NAME:.....

SCHOOL:.....

INDEX NO:.....

CANDIDATE'S SIGN:.....

DATE:.....



233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY/AUGUST - 2014
TIME: 2 HOURS

# MERU COUNTY JOINT EVALUATION EXAM - 2014

*Kenya Certificate of Secondary Examination K.C.S.E*

233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY/AUGUST - 2014
TIME: 2 HOURS

**INSTRUCTIONS TO CANDIDATES**

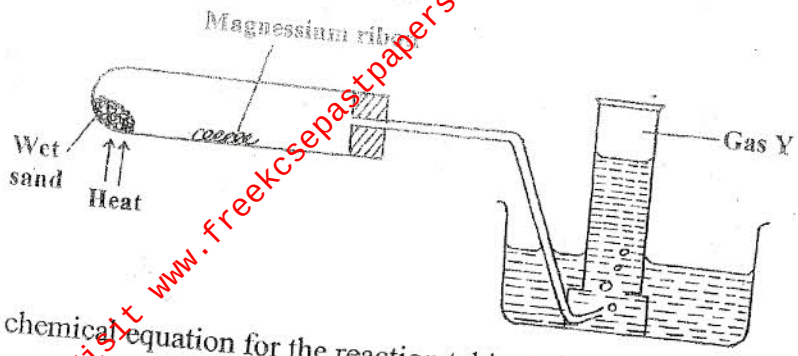
a) Write your name and index number in the spaces provided above.
b) Sign and write the date of examination in the spaces provided above
c) Answer all the questions in the spaces provided.
d) KNEC Mathematical tables and silent non-programmable electronic calculators may be used.
e) All working MUST be clearly shown where necessary.
f) Candidates should answer all questions in ENGLISH

**FOR EXAMINER'S USE ONLY**

| QUESTION | MAXIMUM SCORE | CANDIDATE'S SCORE |
|---|---|---|
| 1-31 | 80 | |

*This paper consists of 12 printed pages.*
*Candidates must check to ascertain that all pages are printed as indicated and that no question(s) is/are missing.*

... up used by a student to investigate a property of magnesium metal. use it to answer the questions that follow.




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

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(b) Describe how one would confirm the identity of gas Y. (2mks)

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2. (a) Give the chemical name of rust (1mk)

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(b) Name one substance which speeds up the rusting process. (1mk)

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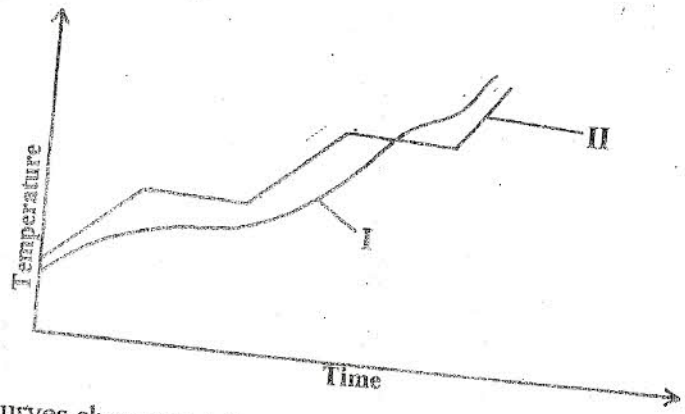
3. The curve below represents the variation of temperature with time when pure and impure samples of a solid were heated separately.




