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ADM NO: _____

CLASS: _____ DATE: _____

SIGN: _____

233/1

CHEMISTRY THEORY

FORM FOUR PAPER 2

TRIAL 2, 2019

TIME: 2HOURS

CHEMISTRY THEORY

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INSTRUCTIONS TO CANDIDATES

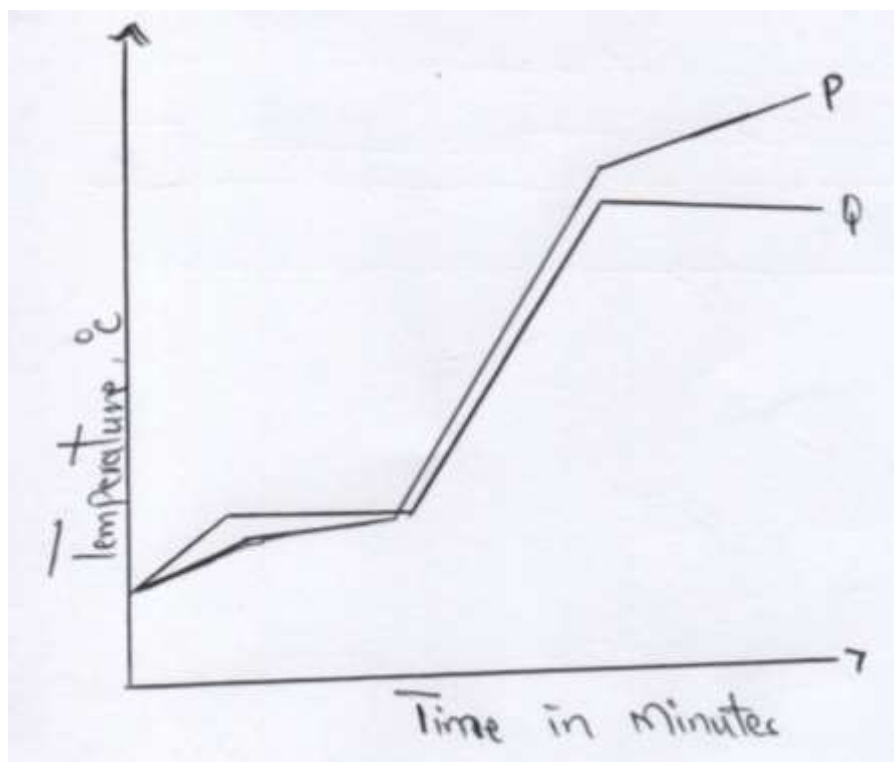
1. Write your name and admission number in the spaces provided above
2. Sign and write the date of examination in the spaces provided
3. Electronic calculators may be used.
4. All working must be clearly shown where necessary

FOR EXAMINERS USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1	8	
2	10	

3	10	
4	12	
5	10	
6	10	
7	09	
8	11	
80MARKS		

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 (1/2 mk)

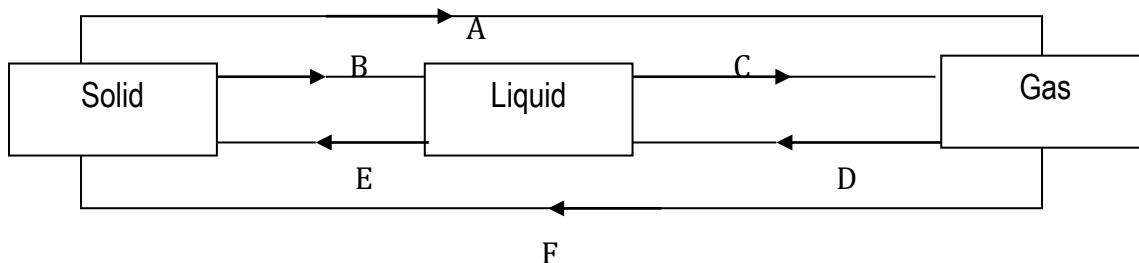
.....

