperature with time when pure and impure samples of a solid were heated separately.



(i) (a) Which curve shows the variation in temperature for the pure solid? Explain. (2mks)

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

(ii) State the effect of impurities on the melting and boiling points of a pure substance.

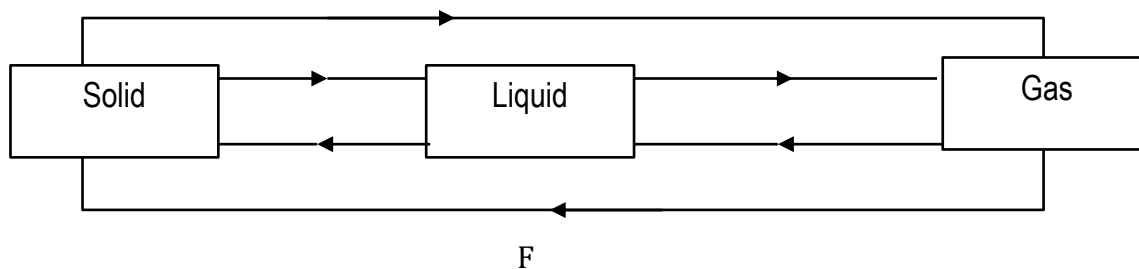
I. Melting points (1 mk)

.....  
 .....

II. Boiling points (1 mk)

.....  
 .....

(b) The diagram below shows the relationship between the physical states of matter.



i) Identify the processes B and D. (2mks)

B.....

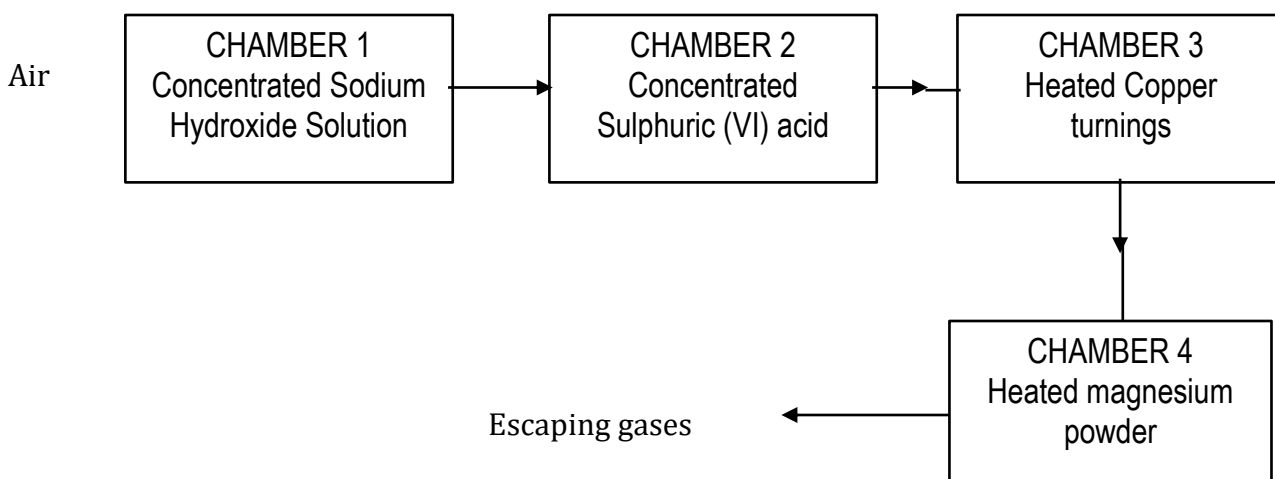
D.....

ii) Name process A (1mk)

iii) State two substances in chemistry that undergo the process A (1mk)

iv) Is the process E exothermic or endothermic? Explain (1mk)

2. Air was passed through several reagents as shown below



(a) Name the main inactive component of air (1mk)

(b) Name the components of air that are removed in the following chambers (3mks)

I. Chamber 1

.....  
II. Chamber 3

.....  
III. Chamber 4  
.....