Which of the two curves shows variation in temperature for the pure solid? Explain (2mks)

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4. Use the information given in the table below to answer the questions that follow. The letters do not represent the actual symbols of the elements.

| Element | B | C | D | E | F |
|---|---|---|---|---|---|
| Atomic number | 20 | 18 | 5 | 3 | 5 |
| Mass number | 40 | 40 | 10 | 7 | 11 |

(a) Which two letters represent the same element? Give (1mk)

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(b) Give the number of neutrons in an atom of element E. (1mk)

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5. (a) State graham's law of diffusion (1mk)

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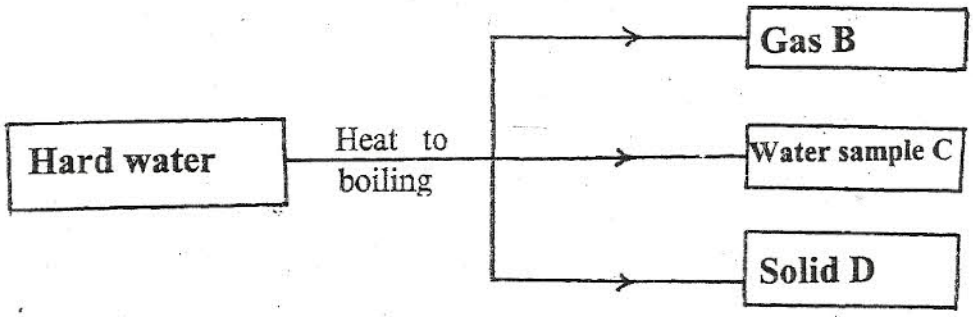
(b) $80cm^3$ of oxygen gas diffused through a porous plug in one minute. How long would it take the same of volume of Carbon (IV) oxide gas to diffuse through the same plug under the same conditions? (C= 12, O = 16) (2mks)

6. Study the scheme below and answer the questions




(a) Identify the anion present in the hard water. (1mk)

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(b) Write a possible chemical equation that leads to production of gas B. (1mk)

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(c) Give one advantage of using water sample C in Laundry. (1mk)

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7. Hexane and hexan-2-ol are liquids at room temperature. Which of the two substances have a higher boiling point? Explain. (2mks)

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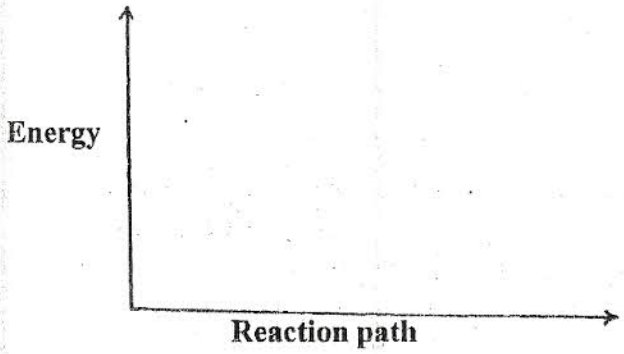
8. Study the equilibrium equation below then answer the question that follow.

$2Q_{2\,(g)} + R_{2\,(g)} \Leftrightarrow 2Q_2R_{(g)}\ \Delta H - 197kJ/mol$

On the grid provided below, sketch a labeled energy level diagram for the reverse reaction.(2mks)




9. (a) What is cracking of alkanes? (1mk)

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(b) Alkanes have the general formula $C_nH_{2n+2}$.An alkane molecule with 10 carbon atoms was cracked to give two products with equal numbers of carbon atoms.

(i) Write a chemical equation for the cracking. (1mk)

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(ii) How can the two products of cracking be distinguished using acidified Potassium Manganate (VII) solution? (1mk)

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10. In the haber process, nitrogen and hydrogen gases are reacted in the presence of finely divided iron catalyst.

(a) State why the catalyst is finely divided. (1mk)

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(b) A gaseous mixture of $NH_3$ and the unreacted $N_2$ and $H_2$ gases were bubbled through 0.2M HCl. State and explain what happens to the concentration of the acid. (2mks)

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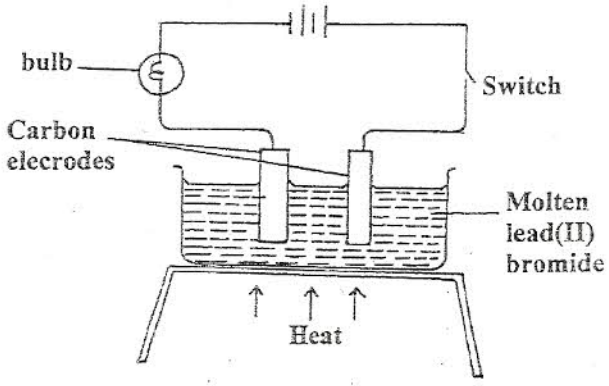
11. Study the set-up below and answer the questions that follow.




