NAME .... ADM NO:.................CLASS ....

CANDIDATE'S SIGN........................   DATE..

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

LANJET PRE MOCK EXAMINATION- 2024
Kenya Certificate of Secondary Education (K.C.S.E)
CHEMISTRY
PAPER 2
TIME: 2 HOURS

INSTRUCTION TO CANDIDATES

1.   Write your name and index number in the spaces provided above
3.   Answer all the questions in the spaces provided
4.   All working **must** be clearly shown where necessary.
5**.**   **Candidates should check to ascertain that each page s printed as indicated and that no question is/are missing.**

FOR EXAMINER'S USE ONLY

| Question	Maximum score	Candidate's score
1		
2		
3		
4		
5		
6		
7		
TOTAL	80	

1. The grid shown below represents the periodic table. Study it and answer the questions that follow (the letters do not represent actual symbols of the element)

	K							S
G							T	
	H							
L								

a) Which element exists naturally as a;   (2mks)
   i.   Diatomic gas

   ii.   Monoatomic gas

b) Write down the formula for the most stable ion of K and its electronic arrangement.   (1mk)

c) How do the atomic radii of G and L compare? Explain.   (2mks)

d) How do the first ionization energies of G and L compare? Explain.   (2mks)

e) Which two electrons would react most vigorously with each other?   (1mk)
f) Give an equation for the reaction between the elements you have given in (e) above.   (2mks)

g) Which element has the smallest atomic radius? Explain.   (2mks)

h) Give the number of valence electrons in;   (2mks)

2

i. K
ii. T

2. Study the reaction scheme below and answer the questions that follow.
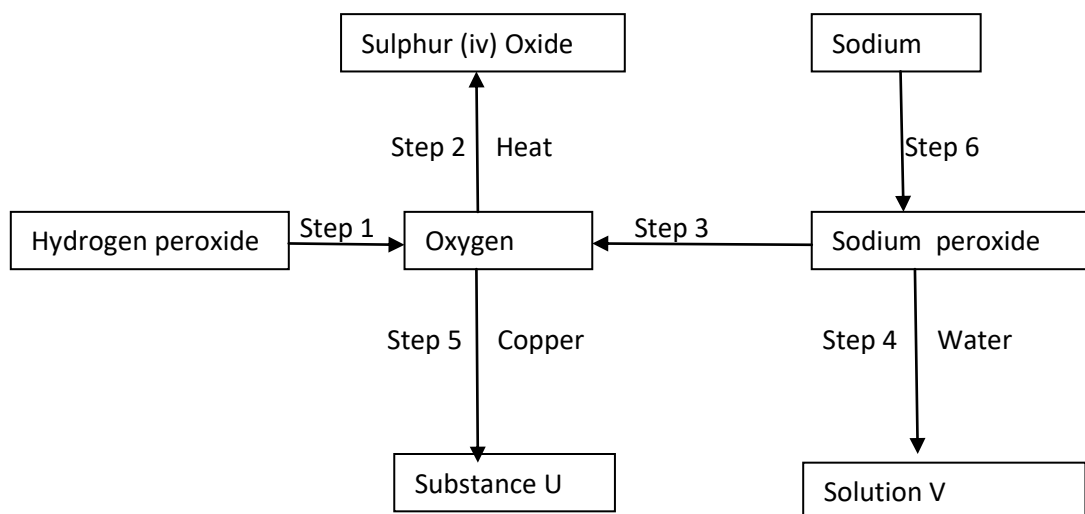
a) Identify substance U and solution V.   (2mks)

b) Name the reagents necessary for the reactions in the following steps.   (2mks)
   i. Step 1

   ii. Step 2

   iii. Step 3

   iv. Step 6

c) Give the condition necessary for the reaction in step 5 to take place.   (1mk)

d) Write equations for the reactions in the following steps.   (3mks)
   i. Step 1

   ii. Step 2

   iii. Step 5

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e) State and explain the observation made in step 5. (2mks)

