Name.. Signature..

School... Index No..

545/2
CHEMISTRY
Paper 2
July/August 2018
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES;

- *Section A consists of 10 structured questions. Answer all questions in this section.*

  Answers to these questions must be written in the spaces provided.

- *Section B consists of 4 semi – structured questions. Answer any two questions from this section.*

  Answers to section B must be written in the answer booklet/sheets provided and stapled at the back of the question paper.

- *Show all your working clearly in both sections.*
  Where necessary use;
  [Mg= 24 Ag=108, C = 12, O = 16, H = 1, Molar gas volume at s.t.p = 22.4dm³]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

Turn Over

SECTION A

Answer all questions in this section.

1. a) Define the term "flame".   (1 mark)

_____

_____

    b) Figure 1 below is the structure of a Bunsen burner luminous flame obtained as a result of burning methane. Study it and answer the questions that follow.
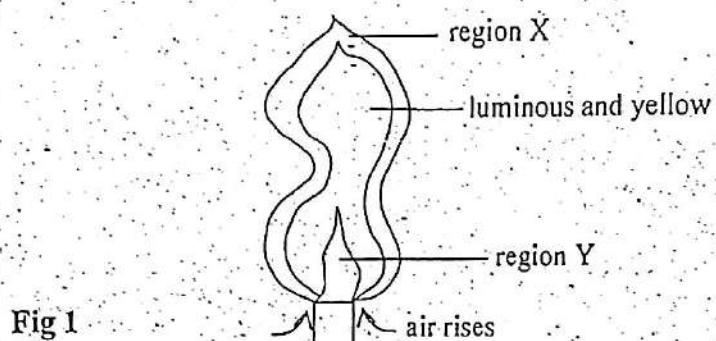
Fig 1

State what is observed when a match stick head is put at;

    i) region X _____ (½ mark)

_____

    ii) region Y _____ (½ mark)

_____
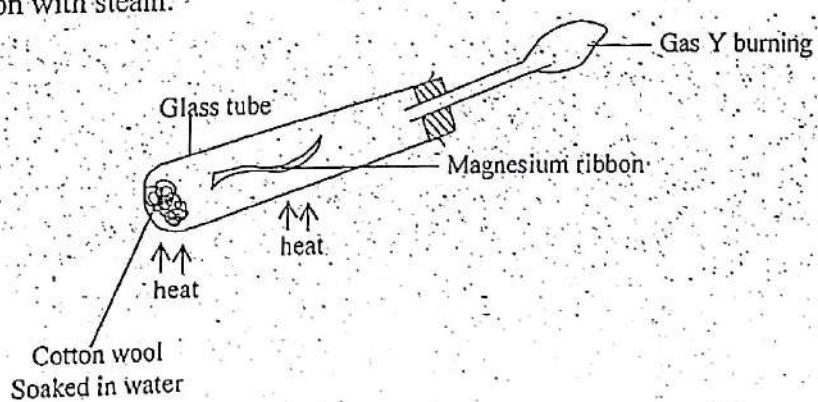
    c) Briefly explain your answer in b(ii) above.   (1 mark)

_____

_____

    d) Write the equation of the reaction taking place at the luminous and yellow zone.
                                                                                 (1½ marks)

2. a) The diagram below shows a setup of apparatus that can be used to react Magnesium ribbon with steam.

    i) State what was observed inside when the tube was strongly heated.   (1 mark)

_____

_____

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ii)   Write the equation for the reaction that took place in the tube.   (½ mark)

_____

_____

b)   Gas Y was passed over heated copper (II) oxide.   (1 ½ mark)

i)   Write the equation for the reaction that took place.

