

Name.....Index / Adm no.....

233/2

Candidates signature.....

CHEMISTRY

Date.....

Paper 2

(THEORY)

MARCH/APRIL. 2017

2Hours

FORM FOUR JOINT EVALUATION 2017

Kenya Certificate Of Secondary Education

CHEMISTRY

Paper two

(THEORY)

2 Hours

**Instructions to candidates.**

- (a) Write your name and index/adm no. in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer **all** the questions in the spaces provided.
- (d) KNEC Mathematical tables and silent electronic calculators may be used.
- (e) **All** working **must** be shown clearly where necessary.
- (f) **This paper consists of printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer the questions in English.**

**For Examiner's Use Only**

Questions	Maximum Score	Candidates Score
1	12	
2	14	
3	12	
4	12	
5	12	
6	9	
7	9	
<b>Total Score</b>	<b>80</b>	

1. The grid below shows part of the periodic table. The letters are not the actual symbols of the elements. Use it to answer the questions that follow.

								A
B					C			
			D		E		F	
G							H	

- i) State the name given to the group that A belongs. 1mk  
 .....
- ii) Write the formula of the compound formed when D and F combine. 1mk  
 .....
- iii) How do melting points of B and C compare. 2mks  
 .....  
 .....
- iv) How do the reactivity of F and H compare. Explain 2mks  
 .....  
 .....
- v) C has a smaller atomic radius than B. explain 1mk  
 .....
- vi) Element J forms a divalent anion and has 16 protons in its nucleus. Place it in its position in the grid above. 1mk
- vii) When the chloride of B is dissolved in water, it forms a neutral solution but the chloride of D forms an acid solution. Explain this difference 2mks  
 .....  
 .....
- viii) 2.3 g of sodium metal were ignited in a gas jar of chlorine until there was no further change. Calculate the volume of chlorine gas used in this reaction. (Na=23; MG<sub>V</sub>=24dm<sup>3</sup>) 2mks  
 .....  
 .....

2. A) i) define the term hydrocarbon.

1mk

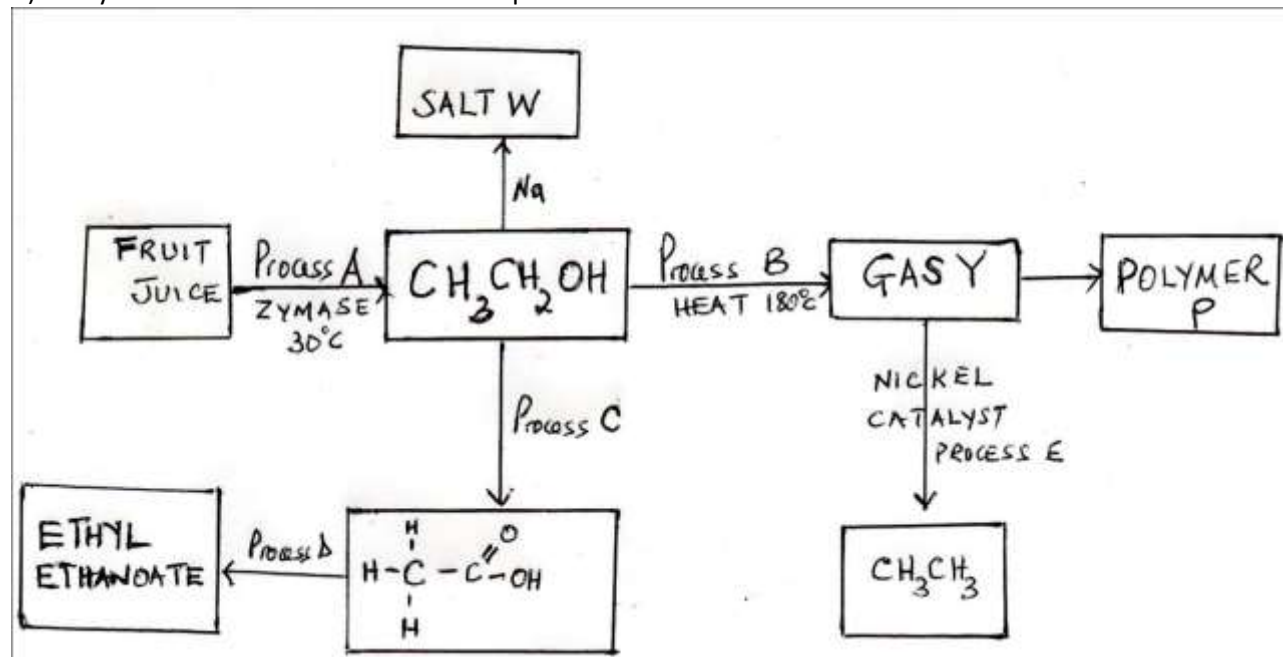
.....

ii) unsaturated hydrocarbons burn in a sooty flame. Explain.

