NAME: ………………………………………………………… INDEX NO: …..………………

SCHOOL: ………………………………………………………….. DATE: ……………..……….……

CANDIDATE'S SIGN …………………………………………………

233/1
CHEMISTRY
PAPER 1
JULY/AUGUST 2014
TIME: 2 HOURS

KISUMU WEST DISTRICT JOINT EVALUATION EXAM
Kenya Certificate of Secondary Education (KCSE)

CHEMISTRY
PAPER 1

INSTRUCTIONS TO CANDIDATES:

- *Write your **name, school** 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.*

- *Mathematical tables and silent electronic calculators may be used for calculations.*

- *All workings **must** be clearly shown where necessary*

This paper consists of 8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. A mixture contains iron (III) chloride, zinc (II) oxide and potassium chloride. Describe how each of the substance can be obtained from the mixture. (3mks)

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2. An element, **X** has atomic number 14 while element **B** has atomic number 8.

i) Write the electronic arrangement for each element. (2mks)

…….

……..

ii) Draw using dots (•) and crosses (x), diagram to show the bonding between **X** and **B** (2mks)

3. $60cm^3$ of oxygen gas diffused through a porous portion in 50 seconds. How long would it take $60cm^3$ of sulphur (IV) oxide gas to diffuse through the same portion under same conditions.

(S=32.0, O=16.0)

4. A sample of tap water was divided into three portions. The table below shows the tests carried out on the portions and observations made.

Test	Observations	Inferences
To the first portion, $1cm^3$ of soap solution was added	No lather formed	(i)
The second portion was boiled, cooled and $1cm^3$, of soap solution added.	No lather formed	(ii)
To the third portion, $3cm^3$ of aqueous sodium carbonate was added the mixture filtered and $1cm^3$ of soap solution added to the filtrate.	Lather formed immediately	(iii)

Complete the table by filling the inferences. (3mks)

5. a) Name **two** types of flame of the Bunsen burner. (1mk)

……………………………………………………………………………………………………….….

……..

b) Which is the better flame for heating in the laboratory. Give **two** reasons. (2mks)

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6.   a) Both iodine and astatine belong to the same group in the periodic table, Name the group. (1mk)

……

……..

b) Astatine is below iodine in the group compare their boiling point, giving reasons. (1mk)

……

……..

7.   A colourless liquid freezes at 8.5^0C and boils at 121^0C. It contains carbon 40% hydrogen 6.71% and the rest is oxygen. The relative molecular mass of the compound is 60. (H=1.0, O=16, C=12)

a) Determine its empirical formula. (2mks)

……….

……..

b) Find the molecular formula of the liquid. (1mk)

……….

……..

8.   a) Distinguish between exothermic and endothermic chemical reactions. (1mk)

……….

……..

b) The heats of combustion of carbon, hydrogen and ethanol are -393, -286 and -1386 $kJMol^{-1}$ respectively. Calculate the heat of formation of ethanol. (3mks)

9.   Given below are pH values of different solutions **P, Q** and **S**. Study it and answer the questions that follow.

Solution	pH
P	1
Q	7
S	14

a) Which **two** solutions would react together to give a pH of 7.0 (1mk)

……

b) Which solution can be considered to be an oxide of hydrogen. (1mk)

………………………………………………………………………………………………..

10. The table below gives properties of four substances.

Substances	Melting points	Boiling points	Electrical conductivity	
			Solid	Liquid
A	1083	2567	Good	Good
B	-182	-164	Poor	Poor
C	1723	2230	Poor	Good
D	993	1695	Poor	Poor

State with a reason which of the above is:-

i) An ionic compound. (1mk)

………………………………………………………………………………………………..

ii) A metallic structure. (1mk)

………………………………………………………………………………………………..

iii) A giant atomic structure. (1mk)

………………………………………………………………………………………………..