State and explain the observation that would be made when the circuit is completed. (3mks)

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12. When x $cm^3$ of a solution of 0.5M magnesium nitrate were reacted with excess ammonium carbonate solution, the mass of magnesium carbonate that precipitated was 8.4g.

(a) Write the ionic equation for the reaction that took place (1mk)

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(b) Calculate the value of x (C= 12.0, Mg = 24.0, O = 16.0) (2mks)

13. (a) State the observation made when hydrogen sulphide gas is bubbled through a solution of Zinc nitrate. (1mk)

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(b) Write a chemical equation for the reaction that takes place in 13(a) above. (1mk)

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14. (a) A radioactive cobalt $\left({}^{61}_{27}Co\right)$ undergoes decay by emitting a beta particle and forming a nicke (Ni) atom. Write a decay equation for the above change. (1mk)

(b) The table below gives the rate of decay for a radio active element S

| Number of days | Mass(g) |
|---|---|
| 0 | 12.8 |
| 280 | 0.8 |

Determine the half-life of the radioactive element. (2mks)

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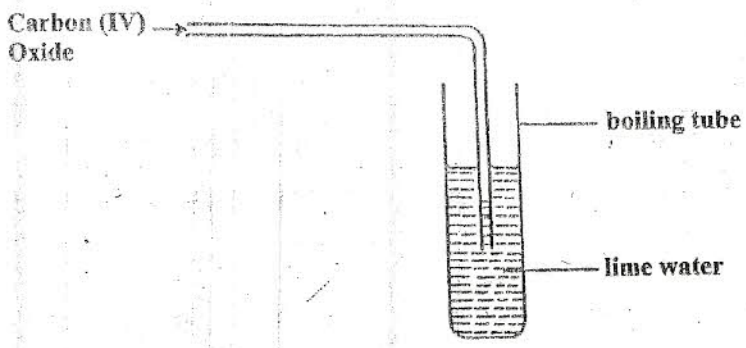
15. Excess carbon (IV) oxide was passed through lime water as shown below




State and explain the observation made in the boiling tube. (3mks)

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16. Iron is extracted from it's ores in the blast furnace. Describe the process that leads to the formation of iron in the blast furnace. (3mks)

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17. When a sample of concentrated Sulphuric (VI) acid was left in an open beaker in a room for 2 days the volume was found to have increased slightly.

(a) What property of concentrated Sulphuric(VI) acid is shown by the above observation? (1mk)

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(b) State one use of concentrated Sulphuric (VI) acid that depends on the observation made above. (1mk)

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18. Study the following reduction potentials and answer the questions that follow,

| | $E^{\theta}(V)$ |
|---|---|
| $F^{2+}_{(aq)} + 2e^- \longrightarrow Fe_{(s)}$ | -0.44 |
| $Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$ | +0.34 |
| $Ag^{+}_{(aq)} + e^- \longrightarrow Ag_{(s)}$ | +0.80 |
| $Zn^{2+}_{(aq)} + 2e \longrightarrow Zn_{(s)}$ | -0.76 |
| $Mg^{2+}_{(aq)} + 2e \longrightarrow Mg_{(s)}$ | -2.36 |

(a) Identify

(i) The strongest reducing agent. ( ½ mk)

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(ii) The strongest oxidizing agent. ( ½ mk)

