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

233/1   Candidate's Signature …………..…………
CHEMISTRY   Date: …………………………
PAPER 1
THEORY
JULY/AUGUST 2014
TIME: 2 HOURS

HOMA-BAY SUB-COUNTY JOINT EVALUATION EXAM

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

233/1
Chemistry
Paper 1
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.
- Answer ***all*** the questions in the spaces provided.
- Mathematical table and silent electronic calculators may be used.
- All working **must** be clearly shown where necessary.

FOR EXAMINERS USE ONLY

Question	Maximum score	Candidate's score
1-30	80	

This paper consists of 11printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1

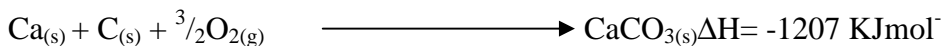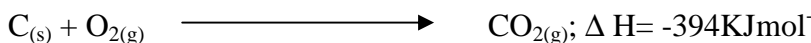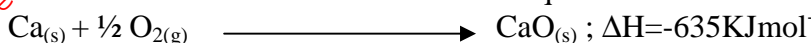1.	State **two** reasons why most apparatus in the laboratory are made of glass	(2mks)

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2.	The following is an organic compound represented as $CH_3CH_2COOCH_2CH_3$
	(i) Name the organic acid and alkanol used in making the compound	(2mks)

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	(ii) Name the organic compound and the gas formed when the alkanol in (i) above is reacted
	with Potassium	(1mk)

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3.	Use the information below to answer the question that follows

	$Ca_{(s)} + ½ O_{2(g)} \longrightarrow CaO_{(s)}$; $\Delta H=-635KJmol^-$

	$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$; $\Delta H= -394KJmol^-$

	$Ca_{(s)} + C_{(s)} + {}^3/_2O_{2(g)} \longrightarrow CaCO_{3(s)} \Delta H= -1207 KJmol^-$

	Calculate the enthalpy change for the reaction

4.	(a) What is the role of the following parts during fractional distillation of a mixture of water
	and ethanol
	(i) Fractionating column	(1mk)

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	(ii) Glass beads in the fractionating column	(1mk)

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	(b) State any one application of fractional distillation process	(1mk)

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5.	Name the process which takes place when:
	(i) Iodine changes directly from solid to gas	(1mk)

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

	(ii) $Fe^{2+}_{(aq)}$ changes to $Fe^{3+}_{(aq)}$	(1mk)

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	(iii) White sugar changes to black solid when mixed with excess concentrated sulphuric (VI) acid
	(1mk)

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2

6. The melting point of phosphorous trichloride is -91°C while that of sodium chloride is 801°C. In terms of structure and bonding. Explain the difference in their melting point (3mks)

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7. (a) Name a suitable drying agent to be used to dry chlorine gas (1mk)

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(b) Chlorine reacts with red hot powder to give iron (III) chloride but not iron (II) chloride. Explain? (1mk)

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(c) Sodium hydroxide reacts with chlorine to form bleaching powder. Write a balanced equation for the reaction (1mk)

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8. The electronic arrangement of elements are represented by letters A to D are as follows

A:2.8.6   B:2.8.2   C:2,8,1   D2:8.8

(a) Select the element which forms

(i)Double charged cation (1mk)

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(ii) A soluble carbonate. (1mk)

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(b) Which element has the shortest atomic radius? (1mk)

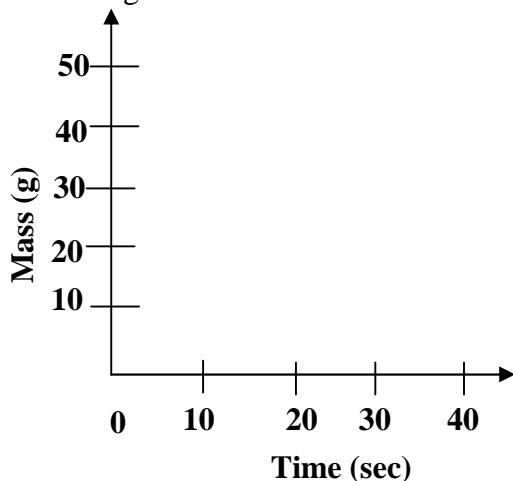………………………………………………………………………………………………………..

