Name ..... **Index No.** .....

School ..... Candidates signature .....

233/1 Date .....
CHEMISTRY
Paper 1
July/August 2016
Time : 2 Hours

WESTLANDS SUB-COUNTY JOINT EXAMINATION
Kenya Certificate of Secondary Education

CHEMISTRY
Paper 1
July/August 2016
Time : 2 Hours

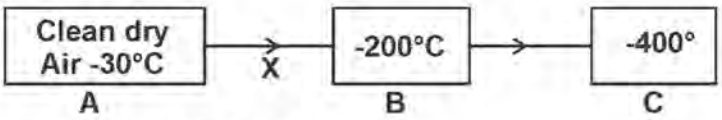
INSTRUCTIONS TO CANDIDATES

* Write your name and index number in the spaces provided.
* Sign and write the date of examination in the spaces provided.
* Answer **ALL** questions in the spaces provided in the question paper.
* Mathematical tables and silent calculators may be used.
* All working must be clearly shown where necessary.

For Examiner's Use Only

Question	Maximum score	Candidate's Score
1 - 26	80	

1. Study the flow chart given below and answer the questions that follow.



a) Identify the state of matter in box C. (1 mark)

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b) List two processes that occur at point X (i.e. between A and B) (2 marks)

i) .....

ii) .....

2. a) Name two ores from which copper is extracted. (1 mark)

i) .....

ii) .....

b) During the extraction of copper metal, the ore is subjected to FROTH FLOTATION. Give a reason why this process is necessary. (1 mark)

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c) Name one alloy of copper and state its use. (1 mark)

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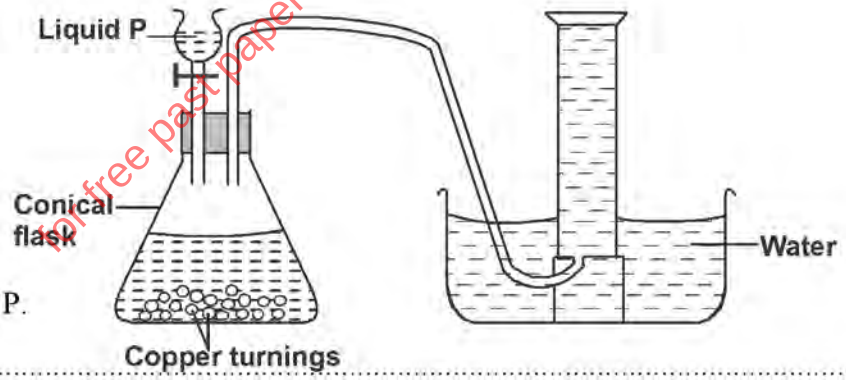
3. Study the diagram below which represents a set up used to prepare nitrogen (IV) oxide gas in the laboratory.



a) Name liquid P. (1 mark)

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b) State two observations made in the conical flask. (1 mark)

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c) Why was there no gas collected ? (1 mark)

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4. a) What is an acid ? (1 mark)

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b) Name the acid from which the following salts have been obtained. (strictly use IUPAC naming)

i) $MgSO_3$ ..... (½ mark)

ii) NaClO ..... (½ mark)

iii) $Na_2CO_3.NaHCO_3$ ..... (½ mark)

iv) $Ca_3(PO_3)_2$ ..... (½ mark)

5. Using crosses (x) and dots (•) draw the structure of carbon (II) oxide. (C = 6.0, O = 8.0) (2 marks)

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6. A radioactive isotope P decays by emitting two alpha particles and one beta particle to form

a) What is the atomic number of P ? (1 mark)

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b) After 112 days, $^1/_{16}$ of the mass of P remained, determine the half life of P. (2 marks)

$^{214}_{83}Bi$

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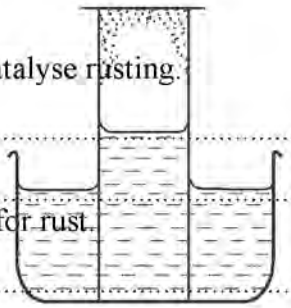
7. The diagram below shows the final set up observed after three days used to investigate the percentage of active air. Study it and answer the questions that follows.



a) Label the diagram fully. (1 mark)

b) List two conditions which catalyse rusting. (2 marks)

i) .....

ii) .....

c) Write the chemical formula for rust. (1 mark)

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d) Give two techniques used to deposit a thin metal on iron to prevent rusting.

i) ..... (½ mark)

ii) ..... (½ mark)

8. Silicon consists of three isotopes: 28 with 92.2%, 29 with 4.7% and 30 with 3.1%. Find the relative atomic mass of silicon. (2 marks)

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9. Sulphur (IV) oxide and nitrogen (IV) oxide react as shown in the equation below.