_____

_____

c)   The residue in (a) was dissolved in dilute hydrochloric acid and to the resultant solution, aqueous ammonia was added drop wise until in excess.

i)   State what was observed.   (1 mark)

_____

ii)   Write the ionic equation for the reaction that took place.   (1 ½ marks)

_____

_____

3.   a)   Define the term basicity of an acid.   (1 mark)

_____

_____

b)   State one example in each case of a mineral acid that is;   (1 mark)
     i)   Dibasic

_____

     ii)   Mono basic   (1 mark)

_____

c)   i)   Write the equation for the reaction between the acid named in b(i) and aqueous ammonia.   (1 ½ marks)

_____

_____

     ii)   State one use of the product in c(i) above.   (½ mark)

_____

4.   The figure below shows part of the periodic table. The letters are not the usual symbols of the elements used.

I	II	III	IV	V	VI	VII	VIII
					L		Y
		M		H			
X	K		J			P	
F	Z						

a) Give the general name given to the elements belonging to the group of;

   i) X _____

   ii) Z _____

   iii) P. _____   (1½mark)

b) Arrange elements F, K, M, X and Z in order of their increasing reactivity (1 mark)

_____

_____

c) State whether the compound formed between the following pairs of elements conduct or do not conduct electricity.

   i) J and P _____

   ii) M and L _____   (1 mark)

d) Name the conducting species in;

                                                   (½mark)

   i) Element Z _____

   ii) Compounds formed between M and L _____

                                                   (1 mark)

5. a) Define the term Molar gas volume.   (1 mark)

_____

_____

b) Silver nitrate crystals decompose on heating according to the equation.

$$2AgNO_3(s) \longrightarrow 2Ag(s) + 2NO_2(g) + O_2(g)$$

Calculate the mass of silver nitrate required to produce $448cm^3$ of nitrogen dioxide. (Ag = 108, N=14, O = 16, 1 mole of a gas occupies $22.4dm^3$ at s.t.p) (2½ marks)

_____

_____

_____

_____

c) Suggest one anion that can be identified by silver nitrate solution and state the observation. (1½ marks)

_____

_____

_____

6. A mixture of sulphur and concentrated nitric acid was heated in a round bottomed flask.

   i) State what is observed   (1 mark)

_____

_____

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ii). Write an equation of reaction that took place. (1½ mark).

_____

_____

b) The gaseous product in (a) above dissolved in water to form two acids
   i) Name the two acids formed. (1 mark)

_____

_____

   ii) Write an equation for the reaction in b (i) above (1½ marks)

_____

_____

_____

7. a) Chlorine gas can be prepared in the laboratory by heating concentrated hydrochloric acid and substance Z.
   i) Identify Z. (½mark)

_____

   ii) Write the equation for the reaction leading to the formation of chlorine. (1½ marks)

_____

_____

   b) Dry chlorine gas was passed separately over dry and damp red litmus paper. State what is observed with;
   i) Dry red litmus paper (½ mark)

_____

   ii) Damp red litmus paper (½ mark)

_____

   c) Write equation for the reactions in b (ii) above (2 marks)

_____

8. When Lead (II) oxide was separately treated with gases A and B, lead metal was formed. Gas B however burns in air forming an acidic gas Y.
   a) (i) Identify gases;
      A _____ (½ mark)
      B _____ (½ mark)
      Y _____ (½ mark).
   (ii) Name one other substance that can be used instead of gases A and B. (½ mark)

_____

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b) Write equations to show how; (1½ marks)

i) gas A reacts with lead (II) oxide.

_____

_____ (1½ marks)

ii) gas B reacts with air to form Y.

_____

_____ (1 mark)

9. a) Define the term saturated hydro carbon.

_____

_____ (1 mark)

b) Give the structural difference between ethene and ethane

_____

_____

i) Name one reagent that can be used to distinguish ethene from ethane in the
laboratory. (½mark)

_____

_____

ii) State what is observed when the reagent named in b(i) above is separately
treated with ethene and ethane. (1 mark)

_____

_____

iii) Write the equation for the reaction between ethene and the reagent named in
b(i) above. (1½mark)

_____

_____ (1 mark)

10. a) Define Enthalpy of combustion.

