NAME:……INDEX……..…..DATE…….

SCHOOL:……SIGNATURE……

233/1

CHEMISTRY

PAPER 1

JULY / AUGUST, 2013

2 HOURS

SUBUKIA DISTRICT JOINT TEST

Kenya Certificate of Secondary Education 2013

233/1

CHEMISTRY

PAPER1

JULY / AUGUST 2013

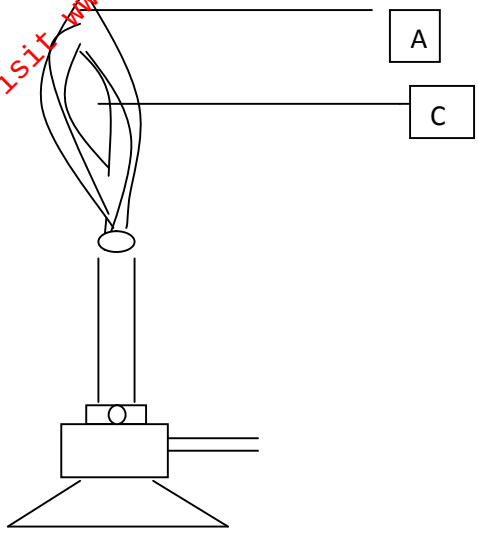
INSTRUCTIONS TO CANDIDATES

- *Answer **all** questions in the spaces provided.*
- *Mathematical tables and electronic calculators **may** be used.*
- *All workings **must** be shown where necessary*

For Examiner's Use Only

Questions	Maximum Score	Candidates Score
1-30	80	

1.The diagram below shows a Bunsen burner when in use.



a)Name the regions labeled C and A (2mks)

C……

A…….

b)State any one observation made if the air hole of the above Bunsen burner is adjusted fully. (1mk)

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2.Hardness of water may be removed by either boiling or addition of chemicals.

a)Write an equation to show how boiling removes hardness of water. (1mk)

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b)Name two chemicals that are used to remove hardness of water. (1mk)

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3.Hydrogen and Oxygen can be obtained by electrolysis of acidified water. Using equations for the reactions at the electrodes, explain why the volume of hydrogen obtained is twice that of Oxygen. (2mks)

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4.(a) Using electrons in the outermost energy level, draw the dot (.) and cross(x) diagrams for the molecules H_2O and C_2H_4 (H=1, C=6, O=8) (2mks)

H_2O

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C_2H_4

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(b) The formula of a complex ion is $[Zn(NH_3)_4]^{2+}$. Name the type of bond that is likely to exist between Zinc and Ammonia in the complex ion. (1mk)

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5.Analysis of a compound showed that it had the following composition: 69.42% Carbon, 4.13%hydrogen and the rest Oxygen.

a) Determine the empirical formula of the compound.

C=12.0, H=1.0, O=16.0) (2mks)

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b) If the mass of one mole of the compound is 242, calculate or find its molecular formula. (1mk)

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6. A sample of water in a beaker was found to boil at 102.0 ^{0}C at 1 atmospheric pressure. Assuming that the thermometer was not faulty, explain this observation. (1mk)

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7. (a) Complete the nuclear equation below: (1mk)

$$^{131}_{53}I \longrightarrow {}^{131}_{54}Xe + \_\_\_$$

b) The half-life of $^{131}_{53}I$ is 8 days. Determine the mass of $^{131}_{53}I$ remaining if 50 grammes decayed for 40 days. (1mk)

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c) Give one negative effect of radioisotopes. (1mk)

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8. When lead (II) nitrate is heated, one of the products is a brown gas.

a) Write an equation for the reaction that occurs. (1mk)

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b) If 0.58dm^3 of the brown gas was produced, what was the mass of the lead (II) nitrate that was heated?(Pb=207,N=14,O=16, Molar gas Volume=24dm^3) (2mks)

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9. Hydrogen sulphide is a highly toxic and flammable gas and is usually prepared in the fume chamber.