$SO_{2(g)} + NO_{2(g)} \rightarrow SO_{3(g)} + NO_{(g)}$

i) Using the oxidation numbers, show that the reaction above is a redox reaction. (2 marks)

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ii) Identify the oxidising agent. (1 mark)

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10. a) Draw the structure of the given molecules.

i) 2, 3-dimethylpentane (1 mark)

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ii) 2-Bromo-3-chlorobutane (1 mark)

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b) Give the IUPAC names of the following molecules.

i) (1 mark)

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ii) (1 mark)

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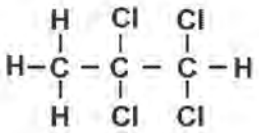
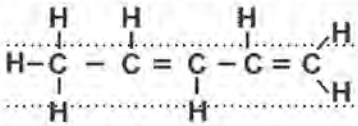
11. The diagram below shows a reaction of a clean magnesium ribbon with steam. Study it and answer the questions that follow.



a) Name two impurities removed using sand paper for magnesium ribbon to react.

i) ..... (1 mark)



ii) ..... (1 mark)

b) Write a balanced equation between steam and magnesium metal. (1 mark)

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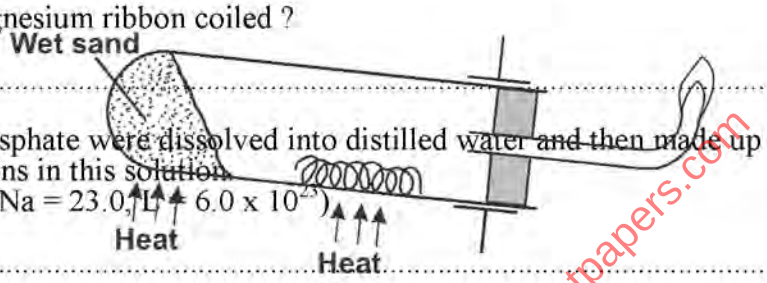
c) Why was the magnesium ribbon coiled ? (1 mark)



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12. 1.64g of sodium phosphate were dissolved into distilled water and then made up to $1dm^3$. Find the number of sodium ions in this solution.
(O = 16.0, P = 31.0, Na = 23.0, L = 6.0×10^{23}) (3 marks)

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13. Starting with solid lead (II) carbonate, solid sodium chloride, distilled water and dilute nitric (V) acid, describe how solid lead (II) chloride salt can be prepared. (3 marks)

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14. Study the information in the table below and answer the questions below the table.

Calculate the enthalpy change of the reaction.

$CH_{4(g)} + Cl_{2(g)}$ $CH_3Cl_{(l)} + HCl_{(g)}$ (3 marks)

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15. In an experiment, equal amounts of magnesium powder were placed into test tubes 1 and 2 as shown below.

Bond	Bond energy: KJ/mole
C - H	414
Cl - Cl	244
C - Cl	326
H - Cl	431

Explain why the amount of hydrogen gas liberated in test tube 2 is greater than that in test tube 1 before the reaction was complete. (3 marks)

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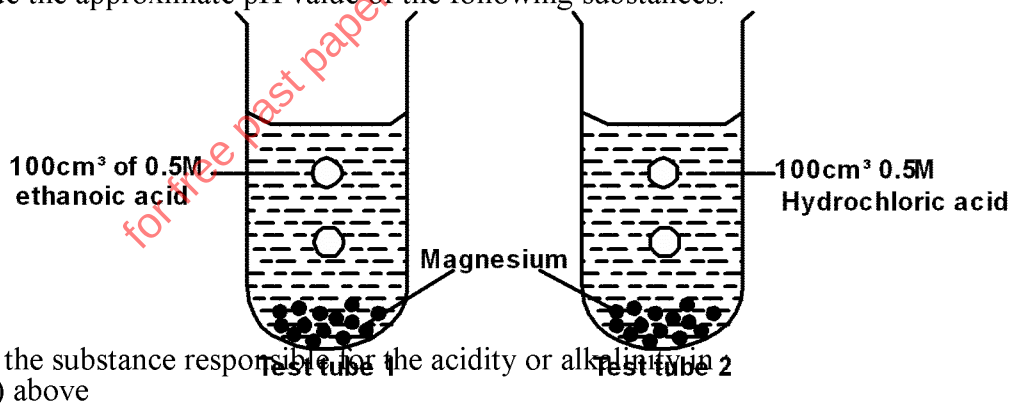
16. a) Provide the approximate pH value of the following substances.



b) Name the substance responsible for the acidity or alkalinity in

I. (a) (ii) above (1 mark)

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II. (a) (iv) above (1 mark)

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17. $48cm^3$ of an oxide of nitrogen diffused through a porous plug in the same time it took $159cm^3$ of helium to diffuse through the same plug under the same conditions. What is the molecular mass of the oxide ? (He = 4) (2 marks)

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Substance	pH value
i) Aluminium chloride solution	(½mk)
ii) Sour milk	(½mk)
iii) Distilled water	(½mk)
iv) Dilute sodium hydroxide	(½mk)