_____

_____

b) When 3.2g of Methanol was burnt completely, the heat produced raised the
temperature of 50g of water from 24.5°C to 37°C. Calculate the heat of combustion of
Methanol
(C=12, H=1, O=16, specific heat capacity of water is 4.2J/g/°C, 1 mole of methanol
weighs 32g) (3 marks)

_____

_____

c) State one use of methanol other than being a fuel (1 mark)

_____

_____

SECTION B

Answer any two questions in this section.

11. a) What is meant by reaction rate? (1 mark)

    b) Describe an experiment to show the effect of concentration of reactants on the rate of the reaction. (7 marks)

    c) 2.4g of Magnesium powder was added to 25cm³ of dilute sulphuric acid at 23⁰C.
       i) Sketch a graph to show how the rate of the reaction would vary with temperature. (2 marks)

       ii) On the same graph, sketch another graph to show what would happen to the rate when the temperature was increased to 30⁰C but keeping the mass of Magnesium powder. (1 mark)

       iii) Explain the shape of your graphs in c(ii) above. (1 mark)

       iv) Calculate the molarity of the acid (Mg = 24 , H=1 , S = 32 , O = 16) (3 marks)

12. a) i) State one reason why air is considered a mixture and not a compound. (1 mark)

       ii) Name one method by which the components of air can be separated. (1 mark)

    b) Oxygen gas can be prepared in the laboratory by addition of water to substance Q
       i) Identify Q. (1 mark)

       ii) Write the equation for the reaction between water and Q. (1½ mark)

       iii) Draw a well labelled diagram of the setup of apparatus that can be used to prepare oxygen from substance Q. (2½ mark)

    c) A piece of burning sulphur was lowered into a gas jar of oxygen.
       i) State what was observed. (1 mark)
       ii) Write equation for the reaction that took place. (1½ marks)

    d) Water was added to the gaseous product in (c) and to the resultant solution a red rose flower was immersed.
       i) State what was observed. (1 mark)
       ii) Write equation for the reaction between water and the gaseous product in (c). (1½ marks)
       iii) Explain your observation in d(i) above. (2 marks)

    e) State how the gaseous product in(c) can be identified in the laboratory. (1 mark)

13. a) Describe with the aid of a diagram how a dry sample of hydrogen sulphide gas can be prepared in the laboratory. (4 marks)

    b) (i) State how hydrogen sulphide can be identified in the laboratory. (1 mark)

       (ii) Write equations to support your answer in b(i) above. (1½ marks)

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c) A gas jar of hydrogen sulphide was inverted over one with sulphur dioxide.

(i) Name the solid product formed. (½ mark)

(ii) Write equations for the reaction that took place. (1½ marks)

d) With the aid of equations, show how sulphur can be converted to sulphuric acid. (6½ marks)

(1 mark)

14. a) State one difference between fats and oils.

b) Soap is prepared from vegetable oil and sodium hydroxide solution. (1 mark)
   i) Name the process of manufacture of soap.
   (1 mark)
   ii) State the conditions for the reaction.
   (1 mark)
   iii) Name one substance that must be added to precipitate out soap.

c) Describe how soap can clean dirt on a piece of cloth. (5 mark)

d) Soap is one of the substances that can pollute water. Describe the process of polluted water treatment. (4 marks)

e) Give two importance of the bi-products of sewage treatment. (2 marks)

END

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  Where necessary use;
  [Fe = 56, C = 12, O = 16, H = 1, Molar gas volume at s.t.p = 22.4dm³]

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

Turn Over

SECTION A (50 MARKS)

Answer **all** questions in this section.

1. (a) Ammonium chloride and Lead (II) nitrate behave differently on heating. Which one undergoes;

   (i) Temporary change. (½ marks)

   ....

   (ii) Permanent change. (½ marks)

   ....