3. The table shows the variation of volumes at different amounts of pressure.

Pressure in atmosphere	10	8	5	2	1
Volume (cm^3)	160	200	320	800	1600
Reciprocal of pressure ($^1/_p$)					

   i. Complete the table by determine the reciprocal of pressure. (2mks)

   ii. Plot a graph of volume against reciprocal of pressure. (3mks)

   iii. Use the graph to determine the volume of gas P at a pressure of 3.2 atmosphere. (1mk)

   iv. Calculate the pressure of gas P which has a volume of 5 litres. (2mks)

   v. A given volume of nitrogen gas requires 68.3 seconds to diffuse through a tinny hole in a chamber. Under the same conditions another unknown gas requires 85.6 seconds for the same volume to diffuse. What is the molecular mass of this gas?(r=14) (3mks)

4. In an experiment to determine the molar heat of neutralization of hydrochloric acid with sodium hydroxide, students of Anestar Secondary school reacted $100cm^3$ of 1M hydrochloric acid with $50cm^3$ of 2M sodium hydroxide solution. They obtained the following results.

Initial temperature of acid=25.0^oC

Initial temperature of base = 25.0^oC

Highest temperature reached (acid +alkali mixture) = 34.0^oC

    a) Define the term molar heat of neutralization.   (1mk)

    b) Write an ionic equation for the neutralization reaction between hydrochloric acid and sodium hydroxide.   (1mk)

    c) Calculate:

        i.   The change in temperature($\triangle T$)

        ii.   The amount of heat produced during the reaction (specific heat capacity = $4.2KJkg^{-1}k^-$)

        iii.   The molar heat of neutralization of sodium hydroxide.

    d) Write the thermochemical equation for the reaction.   (1mk)

    e) Draw an energy level diagram for the reaction.   (2mks)

    f) Explain why the enthalpy of neutralization of ethanoic acid with sodium hydroxide
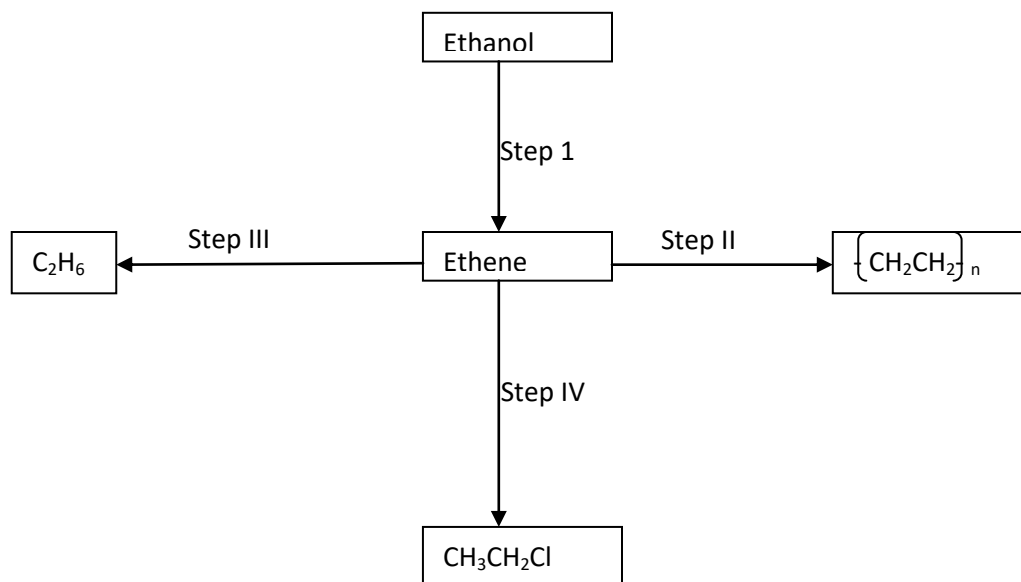
5. a) The diagram below was used to prepare a gas X in the laboratory. Study it answer the questions that follow.
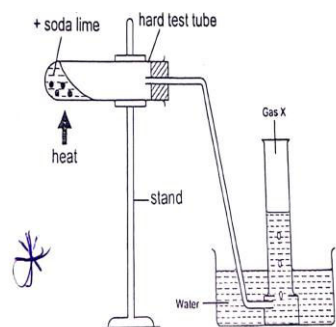
i. Name gas x.   (1mk)

ii. Write an equation to show the production of gas x.   (1mk)

b) Study the scheme diagram below and answer the questions that follow.