a) Name any two reagents that can be used to prepare hydrogen sulphide in the laboratory. (1mk)

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b) Hydrogen sulphide could be used to produced sulphur as shown in the equation below:

$2H_2S_{(g)} + SO_{2\,(g)} \longrightarrow 3S_{(s)} + 2H_2O_{(l)}$

In the equation above, identify the reducing agent and give a reason for your answer. (1mk)

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c) Other than Vulcanisation of rubber, identify two other uses of Sulphur. (1mk)

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10. a) Draw and name the structure of the compound formed when one mole of ethyne reacts with one mole of hydrogen bromide. (2mks)

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b) A certain alkyne has the molecular formula C_4H_6. Draw its structures. (1mk)

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11. Starting with $100cm^3$ of 2M sodium hydroxide solution, describe how pure sample of sodium chloride crystals can be prepared. (3mks)

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12. (a) Explain why the metals Magnesium and Aluminium are good conductors of electricity. (1mk)

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b) Other than cost, give two other reasons why aluminium is used for making electric cables while magnesium is not. (2mks)

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13. Study the standard reduction potentials given below and answer the questions that follow. (The letters do not refer to the actual symbols of the elements.)

$M^{2+}_{(aq)} + 2e^- \longrightarrow M_{(s)}$ $\quad E^{\ddot{\Theta}} = -0.76V$

$N^{2+}_{(aq)} + 2e^- \longrightarrow N_{(s)}$ $\quad E^{\ddot{\Theta}} = -2.37V$

$P^{+}_{(aq)} + e^- \longrightarrow P_{(s)}$ $\quad E^{\ddot{\Theta}} = +0.80V$

$Q^{2+}_{(aq)} + 2e^- \longrightarrow Q_{(s)}$ $\quad E^{\ddot{\Theta}} = -0.14V$

a) The $E^{\ddot{\Theta}}$ value for $Fe^{2+}_{(aq)}$ is -0.44V. Select the element that would best protect iron from rusting. (1mk)

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b) Calculate the $E^{\ddot{\Theta}}$ value for the cell represented by $M/M^{2+}_{(aq)}//P^{+}_{(aq)}/P_{(s)}$ (2mks)

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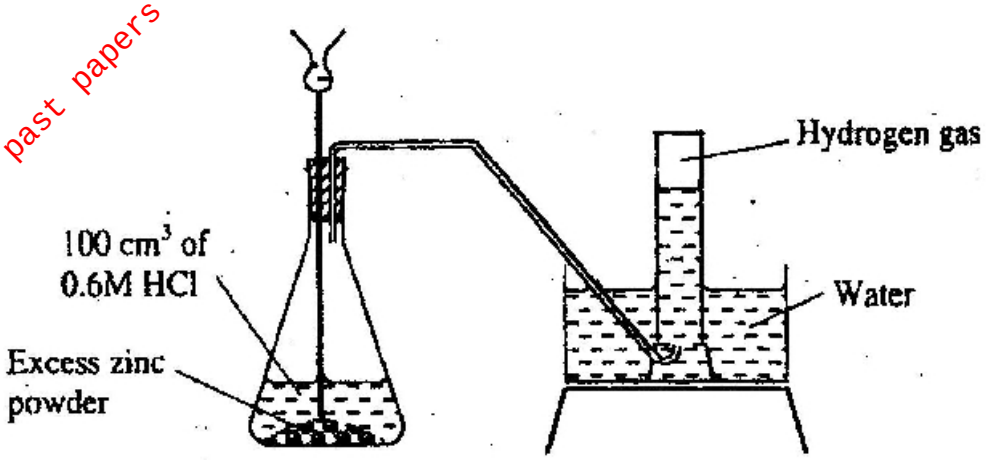
14. The diagram below shows a student's set up for the preparation and collection of hydrogen gas.



a) Supposing the student used 200cm^3 of 0.3M HC l, how would the final volume of hydrogen gas produced compare with the above? Explain. (1Mk)

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b) Explain why;

i) Helium is increasingly being preferred to hydrogen in weather balloons. (1mk)

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ii) Hydrogen, though an ideal fuel, is not commonly used. (1mk)

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15. Dinitrogen (1v) oxide (N_2O_4) decomposes in a closed container according to the following equation:

$N_2O_{4\,(g)} \rightleftharpoons 2NO_{2\,(g)}$; $\Delta H = +57kJ$ mol.