   (b) Write an equation to show how Lead (II) nitrate decomposes when heated

   strongly; ....

   .... (1½ marks)

   (c) Ammonia chloride was dissolved in water and to the resultant solution dilute nitric acid and silver nitrate were added.

   (i) State what was observed..

   .... (1mark)

   (ii) Write an ionic equation for the reaction that took place (1½ marks)

   ....

   ....

2. (a) Distinguish between mass number and atomic number. (01 mark)

   ....

   ....

   ....

   (b) Complete the table below showing atoms of elements V, W, X and Y. (The letters are not the usual symbols of the elements)

Elements	No. of neutrons	Mass number	Electronic configuration
$^{37}_{17}V$			
$^{13}_{6}W$			
$^{.....}_{.....}X$	12		2:8:1
$^{...}_{9}Y$		19	

(04 marks)

3. (a) What is an Oxide? (01 mark)

   ....

   ....

(b) Given the oxides Sulphur trioxide, Carbon monoxide, Aluminium oxide, Sodium oxide and Carbon dioxide. State the oxide(s) that can react with:

    (i)   acids only;   (01 mark)

    ....

    (ii)   alkali only;   (01 mark)

    ....

    (iii)   both acid and alkali   (01 mark)

    ....

    (iv)   neither acid nor alkalis   (01 mark)

    ....

    ....
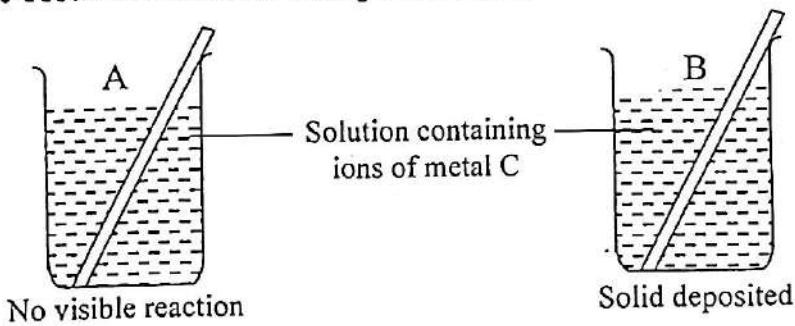
4. (a) Define the term electropositivity ....(01 mark)

    ....

Two rods A and B of different metals were placed in a solution containing ions of their metal C. The observations made were given below;

    A   — Solution containing —   B
                      ions of metal C
    No visible reaction   Solid deposited

(b) Arrange the metals A, B and C in order of their electro positivity (ending with the least electro positive)   (01½ marks)

    ....

    ....

(c) A ring made of iron can be protected by coating it with silver. Draw a diagram of the setup of apparatus that can be used to coat an Iron ring with silver.

                                                      (02½ marks)
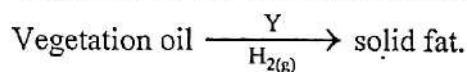
5. A compound A, contains 59%, sodium and the rest is Oxygen.
   (a) Calculate the molecular formular of the compound given that the relative formula mass of the compound is 78 (Na = 23, O = 16) (3½ marks)

....
....
....
....
....
....
....

   (b) Write an equation for the reaction between the compound A and water:
   (1½ marks)

....
....

6. Vegetable oil can be converted to a solid fat by the following equation.

   Vegetation oil $\xrightarrow[H_{2(g)}]{Y}$ solid fat.

   (a) (i) Name the process being illustrated (01 mark)

....

       (ii) Identify Y and state its role in the process (02 marks)

....

   (b) State one industrial application of the process in a(i) above (01 marks)

....

   (c) Vegetable oil was boiled with aqueous sodium hydroxide and a salt was formed. Name the compound formed. (01 mark)

....

7. (a) A Daniel cell is an example of a chemical cell. Identify the
       (i) cathode... (01 mark)

       (ii) electrolyte at anode in the Daniel cell.