i. Name the catalyst that is suitable to carry out the reaction in step 1.   (1mk)

ii.   Name the process that takes place in step II.   (1mk)

iii.   State the conditions necessary for the reaction in step III to occur.   (1mk)

iv.   Write down the equation for the reaction that takes place in step IV.   (1mk)

c) Other than using burning, describe how you would distinguish between ethane and
   ethayne.

d) Draw and name all structures of the isomers of the compound with molecular formula
   C_4H_8.   (3mks)

6. The diagram below shows a voltaic cell formed between half cells $Cr^{3+}(aq)/Cr(s)$ $E^\theta=+0.80$
    Study it and answer the questions that follow.
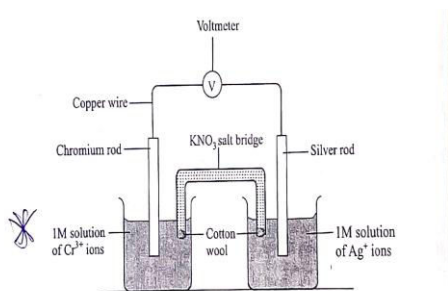
   a) What is the e.m.f of the cell?   (1mk)

   b) State the direction of movement of electrons.   (1mk)

   c) Which electrode is the anode? Explain.   (1mk)

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d) State the half cell in which reduction occurs and give the equation for the reaction. (2mks)

e) What will happen to the electrodes during the operation of the cell? (2mks)

f) State two function of the salt bridge. (2mks)

7. Study the flow chart below and use it to answer the questions that follow.
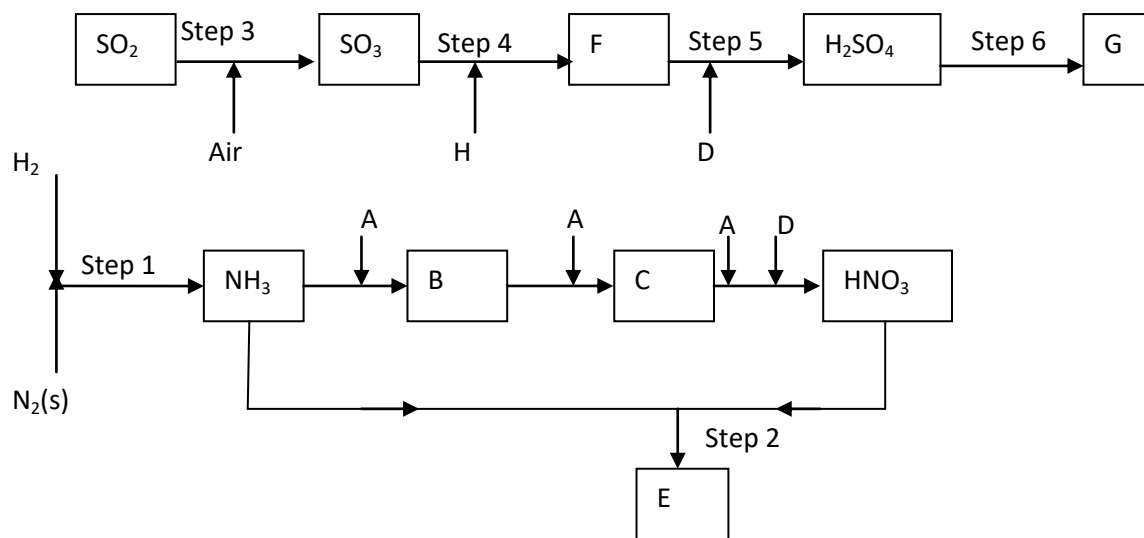
a) Name substance A,B,D, and F. (2mks)

b) Substance E and ammonium sulphate have one common use. State the use.(1mk)

c) Name the suitable catalyst in step 3. (1mk)

d) Write the chemical equation in step 4. (1mk)

e) Identify two gaseous environmental pollutants from the above flow chart. (1mk)

f) State the observation when potassium hydroxide is warmed with substance G.
(1mk)

g) Write a chemical equation where concentrated sulpheric (VI) acid is used as an oxidizing agent.
(2mks)

h) Write type of reaction is shown in the equation: (1mk)
$KNO_3(aq) + H_2SO_4(l) + HNO_3(g)$

i) Carbon (IV) oxide reacts with red hot carbon to produce a colourless gas P. Name gas P and state and explain the precaution you take when preparing this colourless gas P.
(2mks)