C) What is the purpose of passing air through concentrated sulphuric (vi) acid. (1mk)  
.....  
.....

d) Write a chemical equation for the reaction which takes place in :-

I. chamber 1 (1mk)  
.....

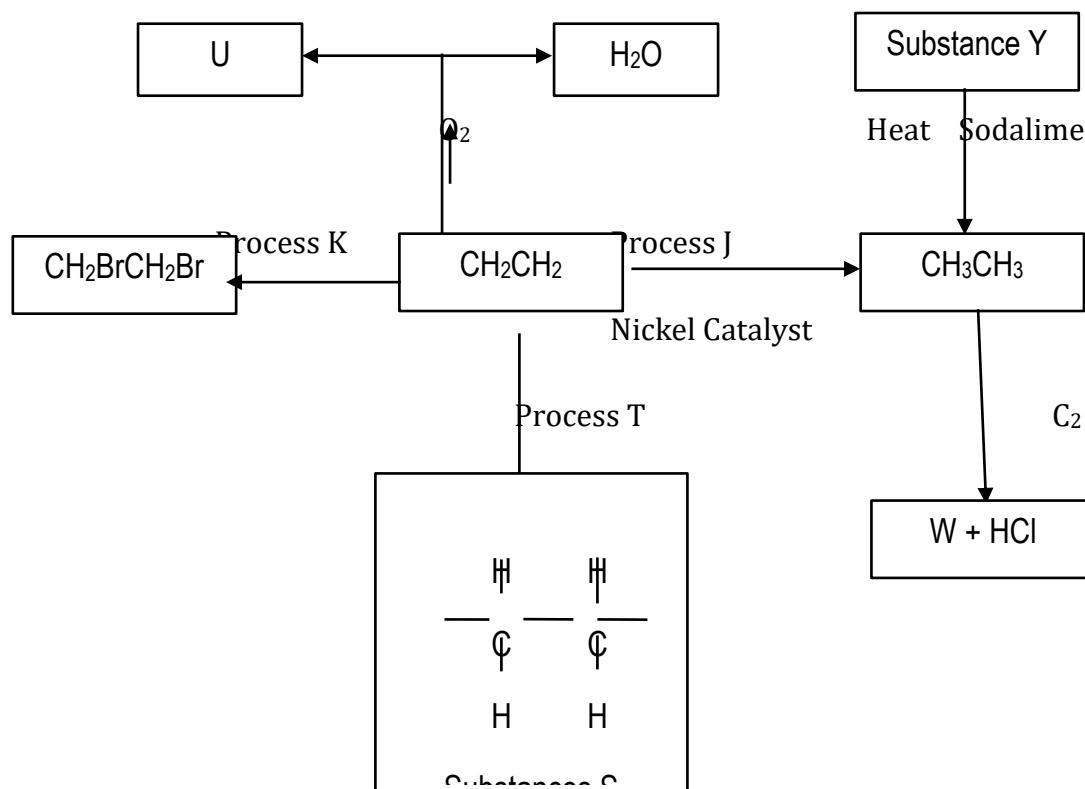
II. Chamber 4 (1mk)  
.....

e) State and explain the observation made in chamber 3 during reaction (2mks)  
.....  
.....

f) Name one gas which escapes from the scheme above (1mk)  
.....

3. (a) Draw and name two isomers of Pentane()

(B) Study the flow diagram below and then answer the questions that follow.



(i) Name process J, K and T (3mks)

J- .....

K- .....

T- .....

(ii) State the reagents necessary for processed J and K (1mk)

(iii)

(iv)

(v)

(vi)

(vii)

(viii) Name substances U, W, S and Y (4mks)

U .....

W .....

S .....

Y .....

C) Describe how burning can distinguish  $\text{CH}_2\text{CH}_2$  from  $\text{CH}_3\text{CH}_3$  (2mks)

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

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

<b>C</b>								<b>T</b>
						<b>U</b>		
<b>X</b>	<b>K</b>		<b>M</b>			<b>Q</b>	<b>W</b>	
	<b>Y</b>					<b>P</b>		<b>Z</b>
<b>J</b>								

a) Identify the elements in period 1 (1mk)

.....

b) With a reason, identify the element with the largest atomic radius (2mks)

.....

c) Draw the atomic structure of element Q (1mks)

d) Write down the electronic configurations of elements Y and W (2mks)

Y- .....