11. i) State how burning can be used to distinguish between ethane and ethyne. Explain. (2mks)

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………………………………………………………………………………………………..

ii) Draw and name the structural formula of the third member of the homologous series

of ethyne. (1mk)

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12. In the Haber process, the optimum yield of ammonia is obtained when a temperature of 450^0C,

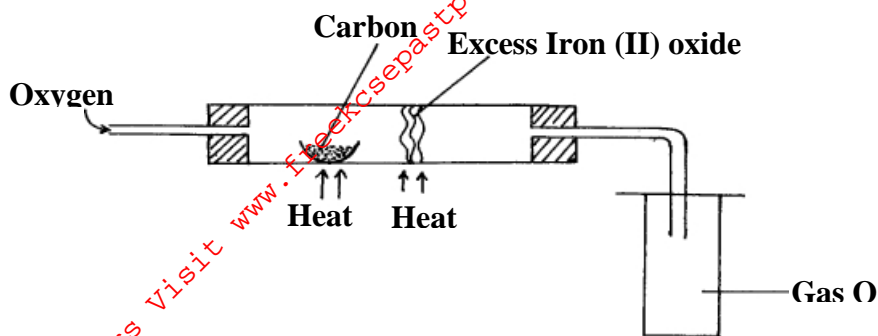pressure of 200 atmospheres and an iron catalyst are used. Equation for the reaction is shown below.

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)} \qquad \Delta H= -92kJ.$$

How would the yield of ammonia be affected if:

i) Temperature raised to 600^0C (1mk)

………………………………………………………………………………………………..

ii) Pressure raised to 250 atmospheres. (1mk)

………………………………………………………………………………………………..

iii) The amount of catalyst doubled Explain. (2mks)

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13. The set up below was used to obtain a sample of iron.

i) Write **two** equations for the reaction which occur in the combustion tube. (2mks)

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……..

ii) Identify gas **Q** (1mk)

……..

14. The reaction below refers to preparation of an insoluble salt of lead starting with lead metal.

Lead $\xrightarrow[\text{A}]{\text{Reagent}}$ Solution **X** $\xrightarrow{\text{Sodium sulphate solution}}$ Mixture $\xrightarrow{\text{Filter}}$ Residue **Q**
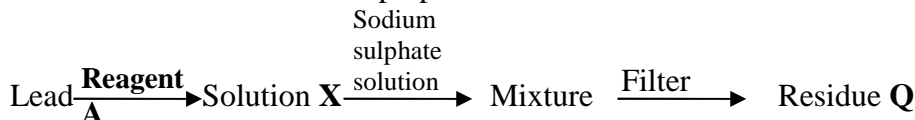
a) Name the type of reaction between solution **X** and sodium sulphate solution. (1mk)

……..

b) Write the ionic equation for the reaction in (a) above. (1mk)

……..

c) Explain why it is not possible to prepare residue **Q** using lead metal and sodium sulphate solution. (2mks)

