Name: …………………………………………… Index No: ………….…..…..………...……

School: ………………………………………….. Candidate's Signature…………..………………

Date: …………….…………………………..

233/1
CHEMISTRY
PAPER 1 (THEORY)
JUNE / JULY 2015
Time: 2 Hours

MACHAKOS COUNTY KCSE TRIAL AND PRACTICE EXAM 2015

Kenya Certificate of Secondary Education (K.C.S.E)

CHEMISTRY
Paper 1
Time: 2 Hours

INSTRUCTIONS TO CANDIDATES:

- Write your **name** and **index number** in the spaces provided above.
- Sign and write the date of examination in the spaces provided above
- Answer **all** the questions in the spaces provided.
- KNEC Mathematical tables and silent electronic calculators may be used for calculations.
- All workings **must** be clearly shown where necessary
- Candidates must answer all the questions in English
- This paper consists of 12 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

For Examiner's Use only:

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1 – 31	**80**	

A special Performance Improvement Project
By His Excellency Dr. Alfred Mutua

1. The electron arrangement of ions Q^{2-} and R^{3+} are as 2, 8, 8, and 2,8 respectively.

   (a) Write the electron arrangement of the elements Q and R   (2marks)

_____

_____

   (b) Write the formula of the compound that would be formed between Q and R   (1mark)

_____

_____

2. Explain why a high temperature is required for Nitrogen to react with oxygen   (1mark)

_____

_____

_____

3. Give one advantage and one disadvantage of using petrol containing tetraethyl lead in motor vehicles

                                                         (2marks)

_____

_____

_____

4. The diagram below is a cross section of a dry cell. Study it and answer the questions that follow.
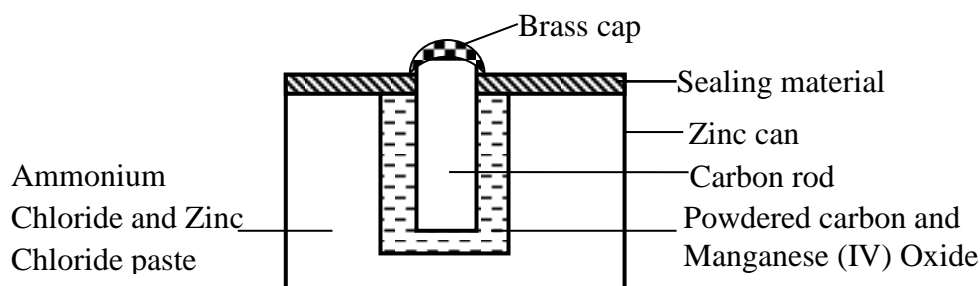
(i) Write the equation for the reaction in which electrons are produced.   (1mark)

_____

_____

(ii) The Zinc can is lined with Ammonium Chloride and Zinc Chloride paste. What would happen if the

    mixture was to become dry? Give reason.   (2marks)

_____

_____

_____

5. The graph below shows the behavior of a fixed mass of a gas at constant temperature.
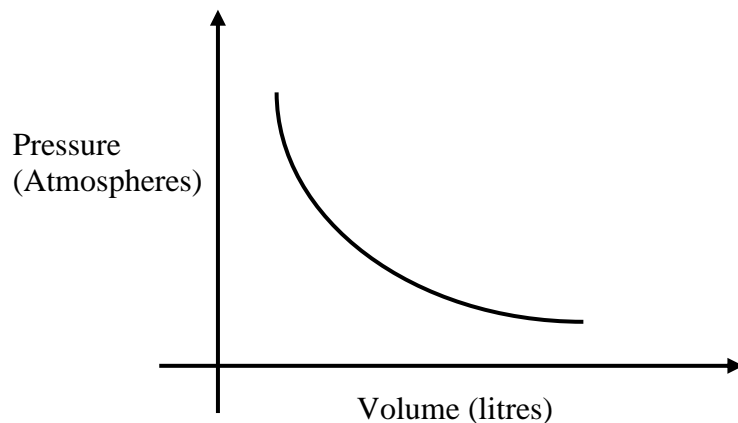
(a) What is the relationship between the volume and the pressure of the gas ? (1mark)

_____

_____

(b) 1500cm^3 of nitrogen gas at one atmosphere were compressed to two atmospheres at   constant temperature . Calculate the volume occupied by the nitrogen gas. (2marks)

_____

_____

6. The table below gives some properties of three elements X,Yand Z.

ELEMENT	Atomic No.	Meeting point(^{0}C)	Boiling Point (^{0}C)
X	53	114	184
Y	35	-7	58.8
Z	17	-101	-34.7

