NAME_____ **SCHOOL** ----------

INDEX NO. ----------

SIGNATURE ----------

DATE ----------

233/2
CHEMISTRYPAPER 2
(Theory)
TIME: 2 HRS

SCHOOL BASED FORM 4 EXAMINATIONS JULY – AUGUST 2017

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided.
2. Answer all questions in the spaces provided.
3. All working must be clearly shown.
4. KNEC Mathematics table and silent scientific calculators may be used.
5. Candidates to answer the questions in EnglishLangaue

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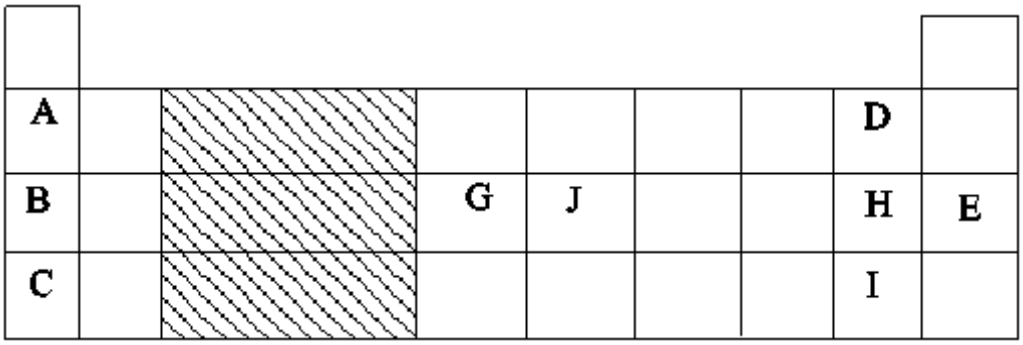
EXAMINER'S USE

QUESTION	MAX SCORE	CANDIDATES SCORE
1	13	
2	9	
3	11	
4	10	
5	12	
6	13	
7	12	
Total Score	80	

1. The figure below represents a section of the periodic table. Study it and answer questions (a) to (h). Note that the letters do not represent the actual symbols of the elements.



(a) Consider elements D. H and I

i) Give the chemical family of these elements. (1 mk)

_____

ii) How do their ionic size compare. (1mk)

_____

iii) Compare and explain the reactivity of the three elements. (2mks)

_____

_____

b) i) Write the electronic configuration of;

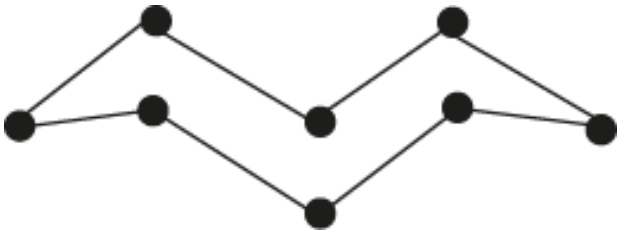
Element H (1mk)

_____

ii) The ion of element G. (1mk)

_____

c) A molecule of one of the elements is shown below. (2mks)



i) Identify this element from the section of the periodic table and give its actual symbol and name. (2mks)

_____

_____

ii) Explain why this element has a higher boiling point compared to that of oxygen. (2mks)

_____

_____

iii) Write an equation to show the reaction between the element named above with oxygen.(1mk)