18. Hydrogen chloride gas was dissolved in water to make solution S. Solution S reacted with metal M to form salt T. About 2cm^3 of solution T was reacted with 2 drops of ammonia solution, forming a white precipitate. The precipitate dissolved on addition of excess ammonia.

a) Identify metal M ..... (1 mark)

b) Write the formula for salt T ..... (1 mark)

c) Write an equation for the reaction that took place between metal M and solution S. (1 mark)

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19. The presence of impurities affect the melting and boiling points of substances. What will be the effect of :

a) Impurity to a boiling point of a liquid. (1 mark)

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b) Name the impurity used in :

i) Extraction of sodium metal from sodium chloride (rock salt). (1 mark)

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ii) Clearing ice from road surfaces during winter time in Europe. (1 mark)

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20. The diagram below shows a piece of potassium metal which was ignited over flame and then lowered into a gas jar full of oxygen gas.

a) What is the colour of the flame ? (1 mark)

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b) Write a balanced equation for the reaction which occurred in the gas jar. (1 mark)

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c) The product of the reaction in (b) above was dissolved in water, write a balanced equation for the reaction which occurred if the conditions were maintained at 5°C. (1 mark)

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21. Identify the type of bond which is present in the following situations :

a) Mercury vapour in fluorescent bulb. (1 mark)

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b) Graphite in a pencil tip. (1 mark)

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c) Neon gas in advertising tubes. (1 mark)

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d) A thin string of viscous honey. (1 mark)

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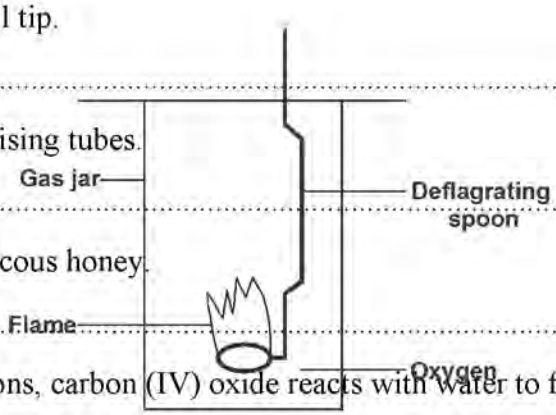

22. Under certain conditions, carbon (IV) oxide reacts with water to form methanol (CH_3OH) and oxygen as shown below.

$$2CO_{2(g)} + 4H_2O_{(l)} \qquad 2CH_3OH_{(l)} + 3O_{2(g)} \qquad \Delta H = +1452kJ / mol$$

What would be the effect on the yield of methanol if the temperature of the reaction mixture is increased ? Explain. (2 marks)

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23. Copper (II) sulphate solution was electrolysed using graphite electrodes.

a) State the observations made at the cathode. (1 mark)

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b) Write an equation for the reaction at the anode electrode. (1 mark)

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24. Group II elements are also called ALKALINE EARTH metals.

a) Provide a reason why the elements are termed as :

i) Alkaline (1 mark)

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ii) Earth (1 mark)

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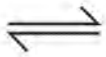
b) The diagram below shows calcium metal reacting with cold water.



i) Write a chemical equation for the reaction occurring below the filter funnel. (1 mark)

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ii) Some of the resultant solution was put into a test tube and two drops of universal indicator added. Record the pH shown by this solution. (1 mark)

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25. The equations below give the effect of heat on different substances.

I. $I_{2(s)}$ $\rightleftharpoons$ $I_{2(g)}$

II. $CuSO_4.5H_2O_{(s)}$ $\rightleftharpoons$ $CuSO_{4(s)} + 5H_2O_{(l)}$

III. $2Pb(NO_3)_{2(s)} \rightarrow 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}$

a) Give another substance which behaves like iodine. (1 mark)

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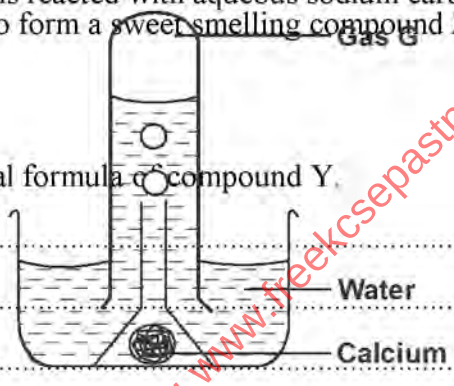
b) Classify equations II and III.

Equation II ..... (1 mark)

Equation III ..... (1 mark)

26. When an organic compound Y is reacted with aqueous sodium carbonate, it produces carbon (IV) oxide. Y reacts with propanol to form a sweet smelling compound Z whose formula is



a) Name and draw the structural formula of compound Y. (2 marks)

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b) What is the name of the group of compounds to which Z belongs ? (1 mark)

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