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9. Describe how a sample of Lead (II) chloride can be prepared using the following reagents dilute nitric (V) acid; dilute hydrochloric acid and lead carbonate (3mks)

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10. A radioactive element of mass 50g has a half-life of 10 seconds

(a) Sketch a graph of mass against time to show how the element mass varies with time (2mks)

(b) Give **one** use of radioactive in industries (1mk)

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11. State and explain **one** disadvantage of using hard water in boilers (2mks)

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12. Hydrogen sulphide gas was passed through a solution of iron(III) chloride
    (i) State and explain the observations made (2mks)

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    (ii) Write an ionic equation for the reaction taking place in (i) above (1mk)

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13. The apparatus below was set up to show the catalytic oxidation of ammonia. Study the diagram and answer the questions that follow

Dry $NH_{3(g)}$ →
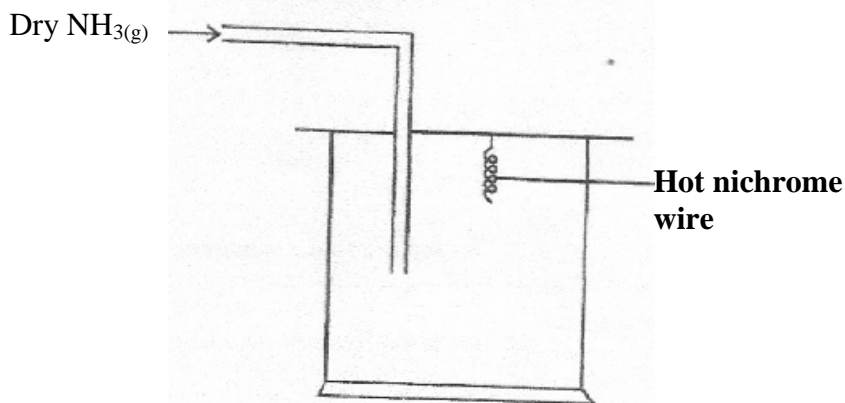
Hot nichrome wire

    (i) Write an equation for the reaction that takes place in the gas jar (1mk)

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    (ii) What is the role of hot nichrome wire? (1mk)

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     (iii) Write the formula of the complex ion formed when excess ammonia gas is passed
        through a solution containing Zn^{2+} ions. (1mk)

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14. A solution of silver nitrate was put in a container made of metal Q for 1 day. Given that:

$Q^{2+}_{(aq)} + 2e^- \rightleftharpoons Q_{(s)}$: E = 0.130v

$Ag^+_{(aq)} + e \rightleftharpoons Ag_{(s)}$: E = +0.80v
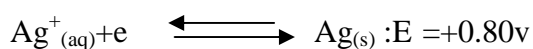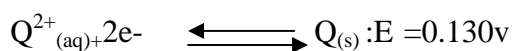
Determine whether or not a reaction occurred between silver nitrate and metal Q (2mks)

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4

15. The table below shows the solubility of salt at various temperatures

Temperature	Solubility g/100g of water
0	36
40	30
80	25
110	20

What would happen if a sample of a saturated solution of the salt $40^{o}C$ is heated to $80^{o}C$?