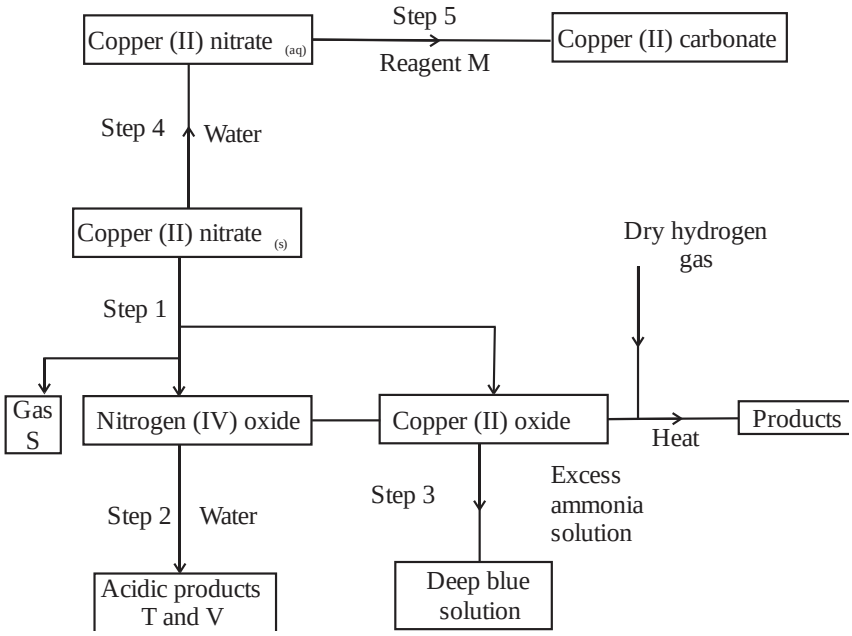
_____

iv) Predict the pH of the oxide of the above element when in water. Explain. (2mks)

_____

_____

2. The flow chart below shows some reactions starting with copper (II) nitrate. Study it and answer questions that follow.



a) i) State the condition necessary in step 1. (1mk)

_____

ii) Identify (4mks)
Reagent M

_____

Gas S

_____

Acidic products

T_____

V_____

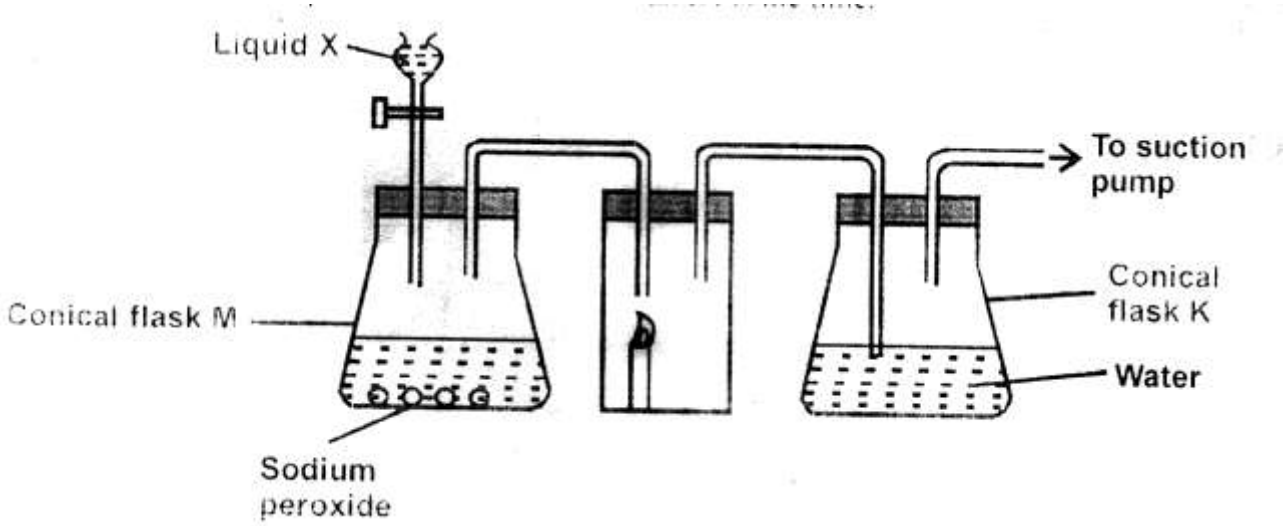
iii) Write the formula of the complex ion formed in step 3. (1mk)

_____

iv) Write the equations for the reaction in
Step 1

Step 2

3. a) The diagram below shows a set up that was used to prepare oxygen gas and passing it over a burning candle. The experiment was allowed to run for some time.



i) Name liquid X (1mk)

ii) Suggest the pH of the solution in conical flask K. Explain (2mks)

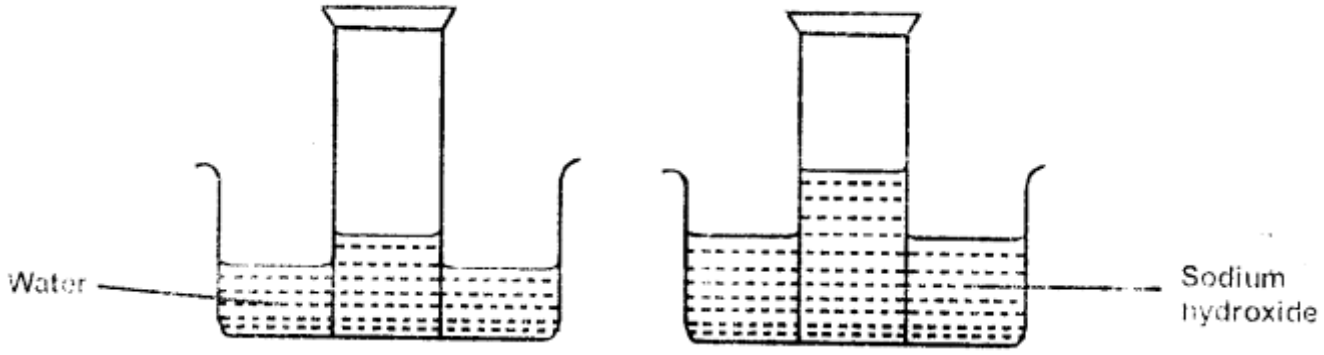
iii) Write an equation for the reaction taking place in the conical flask M. (1mk)

