NAME ……………………………………….. ADM NUMBER………………………...
SIGNATURE……….…………………..
DATE..........................................................

**233/2**
**CHEMISTRY**
**PAPER 2 (THEORY)**
**TIME: 2 HOURS**

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**INSTRUCTIONS TO CANDIDATE**
- **Write your name and admission number in the spaces provided.**
- **Sign and write the date of examination in the spaces provided.**
- **Answer all the questions in the spaces provided.**
- **All working must be shown where necessary.**
- **Electronic calculators and Mathematics tables may used.**

**FOR EXAMINERS USE ONLY**

| Questions | Max score | Candidates score |
|-----------|-----------|------------------|
| 1. | 13 | |
| 2. | 10 | |
| 3. | 11 | |
| 4. | 14 | |
| 5. | 11 | |
| 6. | 10 | |
| 7. | 11 | |
| TOTAL | 80 | |

## QUESTIONS

1. The grid below represents part of the periodic table, Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | Y | | | C | D | | E | |
| F | G | | | | | | | |
| | | | | | | | H | |

a. Name the elements (letters) that can form anions with a change of -1.Give reason for your answer. (2mks)

b. What type of structure is formed by oxide of C. Explain.     2mks

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

d. 1.3 g of Y reacts completely with $1.2dm^3$ of chlorine when reacted at S.T.P (Molar gas volume at s.tp=$22.4dm^3$ ).
   i. Write a balanced chemical equation for the reaction between y and chlorine gas.(2mks)

   ii. Determine the atomic mass of Y.            2mks

e. What is the general  name given to the group of elements Y and G belong.(1mk)

f.  Using dot(.) and crosses (x) draw a diagram to represent the compound formed when G and E react.(2mks)

2.  The set up was used by a student from Karia High School to prepare and collect dry hydrogen gas.
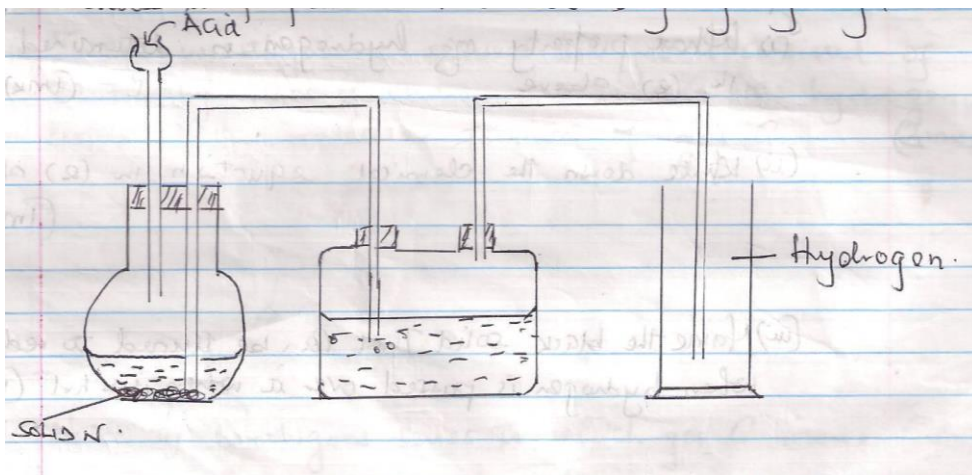


a.  Identify three mistakes in this set up and the solution.(3mks)

b.  Name  liquid B                    1mk

c.  Suggest a possible solid which can be used as solid N in the  set up ;

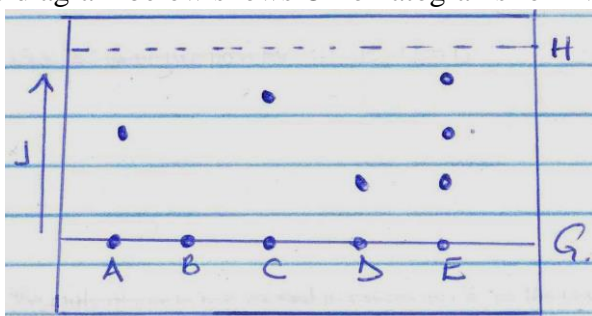d.  Name a suitable catalyst in this reaction.(1mk)

e. Hydrogen produced can be passed over heated lead(II) oxide to determine one property of this gas.

    i.      What property of hydrogen is determined in (e) above.     1mk

    ii.      Write down the chemical equation in (e) above.     1mk

    iii.      State two uses of Hydrogen gas.     (2 mks)