1mk

.....

B) Study the chart below and answer the questions that follow.



i) Identify

2mks

Process A.....

Process B.....

ii) Name the reagent required in process B

½ mk

.....

C) i) Write the equation for the formation of gas Y

1mk

.....

ii) Draw the structural formula of ethylethanoate.

½ mk

.....

iii) Name salt W and another product of the reaction producing salt W.

2mks

.....

.....

D) i) State one use of polymer P 1mk

.....

ii) State one commercial use of process E 1mk

.....

E) Process A produces only 10% of the product, state two ways in which the percentage of the product can be increased. 2mks

.....

.....

F) The structures below represent two cleansing agents, A and B. Which cleansing agent is suitable for use with water containing magnesium sulphate. Give a reason. 2mks



.....

.....

3. A) Other than surface area, state **two** factors that determine the rate of a reaction. 2mks

.....

.....

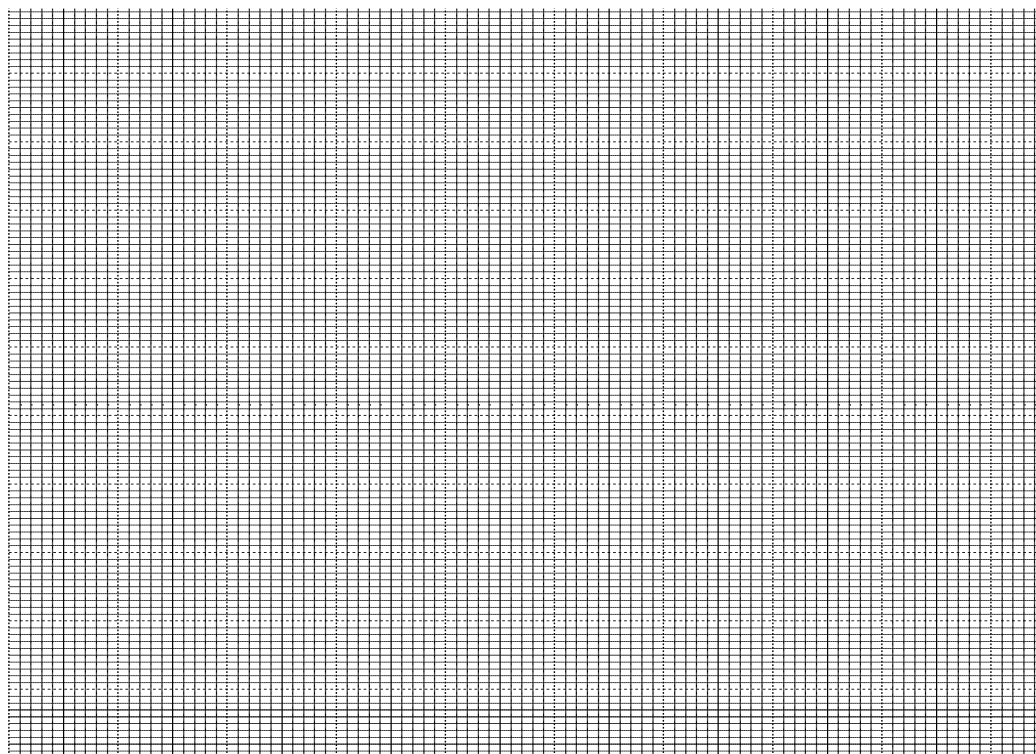
B) In an experiment to determine the rate of reaction, excess lumps of calcium carbonate were added to 2M hydrochloric acid. The mass of calcium carbonate left was recorded after every 30seconds. The results are shown in the table below.

Time (seconds)	0	30	60	90	120	150	180	210
Mass of calcium carbonate left (g)	2.00	1.60	1.30	1.00	0.85	0.8	0.8	0.8

(i) Write the equation for the reaction that took place. 1mk

.....