b) State and explain the two observations made when hydrogen sulphide is bubbled into the solution containing iron (III) chloride. (2mks)

c) i) Describe a simple chemical test that can be used to distinguish between carbon (IV) oxide and carbon (II) oxide gases. (3mks)

ii) Give one use of carbon (II) oxide. (1mk)

d) A form two student inverted a gas jar full of carbon (IV) oxide over water and sodium hydroxide solution as shown below.

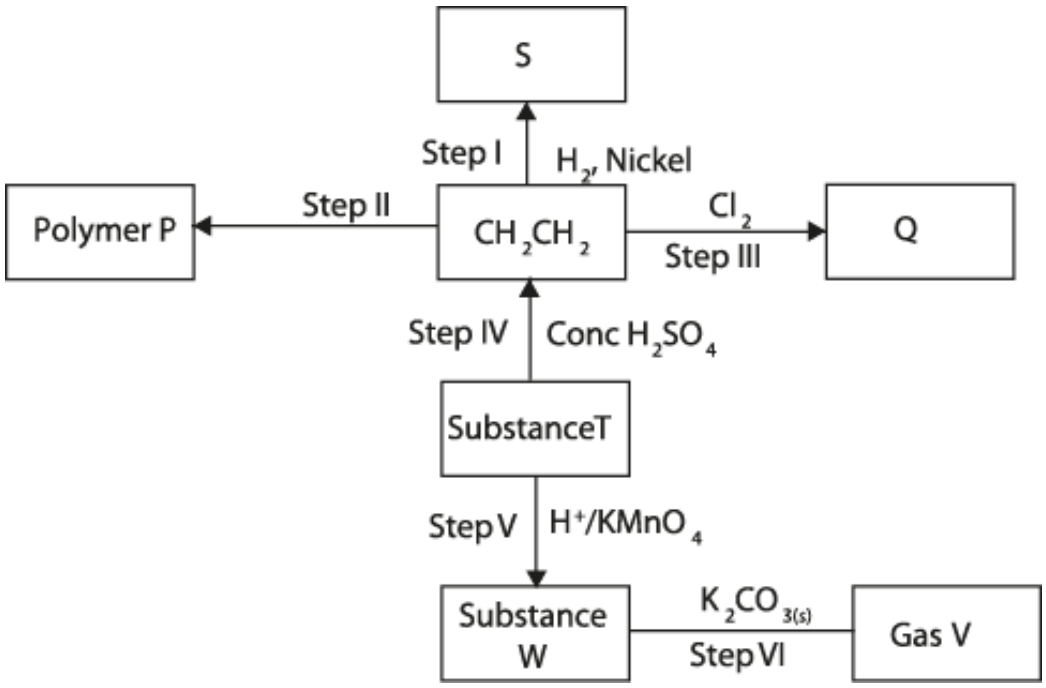


Explain the observations made. (2mks)

_____

_____

4. Study the flow chart below and answer the question that follows:



a) Identify the following:

i) Substance W…… (1mk)

ii) Gas V…….. (1mk)

b) Name the processes involved in the following steps

i) Step I…….(1mk)

ii) Step III……(1mk)

c) i) What type of reaction is taking place in step V? (1mk)

_____

ii) Draw the structure and give their IUPAC name for the following compounds.