Explain (2mks)

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16. The equation given below represents a redox reaction

$$Mg_{(s)}+2HCl_{(aq)} \longrightarrow MgCl_{2(aq)} +H_{2(g)}$$
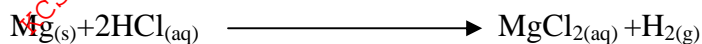
(i) Write the equation of the reduction process (1mk)

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(ii) Which substances is oxidized? (1mk)

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17. When a current of 1.5 amperes was passed through cell containing M^{2+} ions on metal M for 15 minutes the mass of the cathode increased by 0.26g. (1F=96500C)

(i) Calculate the quantity of electricity used (1mk)

(ii) Determined the relative atomic mass of metal M (2mks)

18. State any **two** differences between luminous and non-luminous flames (2mks)
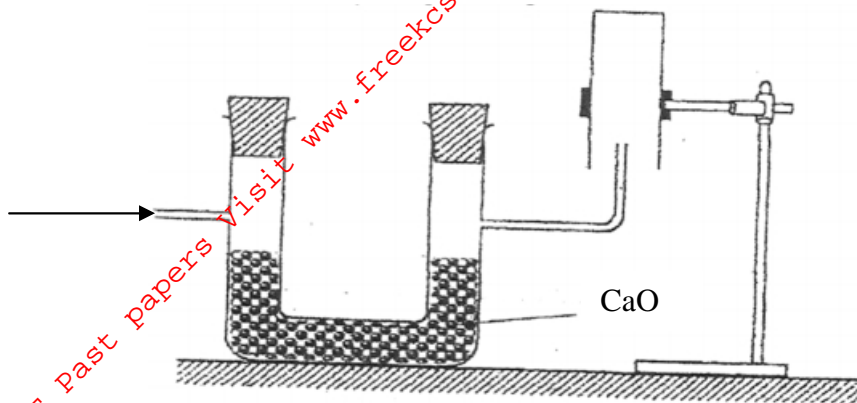
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19. (a) State Graham's law of diffusion (1mk)

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(b) The molar masses of gas **U** and **V** are 16.0 and 44.0 respectively. If the rate of diffusion of U through the porons materials is $12cm^{3-1}$. Calculate the rate of diffusion of V through the same materials (2mks)

5

20. The set up below was used to collect a dry sample of a gas

Give **two** reasons why the set-up cannot be used to collect carbon (IV) oxide gas (2mks)

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21. Dilute sulphuric acid does not react fully with calcium carbonate while dilute hydrochloric acid reacts fully with calcium carbonate liberating carbon (IV) oxide. Explain (2mks)

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22. On complete combustion of 0.5g of a hydro carbon; 1.257g of carbon (IV) oxide and 0.514g of water were produced. If the relative molecular mass of the hydrocarbon is 84, determine the molecular formula ($C=12, H=1, O=16$) (3mks)

21. The conversion of SO_2 to SO_3 in the contact process is shown by the equation

$2SO_{2(g)} + O_{2(g)} \longrightarrow 2SO_{3(g)} \Delta H = ^-197KJ$
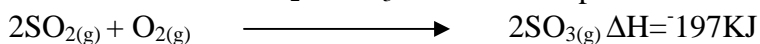
(a) What would be the effect of?

   (i) Increasing the concentration of Oxygen (1mk)

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  (ii) Increasing the temperature (1mk)

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(b) Write an equation for the sulphuric (VI) acid from Oleum (1mk)

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24. Sulphur burns in air to form sulpur (IV) oxide. A simple energy level energy level diagram for the reaction is given below. Study the diagram and answer the questions that follow:

6

Reaction co-ordinate
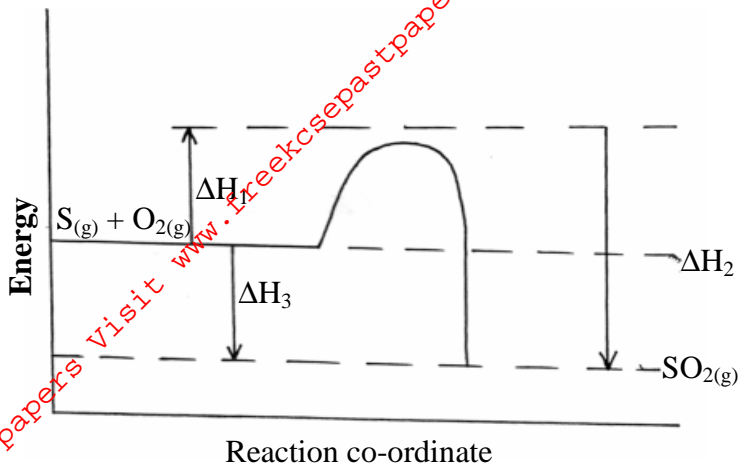
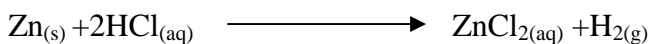(a) What do the following represents? ΔH_1 and ΔH_3 (2mks)