- (ii) On the grid provided, plot a graph of mass of calcium carbonate (vertical axis) against time.  
3mks



- (iii) Determine the rate of reaction at the 105<sup>th</sup> second. 3mks

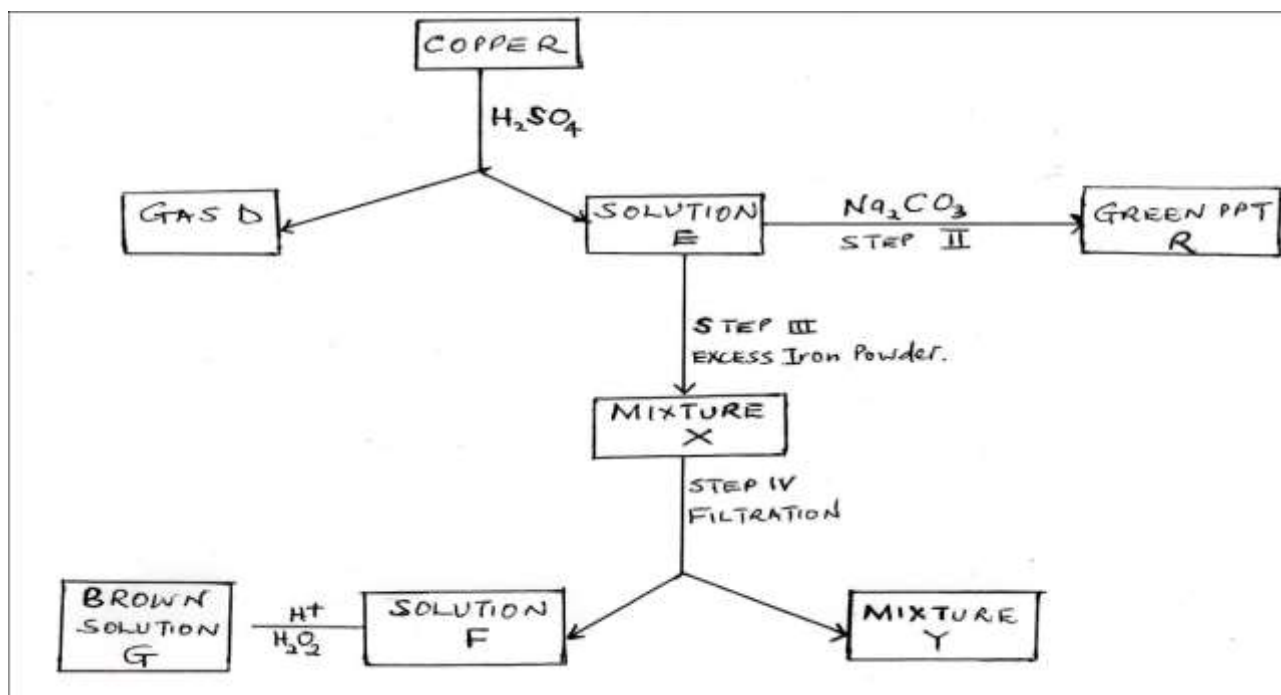
.....  
.....  
.....

- C) Why does the curve level off after some time? 1mk

.....

- D) On the same grid, sketch a curve for the same reaction using 4M hydrochloric acid and label the curve R. 2mks

4. The chart below shows some reactions starting with copper. Study it and answer the questions that follow.



- a) i) Name the type of reaction that takes place in step II 1mk

.....

- ii) State the observation made in step III 2mk

.....

.....

- b) Name the components of mixture Y 2mks

.....

.....

- c) Identify the cation present in brown solution G 1mk

.....

- d) i) Identify gas D. 1mk

.....

ii) Gas D is a raw material in the contact process. State two ways of obtaining gas D for the process. 2mks

.....

.....

e) Write the chemical formula of the green precipitate R 1mk

.....

f) Describe a chemical test for gas D. 2mks

.....

.....

5. a) Define the term acid. 1mk

.....

b) Ammonia gas dissolves in water as shown below



Identify the species that acts as a base. Give a reason. 2mks

.....

.....

c) Briefly describe how the pH of an antacid tablet can be determined. 3mks

.....

.....

.....

d) Copper (II) carbonate was added a little at a time to 50cm<sup>3</sup> of 3M nitric acid until no further change was observed. The mixture was then filtered. The filtrate was divided into two portions Q and R.

i) Portion Q was heated carefully to dryness. What observation was made about the residue left.