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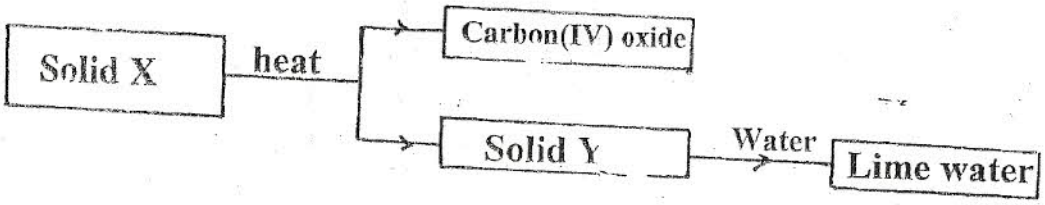
(b) Calculate the emf of the cell; (2mks)

$Mg/Mg^{2+}//Cu^{2+}/Cu$



19. Use the scheme below to answer the questions that follow.




(a) Identify solids;

(i) X..... ( ½ mk)

(ii) Y..... ( ½ mk)

(b) Describe how solid x can be prepared in the laboratory. (2mks)

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20. Distinguish between ionization energy and electron affinity of an element. (2mks)

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21. A chemical compound has the formula;

$CH_3COOCH_2CH_2CH_3$

(a) State the type of chemical compounds represented by the compound above. (1mk)

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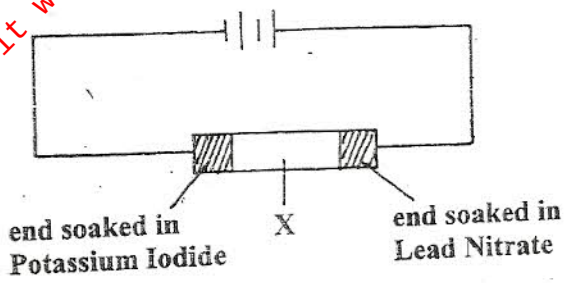
(b) Name the Alkanol and alkanoic acid which reacted to form the compound given above.

Alkanol..... (1mk)

Alkanoic acid..... (1mk)

22. A piece of moist filter paper was soaked in Potassium iodide on one end and lead nitrate on the other end and an electric current pass through it as shown below.




State and explain the observation made at X after sometime. (2mks)

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23. A compound Q is made up of carbon, hydrogen and oxygen whose percentage composition by mass are 62.1%, 10.3% and the rest oxygen respectively. If the molecular mass of Q is 58, determine it's molecular formula (C = 12, H=1, O = 16) (3mks)

24. A mixture contains ammonium chloride, copper (II) oxide and sodium chloride. Describe how each of the substances can be obtained from the mixture. (3mks)

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25. In an attempt to prepare a certain gas, a student added concentrated hydrochloric acid to Manganese ((IV) oxide and heated the mixture. The products were then passed through water ar concentrated Sulphuric (VI) acid separately.

(a) Name the gas prepared.

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(1mk)

(b) What was the purpose of passing the products through water?

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(1mk)

(c) Write an equation for the reaction leading to the production of the gas.

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(1mk)

26. A red moist litmus paper turns blue an exposure to a dry sample of ammonia gas while a dry red litmus paper does not. Explain.

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(2mks)

27. An element Y has the electronic configuration 2.8.5

(a) With a reason, give the period in which element y belongs.

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(1mk)

(b) Write the formula of the most stable anion formed when element y ionizes.

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(1mk)

(c) Explain the difference between the atomic radius of element Y and it's ionic radius.

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(1mk)

28. Explain why the reaction between sodium carbonate is faster with hot hydrochloric acid than with cold acid.

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(2mks)

State with a reason the observation made when Sodium Carbonate solid is added into Iron (III) sulphate solution.

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(2mks)

30. State and explain the observations made when excess ammonia gas reacts with chlorine gas.

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(3mks)

31. An oxide of element F as the formula $F_2O_5$

(a) Determine the oxidation state of F.

(1mk)

(b) In which group of the periodic table is element F.

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(1mk)