(a) Which element is in liquid form at room temperature? Give reason. (1mark)

_____

_____

(b) Explain why the boiling point of element X is higher than that of element Z. (2marks)

_____

_____

_____

7. The diagram below is a set up for the laboratory preparation of dry oxygen gas.
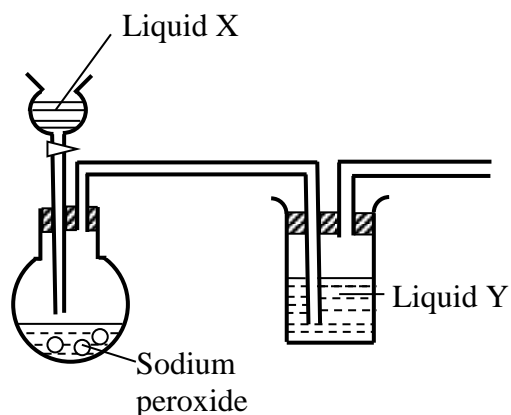
(a) Name:

   I. Liquid Y   (1 Mark)
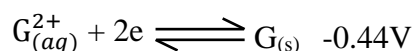
_____

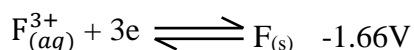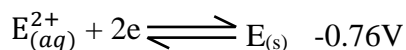   II. Liquid X

_____

(b) Write an equation for the reaction that took place in the flask.   (1mark)

_____

(c) Complete the diagram to show how dry oxygen can be collected.   (1mark)

8. Use the information below and answer the questions that follow .The letters are not the actual symbols of the elements.

$E^{2+}_{(aq)} + 2e \rightleftharpoons E_{(s)}$ -0.76V

$F^{3+}_{(aq)} + 3e \rightleftharpoons F_{(s)}$ -1.66V

$G^{2+}_{(aq)} + 2e \rightleftharpoons G_{(s)}$ -0.44V

(a) Calculate the E^{θ} value for the electrochemical cell represented below.   (1mark)

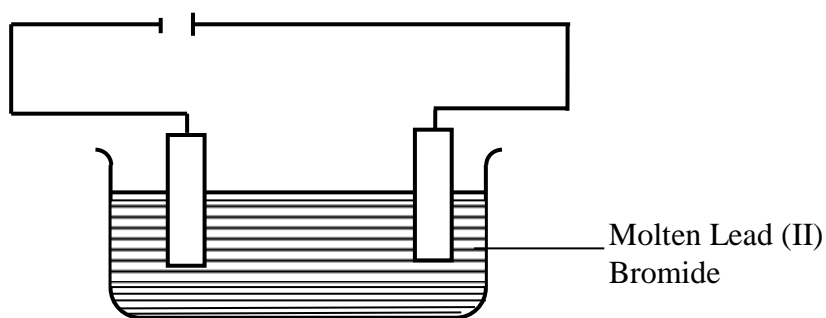 $F_{(s)} \mid F^{3+}_{(aq)} \parallel G^{2+}_{(aq)} \mid G_{(s)}$

(b) Arrange the elements in order of reactivity starting with the least reactive.   (1mark)

_____

_____

(c) Explain if it would be advisable to store element G in a solution containing E^{2+} Ions.   (1mark)

_____

_____

9. The set up below was used to electrolyze molten lead (II) bromide.

Molten Lead (II) Bromide

(a) State the observation that was made at the anode during electrolysis. (1mark)

_____

_____

(b) A current of 2.5A was passed for 30 minutes. Calculate the mass of lead that was deposited

(2marks)

_____

_____

10. When wood is burnt a grey powder called ash remains. The ash is stirred with water and filtered to form a colourless solution.

(a)What is the main component of the colorless solution? Give a reason. (2marks)

_____

_____

(b) State the observation that would be made if methyl orange indicator was passed through the solution of ash. (1mark)

_____

_____

11. The elements A and B have the following properties

Element	Mass No.	Atomic No.
A	37	17
B	37	18
C		

(a) When the isotope A was bombarded with a neutron, an isotope C was formed .Fill in the table to show the properties of element C (1mark)

_____

_____

(b)Write an equation for the reaction between isotope B and Beta particles   (1mark)

_____

_____

(c) State one use of radioisotopes in medicine.   (1mark)

_____

_____

12. When Carbon (IV) oxide gas was passed through aqueous calcium hydroxide a white suspension was formed.

(a) Write an equation for the reaction that took place.   (1mark)