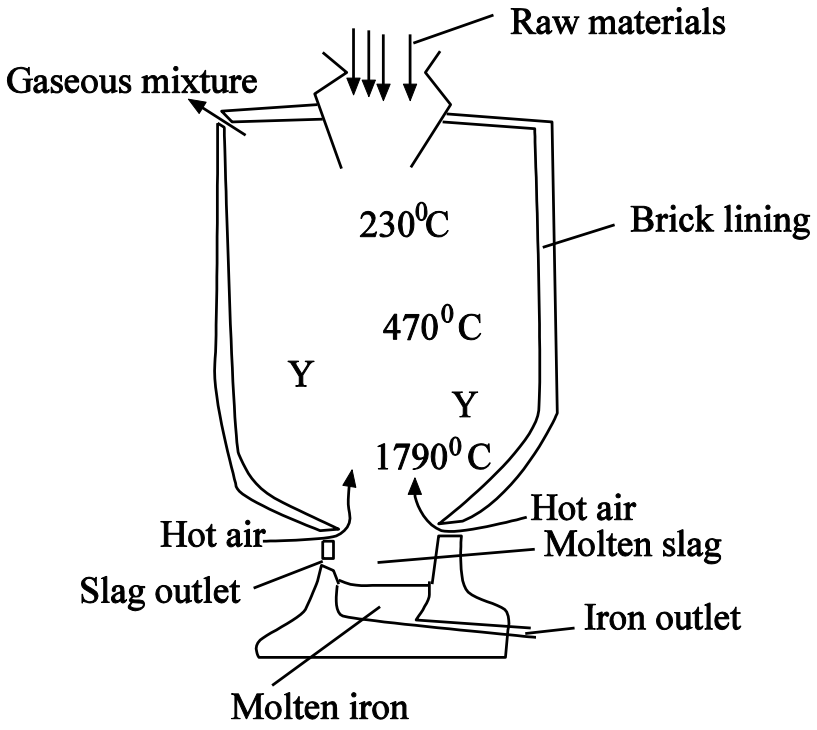
Compound	Structure	Name
Q		
P		

(4mks)

d) Write the equation that took place in step III. (1mk)

_____

5. Iron is obtained from hematite using a blast furnace shown in the diagram below;



a) Name the **four** raw materials required for the production of iron;

i)_____

ii) _____

iii) _____

iv) _____

b) Write an equation for the reaction in which carbon (IV) oxide is converted into carbon (II) oxide. (1mk)

_____

c) Explain why the temperature in the region marked Y is higher than of the incoming air. (1mk)

_____

_____

d) State two physical properties of molten slag that allows it to be separated from molten iron as shown above. (2mks)

_____

_____

e) Iron from the blast furnace contains about 5% carbon

i) Describe how the carbon content is reduced. (2mks)

_____

_____

ii) Why is it necessary to reduce the carbon content? (1mk)

_____

_____

f) Give a reason why the melting point of iron obtained from the blast furnace is 120^0C while that of pure iron is 1535^0c. (1mk)

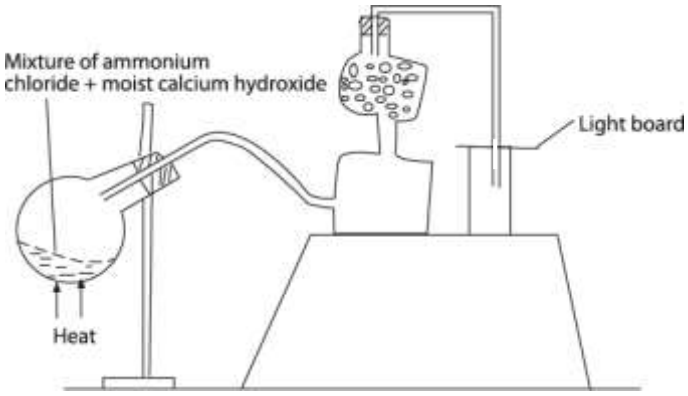
_____

g) State two uses of steel. (2mks)

_____

_____

6. a) A student set up the apparatus as shown in the diagram below to prepare and collect dry ammonia gas.



i) Identify three mistakes in the set up and give a reason why each is mistake. (3mks)

_____

_____

_____

ii) Name a suitable drying agent for ammonia. (1mk)

_____

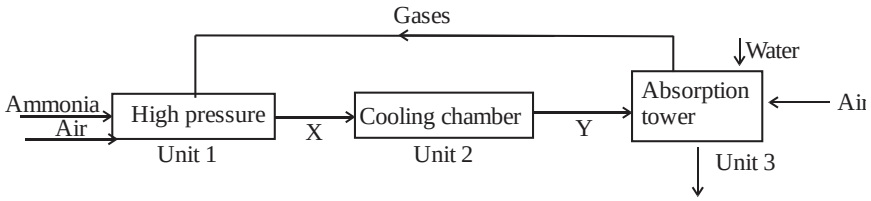
iii) Write an equation for the reaction that occurred when a mixture of ammonium chloride and calcium hydroxide was heated. (1mk)