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(b) Write an expression for ΔH_3 in terms of ΔH_1 and ΔH_2 (1mk)

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25. Given the reaction below
$$Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$$
State how the following factors affect the rate of reaction giving explanation (1mk)

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(a) Using Zinc powder instead of granules (1mk)

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(b) Heating the reactants (1mk)

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26. The flow chart below shows steps used in the extraction of zinc from one of its ores
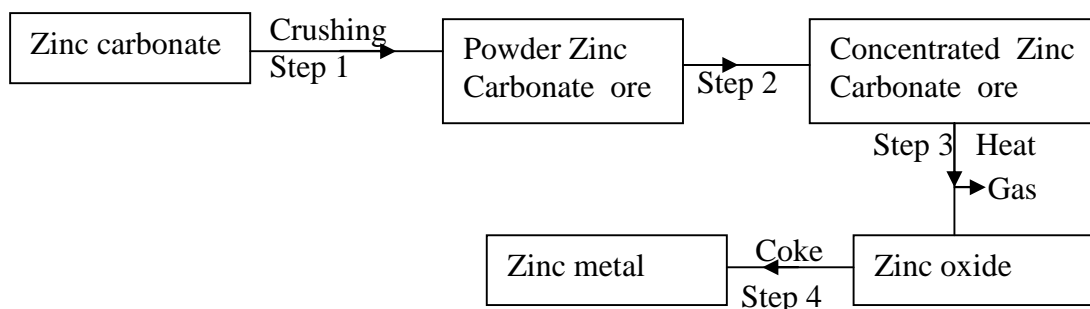
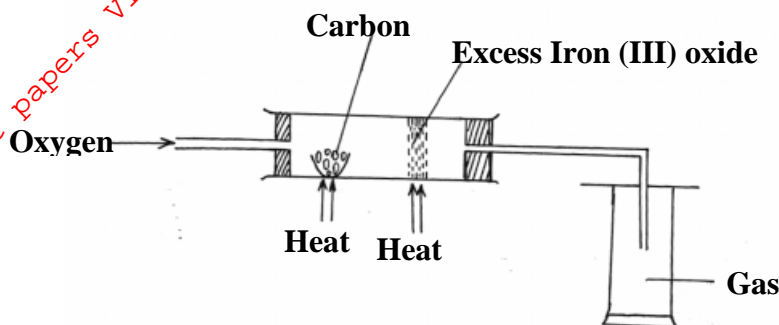(a) Name the process that is used in step 2 to concentrated (1mk)

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(b) Write an equation for the reaction which takes place in step 3   (1mk)

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(c) Name one use of zinc other galvanizing   (1mk)

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

(a) Identify the gas collected   (½ mk)

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(b) What observation is made on the excess iron (III) oxide?   (½ mk)

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(c) Write equations for the two reactions that take place in the combustion tube   (2mks)

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28.   The table below shows PH values of some solutions

Solution	A	B	C	D
PH values	13	7	1	6.5

(a) What solution reacts vigorously with Magnesium metal?   (1mk)

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(b) Which solution is likely to be that of Lemon juice?   (1mk)

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(c) Which solution forms complex ions with zinc (II) oxide?   (1mk)

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29.   When a few drops of aqueous ammonia 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   (1mk)

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(b) Deep blue solution   (1mk)

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30.   Explain why there is general increase in the first ionization energies of the elements in period 3 of the periodic table from left to right   (2mks)

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9