.... (01 mark)

   (b) Write equation for the reaction at each electrode (02 marks)

       Cathode; ....

....

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Anode;...

....

(c) State one disadvantage of the cell.   (01 mark)

....

....

8. (a) Name the method that can be used to prepare Lead (II) Sulphate crystals in the
         laboratory.   (01 marks)

....

    (b) Write the equation leading to the formation of Lead (II) Sulphate in the
         laboratory.   (1½ marks)

....

    (c) State what is observed when ammonia solution is added drop wise until in
         excess to a solution containing.   (1½ marks)
         (i) Zinc ions.

         ....

         ....

         (ii) Lead (II) ions.   (01 marks)

         ....

9. (a) Concentrated sulphuric acid is not a suitable drying agent for ammonia.
         (i) Give a reason for the observation above.   (2½ marks)

         ....

         ....

         (ii) Write the equation to support your answer in a(i) above.   (1½ marks)

         ....

         ....

    (b) Dry ammonia gas was passed over heated Lead (II) Oxide in a combustion tube
         (i) State what was observed.   (01 mark)

         ....

         ....

         (ii) Write an equation for the reaction that took place.   (1½ marks)

         ....

         ....

10. 4g of an alloy of Copper and Zinc when reacted with excess hydrochloric acid gave
     840cm³ of hydrogen gas measured at s.t.p.
     (a) Name the alloy.   (01 mark)

     ....

                                                                               Turn Over

(b) Write the equation for the reaction that took place. (1½ marks)

....

....

(c) Calculate the mass of copper in the alloy. (1½ marks)

....

....

....

....

....

....

(d) State one use of the alloy named in (a) above (01 marks)

....

SECTION B (30 MARKS)

Answer two questions in this section.

11. (a) With the aid of a labeled diagram describe the structure of a diamond crystal.
   (04 marks)

(b) Diamond was burnt in excess air to produce gas Y.
   (i) Identify gas Y. (01 mark)
   (ii) Write the equation for the reaction that took place. (1½ marks)

(c) Gas Y was passed through sodium hydroxide solution for a long time.
   (i) State what was observed. Explain the observation (2½ marks)

(d) Describe how sodium carbonate powder can be prepared on large scale.
   (6½ marks)

12. (a) Describe how a sample of nitrogen can be obtained from air. (05 marks)
   (diagram not required)

(b) (i) Write the equation for the reaction between nitrogen and hydrogen.
      (1½ marks)
   (ii) State the conditions for the reaction above. (01 mark)

(c) Starting with ammonia, describe how nitric acid can be prepared on industrial scale. (5½ marks)

(d) Write the equation for the reaction between copper and;
   (i) Dilute nitric acid. (1½ marks)
   (ii) Concentrated nitric acid (1½ marks)

13. (a) (i) Describe the process of preparation of ethanol from starch. (4½ marks)
   (ii) Write the equation for the process in a(i) above. (1½ marks)

(b) Ethanol can be dehydrated using sulphuric acid to form compound P.
  (i) Name the class of the organic compound to which P belongs. (01 mark)
  (ii) Write the general formula of the class of the compound to which P belongs. (01 mark)

(c) (i) Name the reagent that can be used to identify P in the laboratory. (01 mark)

  (ii) State what is observed when P is treated with the reagent named in c (i) (01 mark)

(d) Polyethene is prepared by addition polymerization.
  (i) State what is meant by the term addition polymerization. (01 mark)
  (ii) Name the monomer units in polyethene. (01 mark)
  (iii) Write the equation for the reaction leading to formation of polyethene. (01 mark)

(e) (i) Give one disadvantage of polyethene. (01 mark)
  (ii) Suggest one way of overcoming the disadvantage mentioned in e(i) above. (01 mark)

14. (a) Define the following terms;
  (i) Enthalpy of solution. (01 mark)
  (ii) Enthalpy of neutralization. (01 mark)

  (b) The table below shows heat changes obtained when seven portions of 50cm^3 of 2M sodium hydroxide solution were each placed in insulated plastic beakers and the temperature noted.
  Various quantities of hydrochloric acid all at the same temperature were added in each beaker and the temperature rise noted.