_____

_____

(b) State and explain the changes that took place when excess Carbon (IV) Oxide was bubbled through the white suspension .   (2marks)

_____

_____

_____

13. Excess Carbon (II) Oxide was passed over a heated sample of an oxide of iron as shown in the diagram below. Study the diagram and the data and use it to answer the questions that follow.
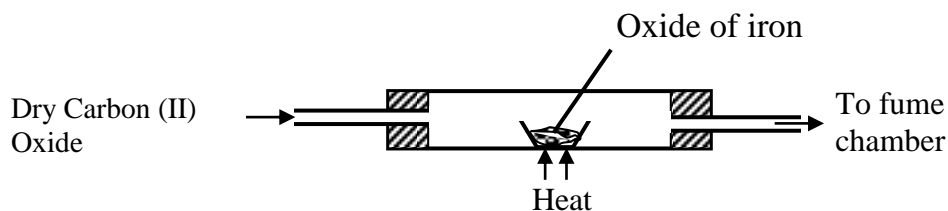

Mass of empty dish =6.72g

Mass of empty dish + oxide of iron =9.04g

Mass of empty dish + residue=8.40g

(a) Determine the formula of the oxide of iron given that the relative formula mass of oxide of

Iron = 232, Fe = 56.0, O=16.0   (2marks)

_____

_____

_____

_____

(b) Write an equation for the reaction which took place in the dish   (1mark)
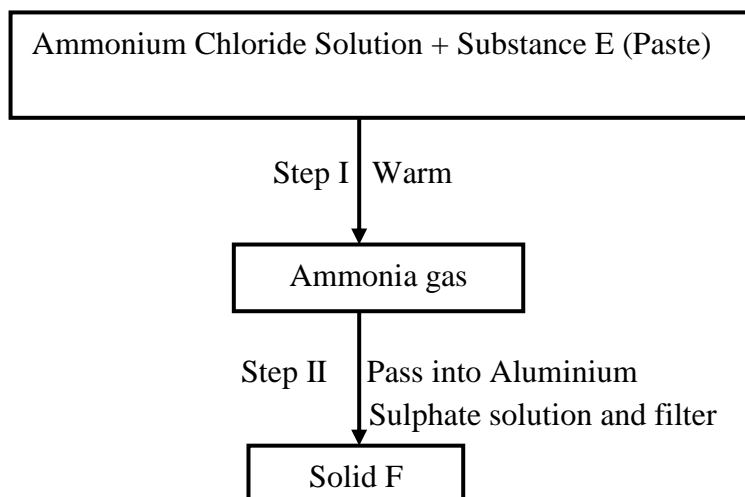
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14. The products of a burning candle were passed through a tube containing calcium oxide as shown in the diagram below.
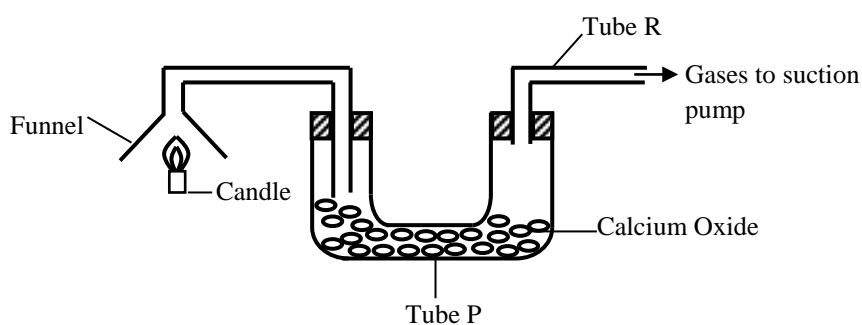
(a) Write two chemical equations for the reactions that took place in tube P.   (2marks)

_____

_____

(b) Name two gases that came out through tube R.   (1mark)

_____

_____

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

(a)Identify substance E   (1mark)

_____

_____

(b)Write an equation for the reaction in Step (II) that produces solid F   (1mark)

_____

_____

16. The elements nitrogen, phosphorus and potassium are essential for plant growth. Phosphorus in the fertilizer may be in the form of ammonium phosphate. Calculate the mass of nitrogen present if a 25kg bag contained pure ammonium phosphate.