II. Boiling points

(1/2 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

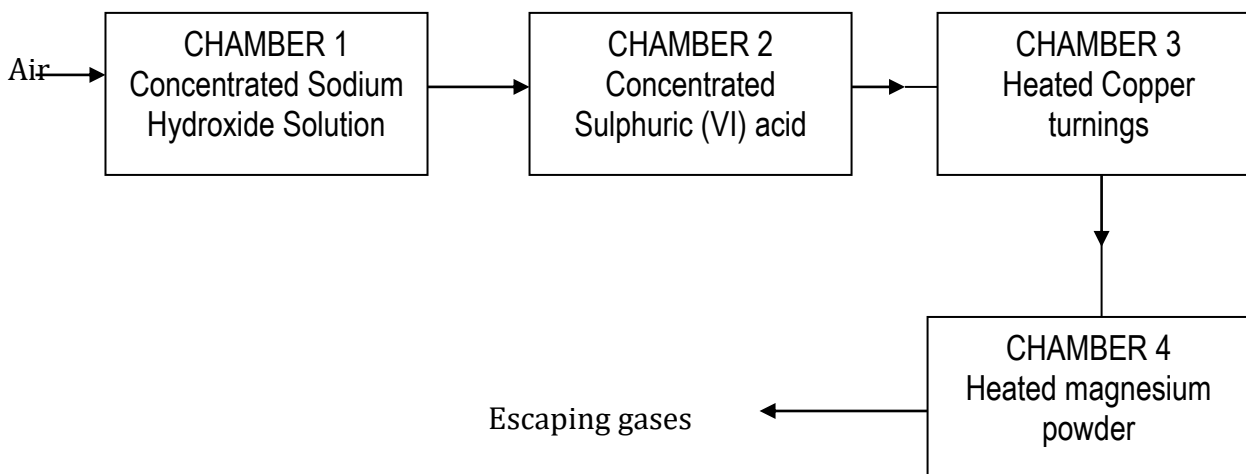
(1mk)

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 (1v) 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)

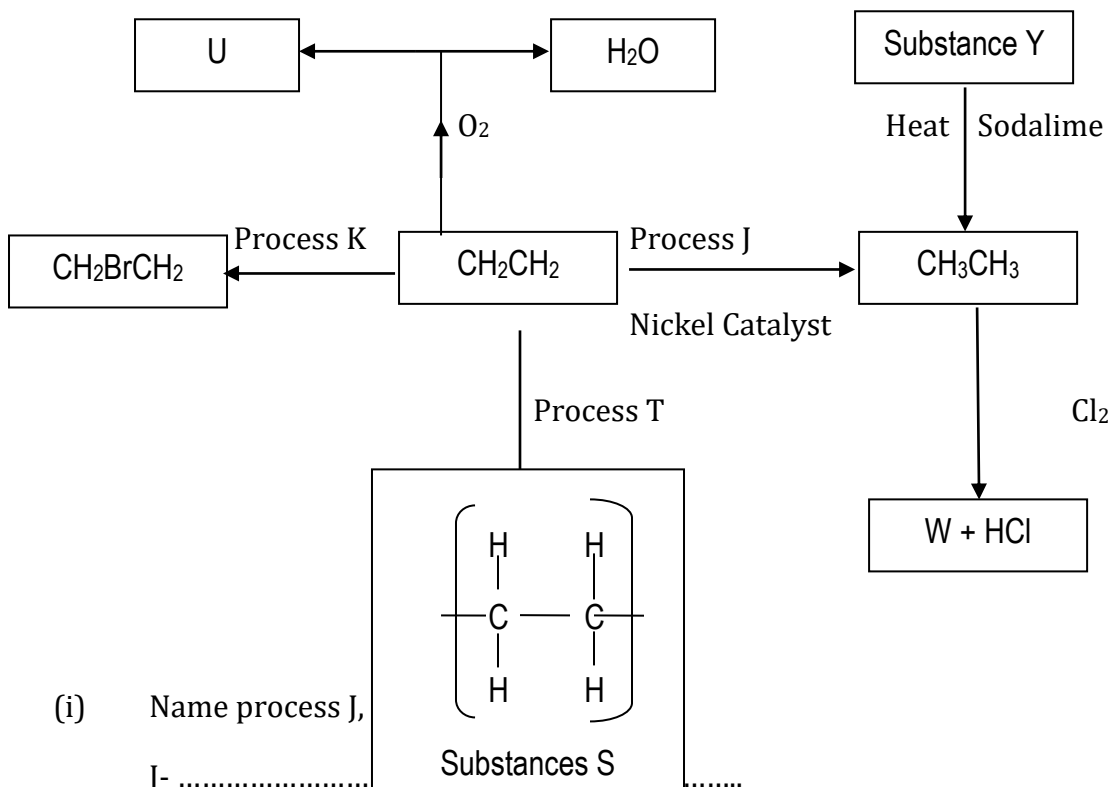
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f) Name one gas which escapes from the scheme above (1mk)

.....

3. (a) Draw and name two isomers of Pentane (2mks)

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



(i) Name process J, (3mks)

J-

K-

T-

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

.....

(iii) Name substances U, W, S and Y (2mks)

U

W

S

Y

C) Describe how burning can distinguish CH_2CH_2 from CH_3CH_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.

C

T

						U		
X	K		M			Q	W	
	Y					P		Z
J								

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

Y-

W-

e) Element G forms an ion 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)

.....