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15. A student set up the apparatus as shown below to prepare and collect dry ammonia.
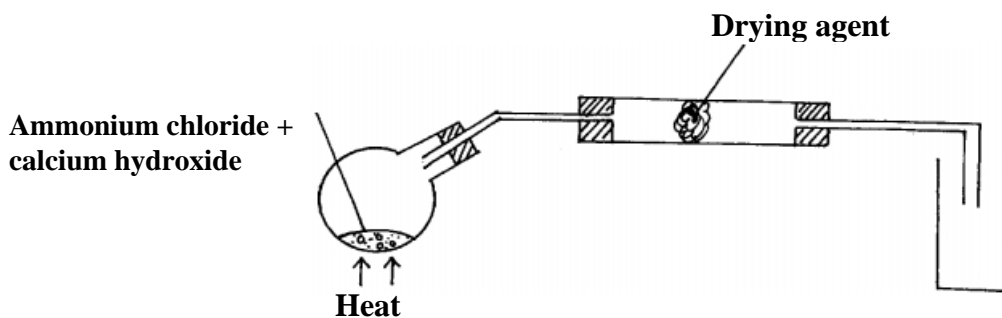
i) Identify **two** mistakes in the set up and give a reason for each mistake. (2mks)
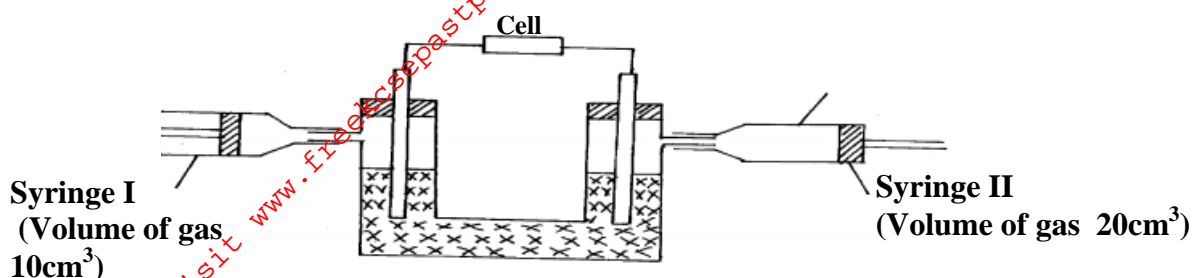
I………………………………………………………………………………………………

II………………………………………………………………………………………………

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

……..

16.   The diagram below shows a set up that was used to electrolyse aqueous magnesium chloride.

Cell

Syringe I
(Volume of gas 10cm³)

Syringe II
(Volume of gas 20cm³)

i) On the diagram above, using arrows, show the direction of flow of electrons.   (1mk)

ii) Identify the syringe in which oxygen gas would be collected.   (1mk)

……..

iii) State and explain the change of magnesium chloride concentration at the end of the experiment.

(2mks)

……..

……..

17.   Calculate the change in temperature when 2.0g of ethanol is burnt to heat 500cm³ of water at room
temperature (C=12, H=1, O=16). Specific capacity of water = 4.18kJkg⁻¹K⁻¹, R.T.P =25⁰C

ΔH_C ethanol = 70kJmol⁻¹   (3mks)

18.   a) Aluminium is extracted through electrolysis process while copper is extracted through reduction
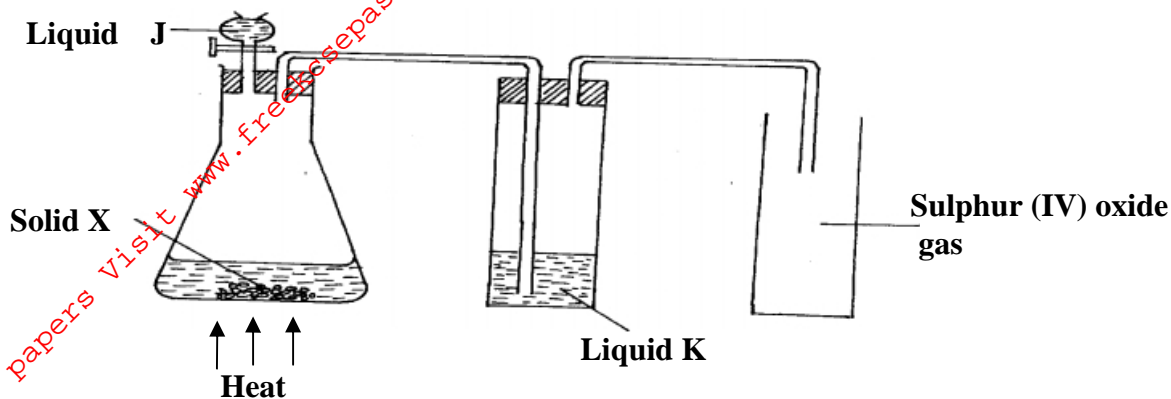process. Explain.   (2mks)

……..

……..

b) Name the process that is used to concentrate the zinc ore, in Zinc extraction process.   (1mk)

……..