1mk

.....

ii) Portion R was heated to saturation and kept in an evaporating dish overnight. What observation was made about the residue left. 1mk

.....

iii) Write an equation for the reaction that would occur if sample Q was strongly heated. 1mk

.....

e) A saturated solution of salt P at 25°C weighed 56g. on heating to dryness, 14g of residue remained. Calculate the solubility of the salt at 25°C. 3mks

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

6. a) Bond enthalpy, Hess' law and enthalpy of combustion can be used to determine enthalpy changes for some reactions.

i. Define the term enthalpy of combustion. 1mk

.....

ii. State Hess' law 1mk

.....

.....

b) An experiment was carried out to determine the molar enthalpy of combustion of methanol and the results tabulated as shown below.

Volume of water 100cm<sup>3</sup>

Initial temperature of water 22.0°C

Final temperature of water 38.0°C

Initial mass of burner +methanol 85.10g

Final mass of burner +methanol 84.78g

Temperature change .....

Mass of methanol burned .....



i) Complete the table to show temperature change and mass of methanol burned. 1mk

ii) Write an equation for the combustion of methanol. 1mk

.....

iii) Calculate the molar heat of combustion of methanol. 3mks

.....

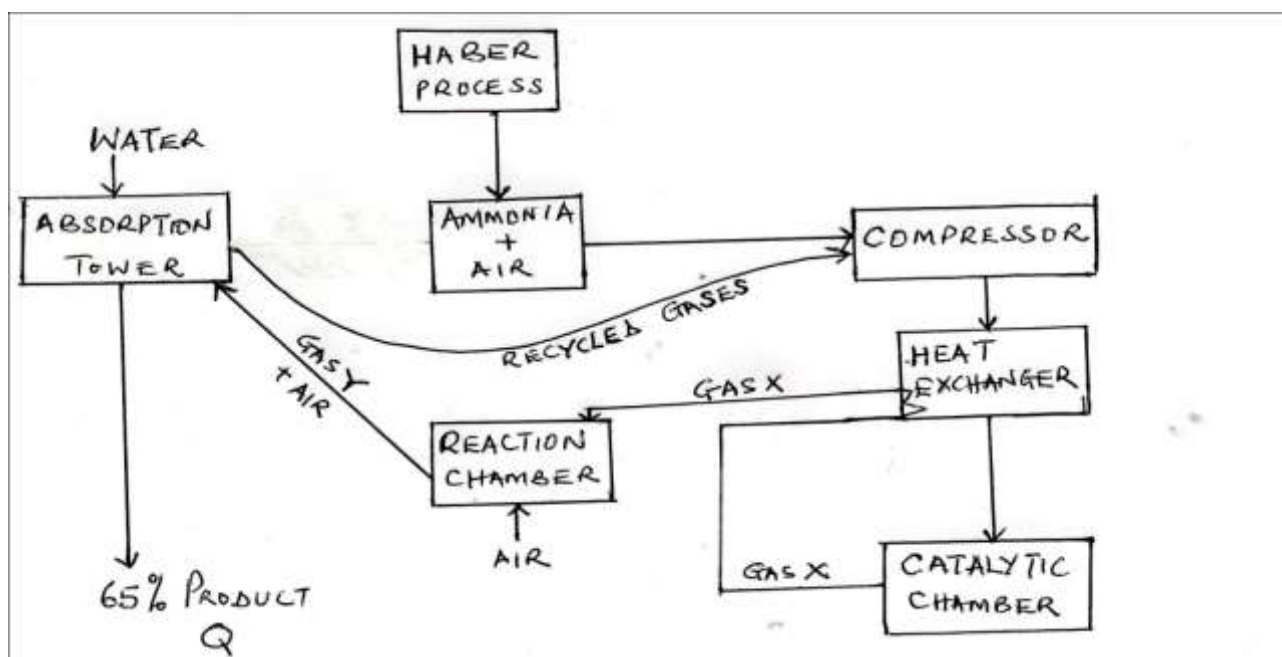
.....

.....

iv) The molar heat of combustion of methanol calculated above is lower than the theoretical one. Explain. 2mks

.....

7. The chart below represents an industrial process. Study it and answer the questions that follow.



a) Identify 2mks

i) Product Q .....

ii) Gas X .....

b) Name a suitable catalyst used in the catalytic chamber. 1mk

.....

c) A more concentrated product Q can be obtained by carefully distilling the product over two reagents, name the reagents. 2mks

.....  
.....

d) Write an equation for the reaction producing gas Y. 1mk

.....

e) Identify one recycled gas. 1mk

.....

f) State two uses of product Q. 2mks

.....  
.....

**THIS IS THE LAST PRINTED PAGE**