W- .....

e) Element G forms an ion  $\text{G}^{3-}$  and its ionic configuration 2.8.8. indicate its position on the grid above (1mk)

f) Identify an element whose oxide reacts with both acids and alkalis (1mk)

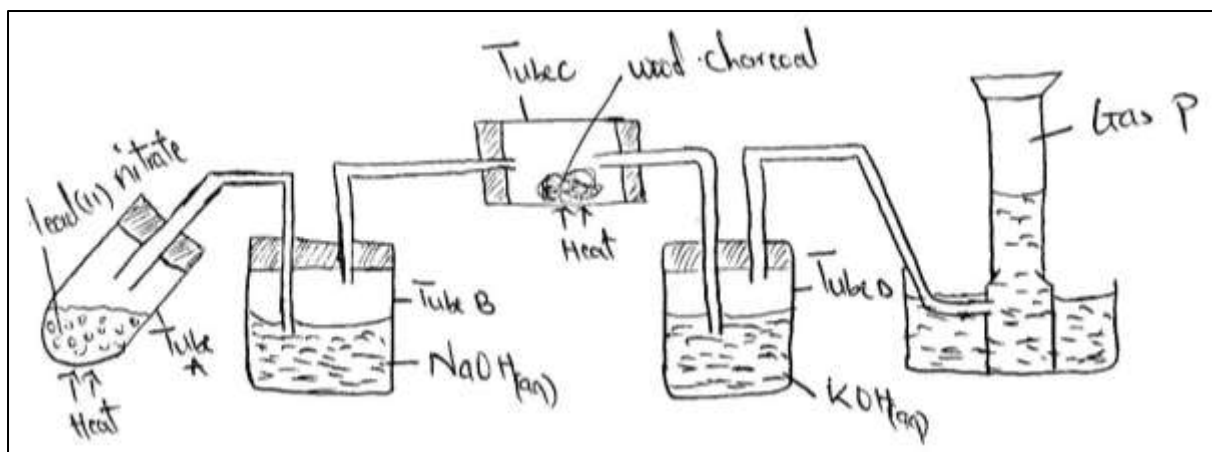
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g) i. Write down the chemical formula of the compound formed between elements K and W (1mk)

.....  
 ii. Draw the bonding in the compound formed in (g) (i) above using dots (.) and crosses (x) to represent electrons (1mk)

h) Compare the atomic radius elements X and K. Explain (2mks)

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



i) Write a chemical equation for the reaction in tube A (1mk)

.....  
 ii) Name the two salts formed in tube B (1mk)

.....  
 iii) State the observation made in tube C (1mk)