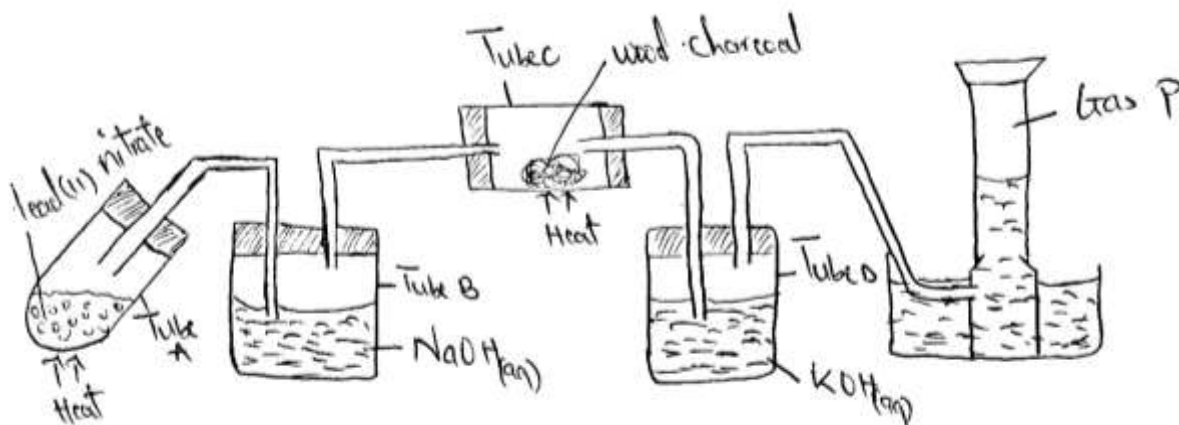
g) i. Write down the chemical formula of the compound formed between elements K and W (1mk)

.....

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

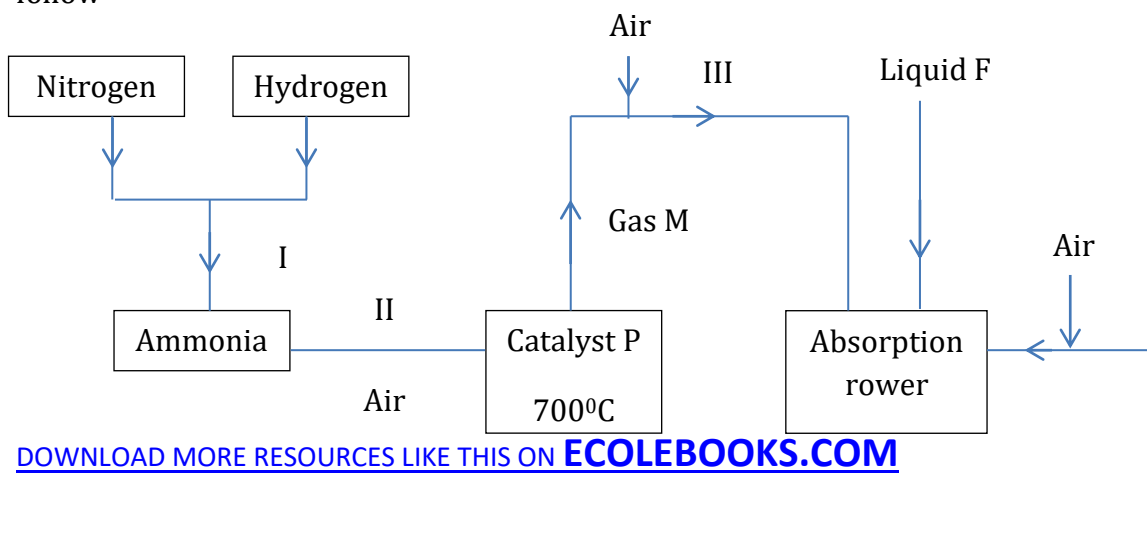
h) Compare the atomic radius elements X and K. Explain (2mks)

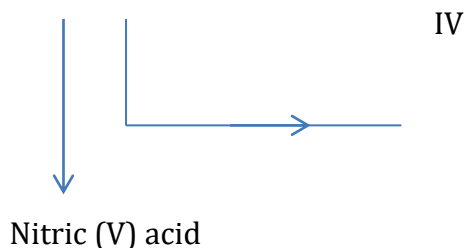
5 (a) Study the diagram below and answer the questions that follow



- 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 (½mk)

.....

b) Hydrogen gas (½mk)

.....

ii) Name the following substances;

a) Catalyst P (½ mk)

.....

b) Gas M (½ mk)

.....

c) Liquid F (½mk)

.....

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

.....