(Pale yellow) (Brown)

State and explain the observations made if:

a) The container is made warm gently ($1^1/_2$mk)

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b) Some $N_2O_{4(g)}$ is let out of the container($1^1/_2$mk)

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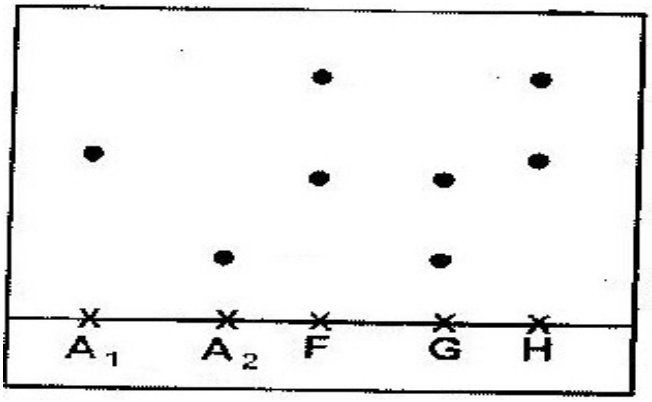
16. Samples of urine from three participants F, G and H at a sporting event were spotted on a chromatography paper alongside two from illegal drugs A_1 and A_2. The figure below shows the final chromatography after methanol solvent was added.



a) Identify the athlete who used an illegal drug. (1mk)

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b) Which drug is more soluble in methanol? (1mk)

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17. When Magnesium was burnt in air, a solid mixture was formed. On addition of water to the mixture, a gas which turns moist red litmus paper blue was evolved. Explain the observations. (2mks)

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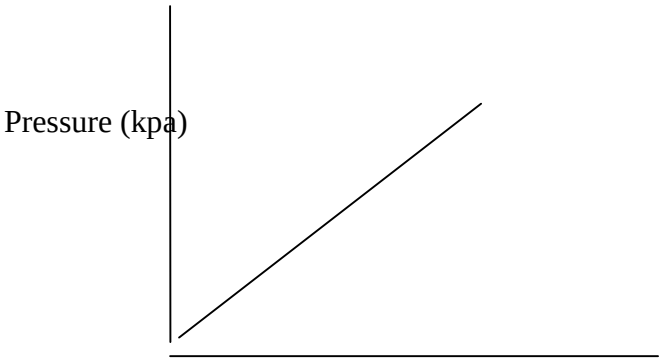
18. The graph below shows the relationship between pressure and temperature of a gas in a fixed volume container.



a)State the relationship between pressure and temperature that can be deduced from the graph. (1mk)

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b) Use the Kinetic Theory on energy to explain the relationship shown in the graph. (2mks)

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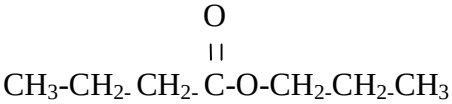
9. The structure below represents a sweet smelling compound.



Give the names of two organic compounds that can be used to prepare this compound in the laboratory. (2mks)

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20. When 8.53g of sodium nitrate were heated in an open test tube, the mass of oxygen gas produced was 0.83g. given the equation of the reaction as;

$2NaNO_{3(s)} \longrightarrow 2NaNO_{2(s)} + O_{2\,(g)}$

Calculate the percentage of sodium nitrate that was converted to sodium nitrite.