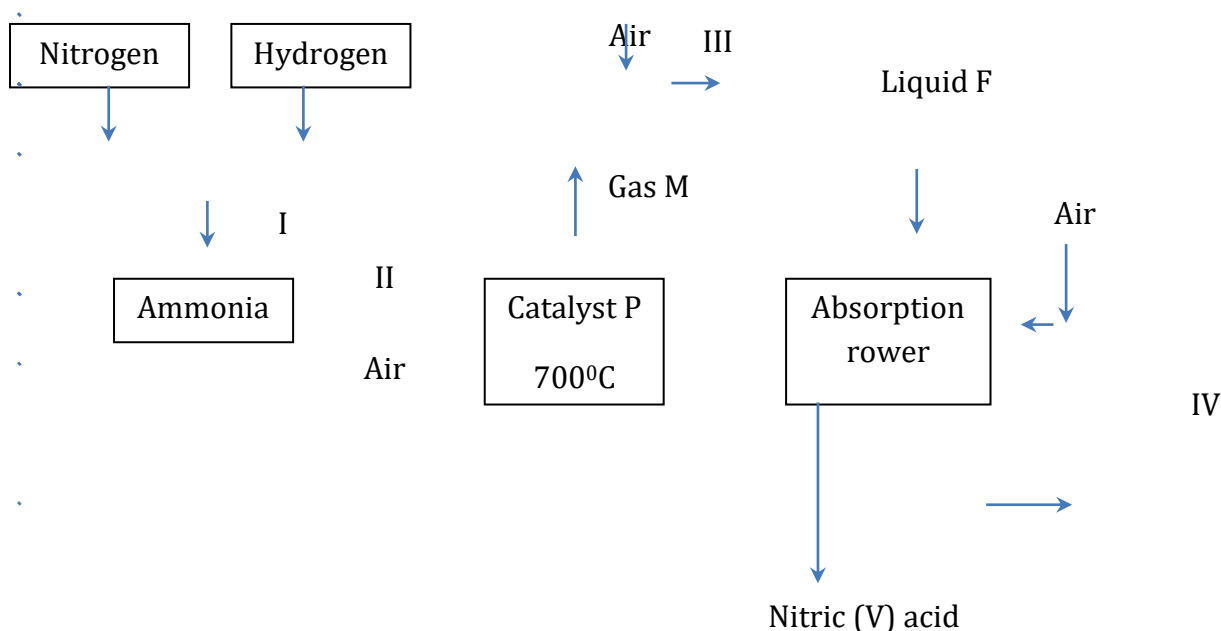
iv) What is the purpose of potassium hydroxide in tube D. (1mk)

.....

v) Name gas P (1mk)

.....

(b) The flow chart below shows some industrial processes. Use it to answer the questions that follow



(i) Give the source of the following raw materials

a) Nitrogen gas (1mk)

.....

b) Hydrogen gas (1 mk)

.....

ii) Name the following substances;

a) Catalyst P (1 mk)

.....

b) Gas M (1 mk)

.....

c) Liquid F (1 mk)

.....

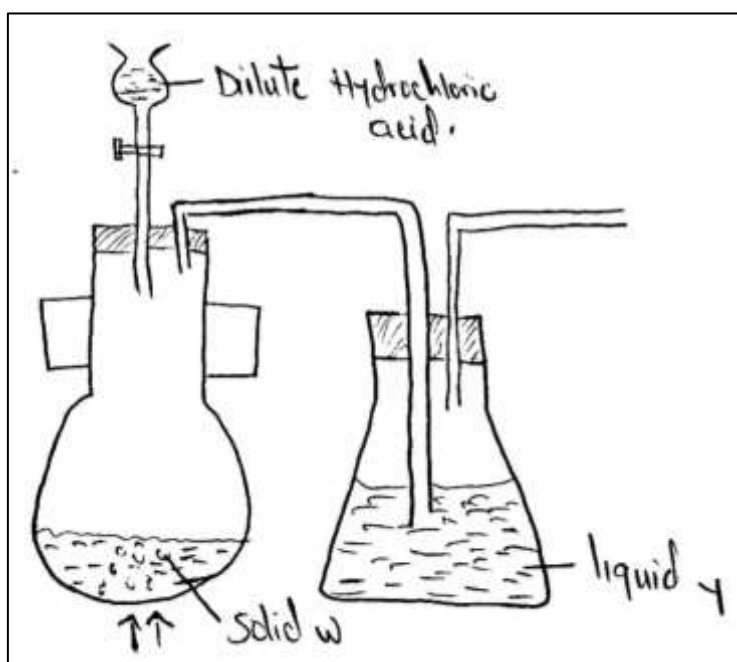
iii) Write the chemical equations for; formation of gas M. (1mk)



.....  
iv) The reaction in the absorption tower (1mk)

.....  
v) State one use of nitric (v) acid (1 mk)

.....  
6. Below is a set of apparatus that was used to obtain a dry sample of sulphur(iv)oxide gas



a) Name;

i) Solid W (1mk)

.....  
(ii) The apparatus containing dilute hydrochloric acid (1mk)

.....  
b) State the role of Liquid Y (1mk)