   $(NH_4)_2 HPO_4$ (N=14.0, H=1.0, P=31.0, O=16.0)   (2 Marks)

_____

_____

_____

_____

17. The flow chart below shows the processes involved in the industrial extraction of zinc metal.
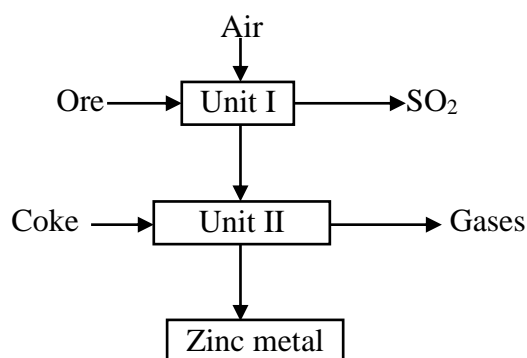
(a) Name the ore from which zinc is extracted on the above diagram.   (1mark)

_____

_____

(b)Write the equation of the reaction taking place in Unit I   (1mark)

_____

_____

(c) Name two uses of zinc metal.   (1mark)

_____

_____

_____

18. A weighed sample of crystalline sodium carbonate ($Na_2CO_3 .nH_2O$) was heated in a crucible until there was no further change in mass .The mass of the sample reduced by 14.5%. Calculate the number of moles (n) of the water of crystallization.   (2marks)

_____

_____

_____

_____

19. (a) Describe how you would prepare crystals of sodium nitrate starting with 200cm^3 of 2M sodium

hydroxide (2marks)

_____

_____

_____

_____

(b)Write an equation for the reaction that takes place when a solid sample of sodium nitrate is heated.
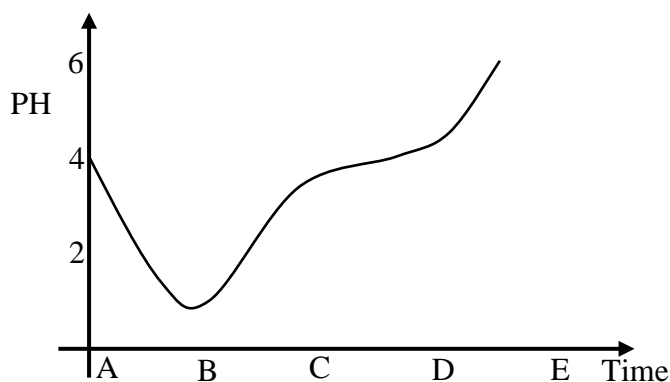
(1mark)

_____

_____

20. The structure below represents a sweet smelling compound.

$$CH_3CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - O - CH_2CH_3$$
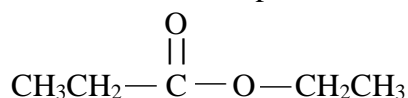
Give the names of the two organic compounds that can be used to prepare this compound in the

laboratory. (2marks)

_____

_____

_____

_____

21. Magnesium reacts with both concentrated and dilute acid. Write the equations for the two reactions.

(2marks)

_____

_____

_____

_____

22. The graph below shows how the PH value of soil in a farm changed over a period of time.

(a) Describe how the PH of the soil can be determined. (2marks)

_____

_____

_____

_____

(b) State one factor that may have been responsible for the change in the soil PH in the time interval AB.
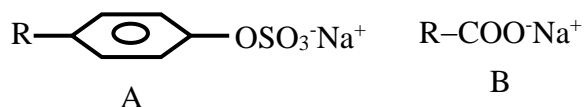(1mark)

_____

_____

23. A student put calcium carbonate and calcium hydrogen carbonate in separate test tubes and performed the tests as shown in the table below. Complete the table by giving the expected observations.

| Salt	Adding water	Heating
Calcium Carbonate		
Calcium hydrogen carbonate		

(2marks)

24. A mixture contains Iron (III) Chloride, calcium chloride and iron filings. Describe how one can separate and recover the substances in the mixture. (3marks)

_____

_____

_____

_____

25. The structure below represents two cleansing agents A and B. Which cleansing agent would be suitable for washing in water containing calcium chloride? Give a reason. (2marks)
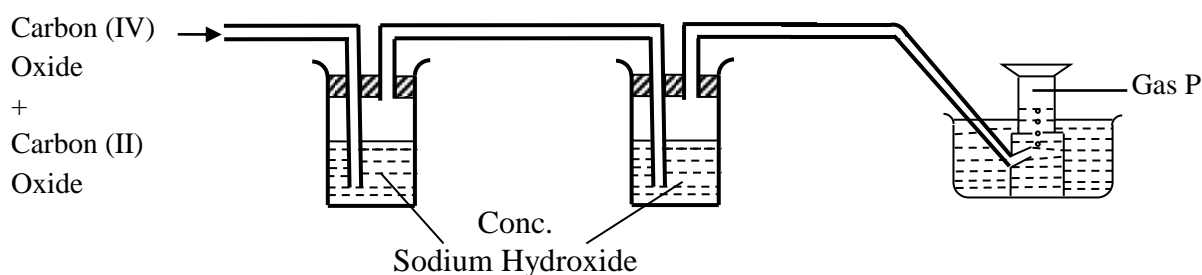
$R \!-\!\!\bigcirc\!\!-\! OSO_3^- Na^+$ $R\!-\!COO^- Na^+$