Na=23, N=14, O=16) (3mks)

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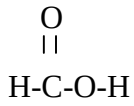
21. The structure of methanoic acid is;



What is the total number of electrons used for bonding in a molecule of methanoic acid? Give reasons. (2mks)

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22. (a) Dry blue and red litmus papers were dropped in a gas containing chlorine gas. State and explain the observation made. (1mk)

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b) A student is provided with dilute hydrochloric acid. Describe how the student would use the acid to distinguish barium sulphite from barium sulphate. (2mks)

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23. 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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24. A certain mass of a gas occupies 150cm^3 at 20^{0}c and 98.7 kpa. Calculate the volume it would occupy at S.T.P. (2mks)

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25. The table below shows some properties of three elements in group VII of the periodic table. Study it and answer the questions that follow.

Element	**Atomic no**	**melting point (^{0}C)**	**boiling point (^{0}C)**
Chlorine	17	-101	-34.7
Bromine	35	-7	58.8
Iodine	53	114	184

a) Which element is a liquid at room temperature? Give a reason. (1mk)

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b) Explain why the boiling point of iodine is much higher than that of chlorine. (2mks)

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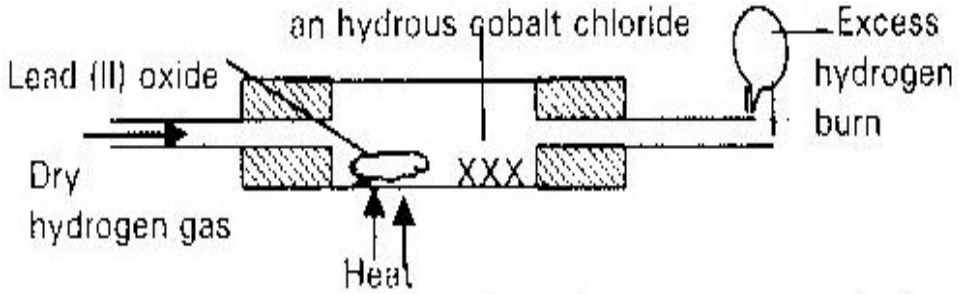
26. In an experiment, dry hydrogen gas was passed over heated lead (II) oxide as shown in the diagram below.



State and explain the observations made in the combustion tube. (2mks)

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27. Hydrated cobalt (II) chloride exists as pink crystals and anhydrous cobalt (II) chloride is a blue powder. Describe a laboratory experiment that can be used to show that the action of heat on hydrated Cobalt (II) chloride is a reversible reaction. (3mks)

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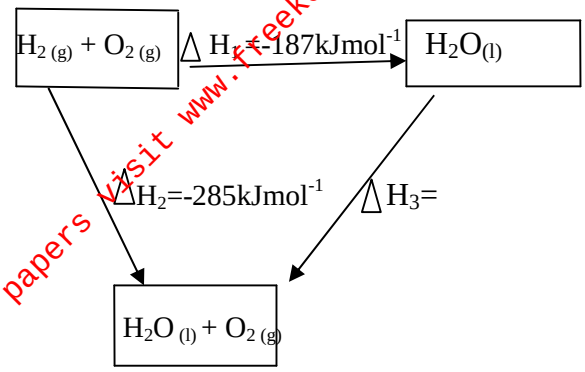
28. The figure below shows an energy cycle;



a) Give the name of the enthalpy change ΔH1 (1mk)

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b) Determine the value of ΔH_3 (2mks)

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29. A student was provided with the following set of apparatus;

A water trough, aqueous sodium hydroxide, burning candle, watch glass and a graduated gas jar. Draw a well labeled diagram of the set up of the apparatus at the end in an experiment to determine the percentage active part of air. (3mks)

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30. During the electrolysis of aqueous silver nitrate, a current of 5.0A was passed through the electrolyte for 3hrs.

a)Write the equation for the reaction that took place at the anode. (1mk)

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b) Calculate the mass of silver deposited. (Ag=108, IF=96500C) (2mks)

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