.....  
 C) Complete the diagram to show how the gas could have been collected (1mk)

d) A sample of sulphur(IV)oxide gas was passed through freshly prepared iron(III)sulphate solution. State and explain the observation made (2mks)

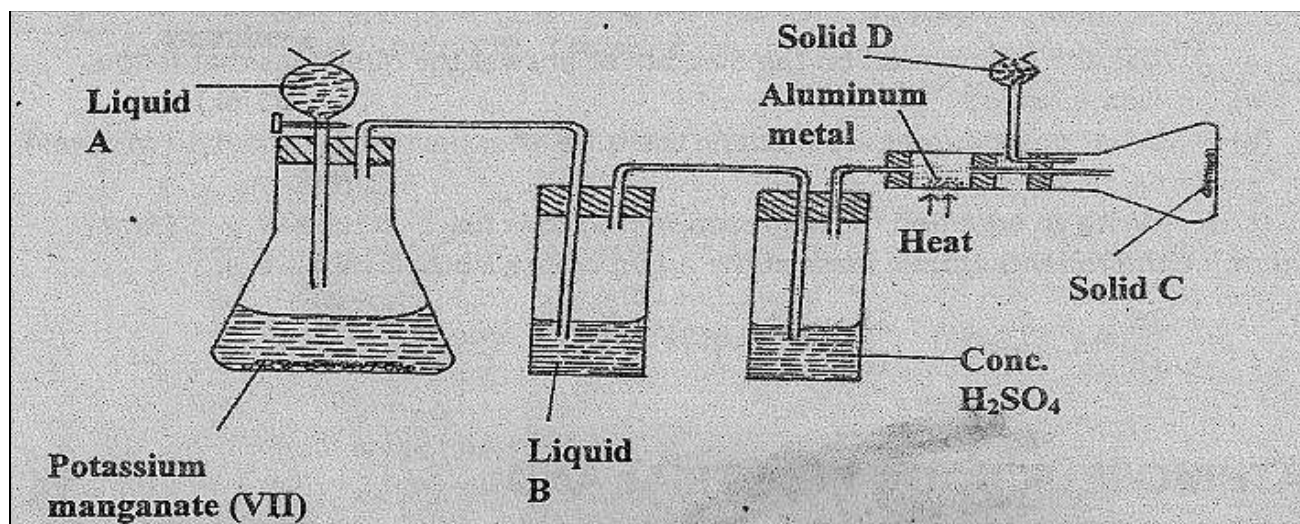
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 .....

e) 50cm<sup>3</sup> of 2M Hydrochloric acid was used during the above experiment. Determine the volume of sulphur(IV)oxide gas produced at r.t.p (molar gas volume = 24dm<sup>3</sup>) (3mks)

.....  
 .....

f) Other than manufacture of sulphuric(VI) acid state two other uses of sulphur(IV) oxide. (2mks)

7. Study the diagram below and answer the questions that follow:



(i) Name Liquids A and B

A ..... (1mk)

B ..... (1mk)

(ii) Solid D can be anhydrous calcium chloride. Suggest another suitable reagent that can be used in place of anhydrous calcium chloride. (1mk)

(iii) State the role of D suggested in (ii) above. (1mk)

(iv) write a balanced equation for the reaction in the conical flask . (1mk)

(v) Explain why solid C collects further away from the heated aluminum metal. (1mk)

(vi) In the combustion tube above 0.675g of aluminum metal reacted completely with 1800cm<sup>3</sup> of chlorine gas at room temperature. Determine the molecular formula of solid C given that its relative formula mass is 267. (Al = 27, Cl = 35.5, Molar gas volume at r.t.p. = 24.0 litres) (3mks)

b) The reaction between hot concentrated sodium hydroxide and chlorine gas produces sodium chlorate (V) as one of the products

(i) give one use of sodium chlorate(V) (1mk)

- (ii) Explain the difference between bleaching by chlorine and by sulphur(IV) oxide gas. (1mks)
- c) A solution of hydrogen chloride in water reacts with zinc carbonate but a solution of the gas in methylbenzene does not. Explain (2mks)