3. The diagram below shows Chromatograms for five different dye.



a) Name the technique used to separate the dyes.     (1 mk)

b) What conditions are required to separate the chromatograms present in a dye.  (2 mks)

c) What is meant by the solvent front. Indicate its position in the diagram.     (2 mks)

d) Which chromatograms are present in dye E.     (2 mks)
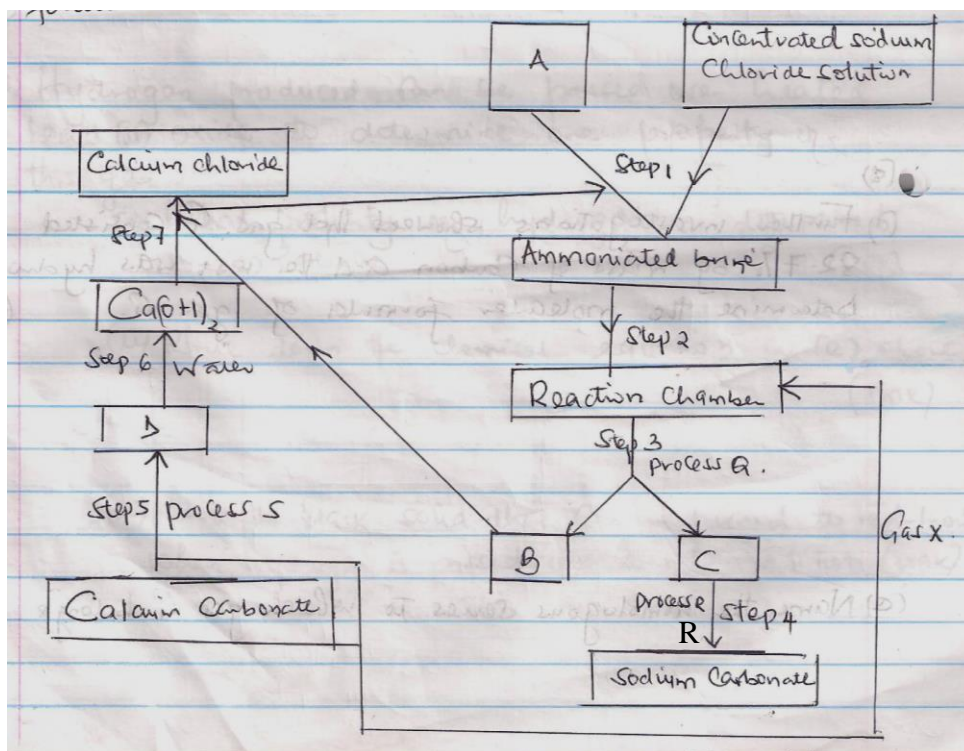
e) Which dye is insoluble. Explain.     (1 mk)

f) Which dye is pure. Explain.     (1 mk)

g) Name two industrial application of chromatography.     (2 mks)

4. Use the flow chart below to answer the questions that follow.



a. Name the process shown by the flow chart above. (1 mk)

b. Name substances A

                  B

                  C

                  D

                  Gas x                         5mks

c. Name process (2 mks)
   Q -

   R -

d. Write chemical equations for the reactions that take place.
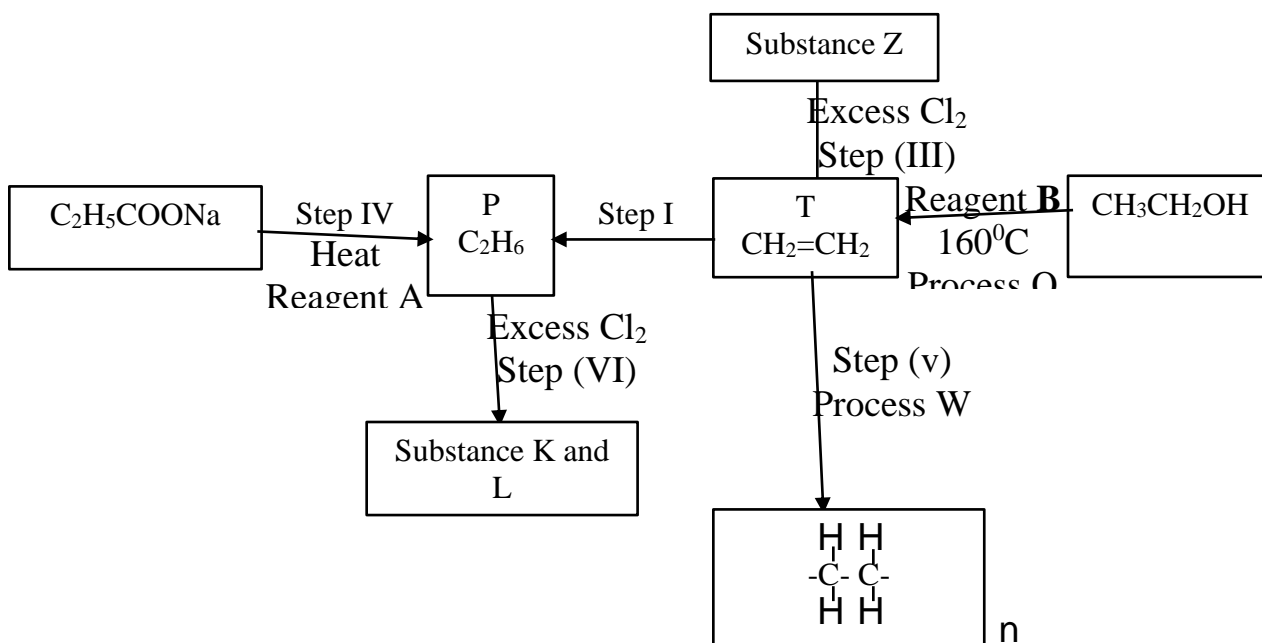(i) Step 4