A   B

_____

_____

_____

26. Study the diagram below and answer the questions that follow.

(a) What do ΔH_1 and ΔH_2 represent. (2marks)

_____

_____

_____
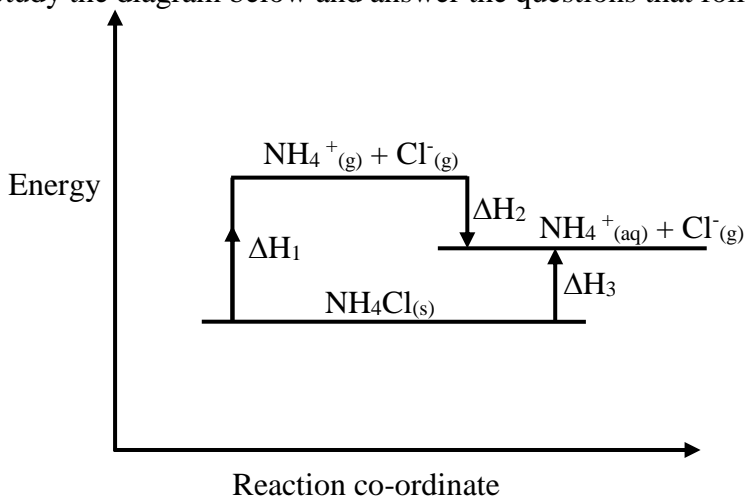
(b) Write an expression to show the relationship between ΔH_1, ΔH_2 and ΔH_3. (1mark)

_____

_____

_____

27.   Study the diagram below and use it to answer the questions that follow.

(a) Name two reagents that are reacted to produce both Carbon (IV) Oxide and Carbon (II) Oxide.
(1mark)

_____

_____

(b) Write the equation for the reactions that took place in the wash bottle. (1mark)

_____

_____

(c) Give a reason why Carbon (II) Oxide is not easily detected. (1mark)

_____

_____

28. When a few drops of ammonia solution were added to Copper (II) Nitrate solution, a light blue

precipitate was formed. On addition of more aqueous ammonia a deep blue solution was formed.

Identify the substances responsible for the:

(a) Light blue precipitate. (1mark)

_____

 (b) Deep blue solution. (1mark)

_____

29. Study the flow chart below and answer the questions that follow.
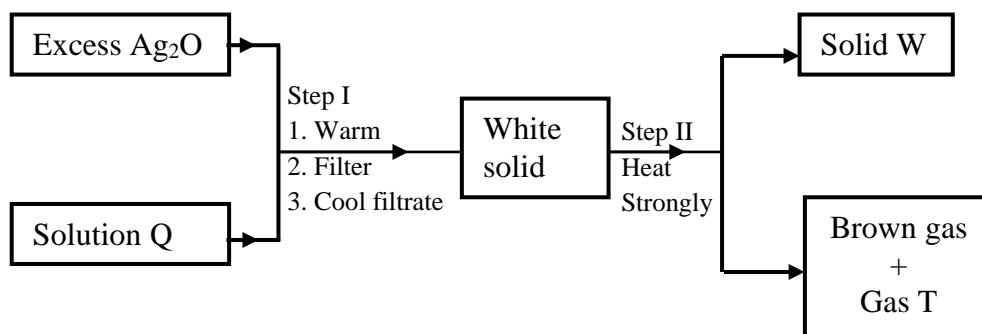
a) Identify solution Q. (1mark)

_____

_____

b) Write an equation for the reaction that took place in step II. (1mark)

_____

_____

c) State one commercial use of gas T. (1mark)

_____

_____

30. How does pH value of 0.1M potassium hydroxide solution compare with that of 0.1M aqueous

Ammonia? Explain (2marks)

_____

_____

31. During the manufacture of rubber raw rubber is heated with sulphur, carbon, phosphorus and manganese

i) What name is given to this process. (1mark)

_____

_____

ii) Explain why the process is necessary. (2marks)

_____

_____