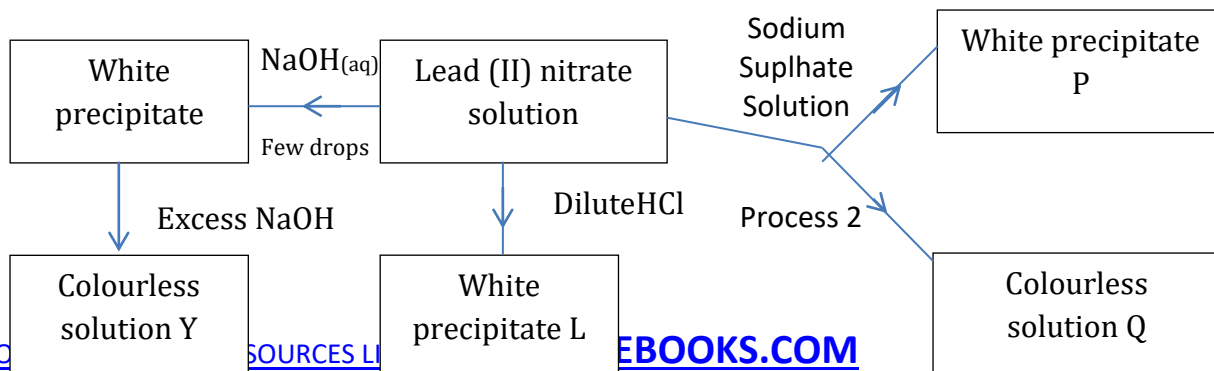
The reaction in the absorption tower (1mk)

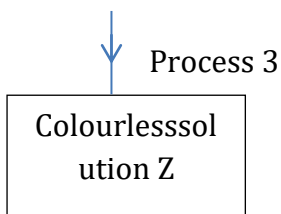
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iv) State one use of nitric (v) acid (½mk)

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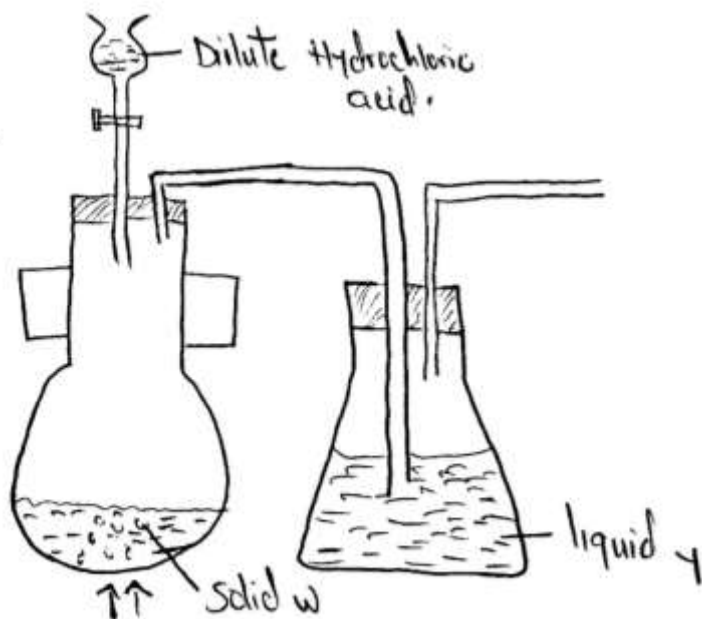
6. Study the reaction scheme below and answer the questions that follow





- a) Write the chemical formular of compounds P and Q
- i) P
- ii) Q (2mks)
- b) Write an ionic equation for the process that produces white precipitate P (1mk)
-
- c) Name process 2 (1mk)
-
- d) Name the process that separated P and Q (1mk)
- P
- Q
- e) Write a balanced chemical equation for the formation of white precipitate L. (1mk)
-
- f) State the condition required for process 3 (1mk)
-
- g) What physical process is exhibited in process 3 (1mk)
-
- h) Name the anion present in colourless solution Z (1mk)
-
- i) Write the formula of the complex ion present in colourless solution Y (1mk)
-

7. 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)

.....

e) 50cm³ 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 = 24dm³)

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

8. In an experiment, 40cm³ of 0.1 M sodium hydroxide solution was placed in a suitable apparatus and 5.0cm³ portions of hydrochloric acid were added. The resulting mixture was stirred with a thermometer and the temperature taken after each addition. Both solutions were initially at 20^oc

Volume of HCL (cm ³)	5	10	15	20	25	30	35	40	45
Temperature (°c)	21.5	22.5	24.0	25.0	26.0	27.0	27.5	27.5	27.0

- a) i. Plot a graph of temperature against volume of the acid added (4mks)
- ii) Use the graph to determine the concentration in moles per litre of the hydrochloric acid (2mks)

b) i) Calculate the heat change for the reaction (1½mk)

- ii) Molar enthalpy of neutralization of hydrochloric acid by sodium hydroxide solution (density of solution 1g/cm³ specific heat capacity 4.2 kj/kg) (1½mks)

c) Write the thermochemical equation for the reaction (1mks)

.....
.....

d) Draw an energy level diagram for the reaction (1mk)