_____

iv) Describe one chemical test for ammonia gas. (1mk)

_____

b) Ammonia gas is used to manufacture nitric (V) acid as shown below.



i) This process requires the use of a catalyst in which unit is the catalyst used? (1mk)

_____

ii) Identify compound X and Y. (2mks)

_____

_____

iii) Using oxidation number explain why the conversion of ammonia to nitric (V) acid is called catalytic oxidation of ammonia. (3mks)

_____

_____

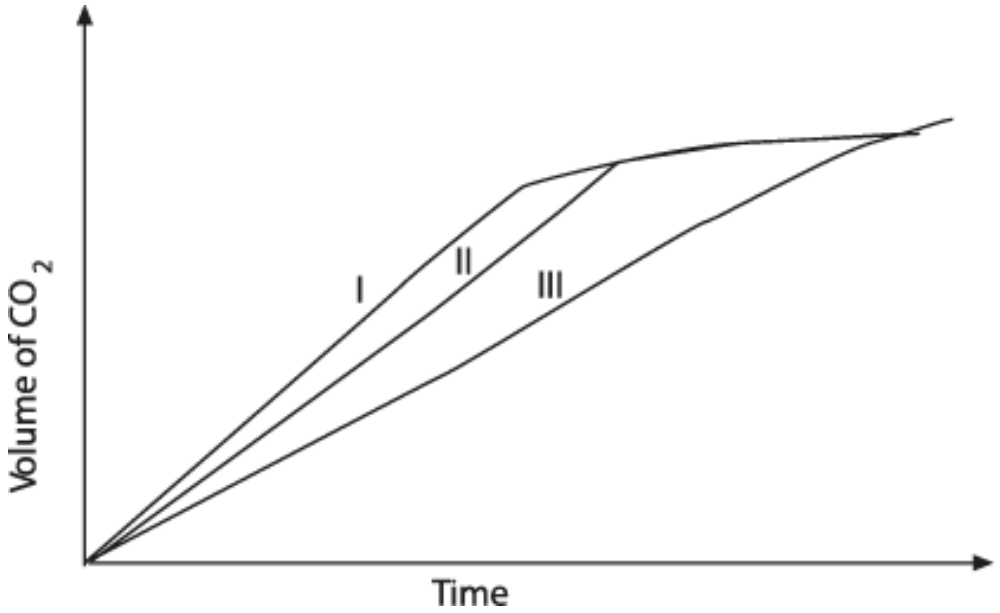
_____

iv) Ammonia reacts with nitric (v) acid to form ammonium nitrate fertilizer. Calculate the percentage composition of nitrogen in ammonium nitrate. (N = 14, O = 16, H = 1)

_____

_____

7. a) Below is a graph that was obtained when different concentrations of hydrochloric acid was reacted with equal amount of calcium carbonate.



The concentration of hydrochloric acid were 0.8M, 0.5M and 0.1M. The calcium carbonate was in powder form. Match the graphs with concentrations.

Graph I…… (1mk)

Graph III…….. (1mk)

b) A state of equilibrium between dichromate (VI) and chromate ions is established as shown in the equation below.

$$Cr_2O_{7(aq)} + 2OH^-_{(aq)} \rightleftharpoons 2CrO_4^{2-}{}_{(aq)} + H_2O_{(l)}$$

Orange Yellow

i) What is meant by dynamic equilibrium? (1mk)

_____

ii) State and explain observation made when a few pellets of potassium hydroxide are added to the equilibrium mixture. (2mks)

_____

_____

c) An experiment was done using magnesium ribbon and dilute hydrochloric acid of different concentrations. The time needed to produce $50cm^3$ of the gas for every experiment was recorded in the table below.

Conc. of HCL in Mol/litre	2.0	1.75	1.50	1.25	1.00	0.75	0.50	0.25
Time in sec(s)	8.8	10.0	11.7	13.5	17.5	22.7	35.5	70.0
$Sec^{-1}\frac{1}{t}$								

i) Complete the table above. (2mks)

iii) Plot a graph of rate$\frac{1}{Time}$ against concentration. (4mks)

i) Determine from your graph the concentration needed to produce $50cm^3$ of hydrogen gas, when time is 15 seconds. (1mk)