19.   Give the systematic names of the following hydrocarbons.

i) CH₃(CH₂)₄ CH₃   (1mk)

……..

……..

           CH₃
            |
ii) CH₃ – C = CH₂   (1mk)

……..

……..

20. The diagram below represents the apparatus a student used to prepare and collect sulphur (iv) oxide gas.

i) Name the substances.

J………………………………………………….. (1mk)

X…………………………………………………. (1mk)

K………………………………………………….. (1mk)

ii) What property of the gas makes it possible to be collected as shown in the diagram. (1mk)

………………………………………………………………………………………………………..

21.   100g of a radioactive substance was reduced to 12.5g in 15.6years. Calculate the half-life of the substance.   (2mks)

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………………………………………………………………………………………………………..

22.   Use the standard electrode potentials for the elements to answer the questions that follows. The letters do not represents the actual symbols.

$$\begin{array}{lll} & & \textbf{E}^{\scriptsize\textit{"}}\textbf{ (V)} \\ D^{2+}_{(aq)} + 2e^- \longrightarrow D_{(s)} & & +0.34 \\ B^{2+}_{(aq)} + 2e^- \longrightarrow B_{(s)} & & +\text{-}2.38 \\ E_{2(g)} + 2e^- \longrightarrow 2e^-_{(aq)} & & +0.54 \\ 2C^+_{(aq)} + 2e^- \longrightarrow C_{2(g)} & & +0.00 \end{array}$$

i) Which element is likely to be hydrogen? Explain   (1mk)

………………………………………………………………………………………………………..

………………………………………………………………………………………………………..

………………………………………………………………………………………………………..

ii) Identify **two** half cells from the above that when combined will give an electrochemical cell with the largest e.m.f. calculate the e.m.f.   (3mks)

23. Chlorine gas was bubbled through potassium iodide solution.

   a) State the observation that would be made. (1mk)

   ……..

   b) Write the ionic equation for the reaction that took place in (a) above. (1mk)

   ……..

   c) Identify the oxidizing agent in the ionic equation (b) above. (1mk)

   ……..

24. During a reaction between iron (III) chloride and chlorine gas 6.30g of iron(II) chloride were
   converted to 8.06g of iron (III) chloride. Calculate the volume of chlorine gas used. (2mks)
   (Fe = 56, Cl = 35.5, M.V = 24dm^3)
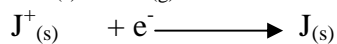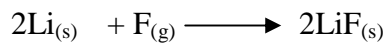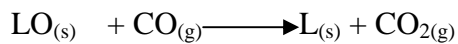
25. Two detergent **A** and **B** are represented as:

   $CH_3(CH_2)_{11}COONa$ and $CH_3(CH_2)$ —— ⟨◯⟩ OSO_3Na.

         A   **B**
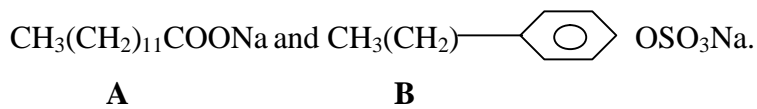
   Which of the detergent is suitable for washing using water containing magnesium sulphate?
   Explain (2mks)

   ……..
   ……..

26. Consider the equations below.

   $LO_{(s)} + CO_{(g)} \longrightarrow L_{(s)} + CO_{2(g)}$
   $2Li_{(s)} + F_{(g)} \longrightarrow 2LiF_{(s)}$
   $J^+_{(s)} + e^- \longrightarrow J_{(s)}$

   Which of the reactions are redox? Explain. (2mks)

   ……..
   ……..

27. a) What is a fuel? (1mk)

   ……..

   b) State **two** factors to consider while choosing a fuel. (1mk)

   ……..
   ……..

28. (a) Explain the observation made when, burning magnesium is lowered into a glass jar of sulphur
   (IV) oxide. (1mk)

   ……..

   (b) Write an equation for the reaction that takes place in (a) (1mk)

   ……..