(ii) Step 7

e. Name two substances that are recycled during the process.           2mks

f. State two uses of sodium carbonate.(2mks)

5. Study the scheme below and answer the questions that follow.



a. State the homologous series in which T and P belong.           (2 mks)
   T-

   P-

b. Write chemical equation for complete combustion of T. 1mk

c. Name process Q ………………………           (1 mk)

Process W                                                    (1 mk)


d.  Name the type of reaction that occurs in
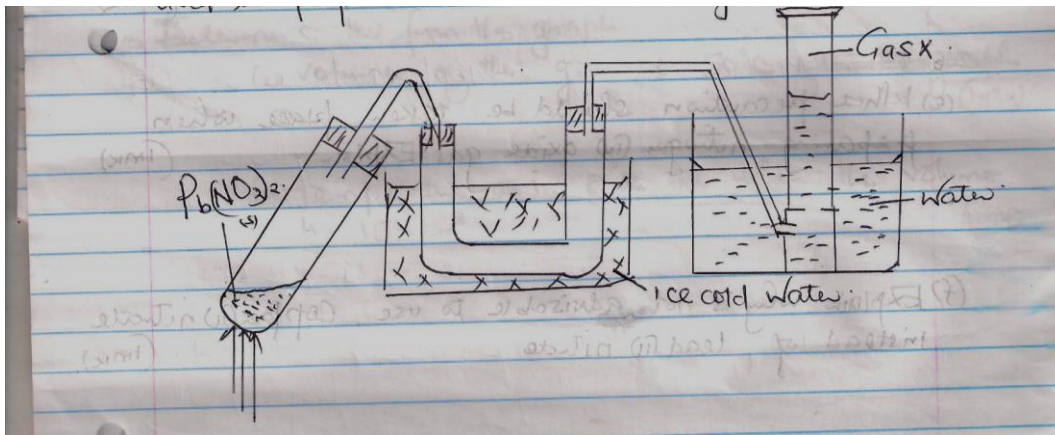    Step I                                                   (1 mk)

    Step III                                                 (1 mk)

    Step VI                                                  (1 mk)

e.  Identify reagent B…………………………                              (1 mk)

    Reagent A……………………………..                                   (1 mk)

f.  Write a chemical equation between reagent A and $C_2H_5COONa$.    (1 mk)


6.  The diagram below represents a set up that can be used to prepare and collect nitrogen (iv) oxide.



a.  Write a chemical equation for the reaction that takes place in the boiling tube.  (1 mk)


b.  Name gas x.                                              (1 mk)


c.  What observations are made on final residue in the boiling after reaction on heating and cooling the residue.        1mk


d.  When a piece of burning magnesium is lowered into a gas jar containing nitrogen (IV) oxide it continues to burn.
    i.   Explain the observation

ii. Write a chemical equation for the reaction.(1mk)

e. What precaution should be taken when preparing nitrogen (IV) oxide gas, Explain. 1mk

f. Explain why it is not advisable to use copper (II) nitrate instead of lead (II) nitrate. 1mk

g. What property of nitrogen (IV)oxide makes it possible to be collected by the method above.(1mk)

h. State one use of nitrogen(iv)oxide.                                               (1 mk)

7. During an experiment, sulphur (IV) oxide was found to diffuse through a porous material at a rate of $25.00cm^3$ per minute. When the experiment was repeated under the same conditions with another gas G.G was found to diffuse through the same porous material at a rate $26.26cm^3$ per minute.
   (i) State Graham's law of diffusion.(1mk)

   (ii) Determine the molecular mass of G.(O=16.0,S=32.0)                      (3 mks)

8. The following table gives sample results from an experiment carried out to investigate the relationship between the volume of a fixed mass of gas with its temperatures.

| Temp $^0$c | 0 | 20 | 40 | 60 | 80 |
|---|---|---|---|---|---|
| Volume of the gas(cm$^3$) | 140 | 150 | 160 | 170 | 180 |

a. *Plot a graph of volume (y-axis) against temperature (x-axis). Extrapolate the graph to intercept the x-axis.*      *3mks*

b. Identify the and state the law.      2mks

c. Determine from the graph
     i. Volume of gas at 50 $^0$c.      1mk

     ii. Temperature when the volume is 155cm$^3$      1mk