Volume of NaOH (cm^3)	50	50	50	50	50	50	50
Volume of HCl (cm^3)	20	40	60	80	100	120	140
Heat evolved (KJ)	1.1	2.2	3.4	4.5	5.6	5.6	5.6

  (i) Plot a graph of heat change against the volume of hydrochloric acid. (4½ marks)

  (ii) From the graph determine the volume of hydrochloric acid required to completely neutralize 50cm^3 of 2M sodium hydroxide. (01 mark)

  (c) Calculate
  (i) The number of moles of sodium hydroxide contained in 50cm^3 of the solution. (2½ marks)
  (ii) The concentration in moles per litre of the hydrochloric acid. (2½ marks)

  (d) Determine the molar heat of neutralization for the reaction. (02 marks)

END

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  Where necessary use;
  [Ba = 137, C = 12, O = 16, H = 1, S = 32, Na= 23, Molar gas volume at s.t.p = 22.4dm³]

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

Turn Over

SECTION A (50 MARKS)

Answer all questions in this section.

1. Dilute sulphuric acid was added to magnesium ribbon, a gas W was evolved

   (a) (i) Identify W.. (½ mark)

   (ii) Write equation for the reaction leading to the formation of W.   (1½ mark)

   ....

   ....

   (b) When dry W was burnt in air and the vapour condensed, a colourless liquid Q was formed.

   (i) Name one compound that can be used to identify Q.   (1 mark)

   ....

   ....

   (ii) State what is observed when the named compound in b(i) is treated with liquid Q   (1 mark)

   ....

   ....

   (iii) Write equation for the reaction between Q and the compound named in b(i)   (1mark)

   ....

   ....

2. (a) Define the term solubility of a salt.   (1mark)

   ....

   ....

   (b) The solubility of salt X is 65g/100g of water at 80^{0}C and 42g/100g of water at 30^{0}C. Calculate the mass, of X that will crystallise by cooling 16g of saturated solution X from 80^{0}C to 30^{0}C.   (2½ marks)

   ....

   ....

   ....

(c)   Water from lake Katwe consists of a mixture of sodium carbonate and sodium chloride.

   (i)   State the method that can be used to separate the two salts.   (1 mark)

....

   (ii)   Hydrochloric acid was added to the mixture in (c) above.
          Write ionic equation for the reaction that took place.   (1½ marks)

....

3.   (a)   Carbon dioxide can be prepared by reacting dilute hydrochloric acid with marble Chips.

   (i)   Write ionic equation for reaction leading to the formation of carbon dioxide.   (1½ marks)

....

   (b)   Burning magnesium was lowered into a gas jar of carbon dioxide.

   (i)   State what was observed.   (1 marks)

....

   (ii)   Give a reason for your observation in b(i).   (1 mark)

....

   (iii)   Write equation for the reaction that took place.   (1½ marks)

....

....

4.   (a)   When a dry mixture of hydrogen and nitrogen was passed over finely divided Iron, gas R was formed.

   (i)   State two other conditions other than that mentioned in(a) that are necessary for the formation of gas R.   (01 marks)

....

....

   (ii)   Write equation for the reaction that took place in (a).   (1½ mark)

....

....

....

   (b)   A gas jar of R was inverted over a gas jar of hydrogen chloride.

   (i)   State what was observed.   (01 mark)

....

....

   (ii)   Write equation for the reaction that took place.   (1½ marks)

....

....

....

5. (a) A hydro carbon W of molecular mass 58 contains 82.8% carbon and 17.2% hydrogen. Calculate;
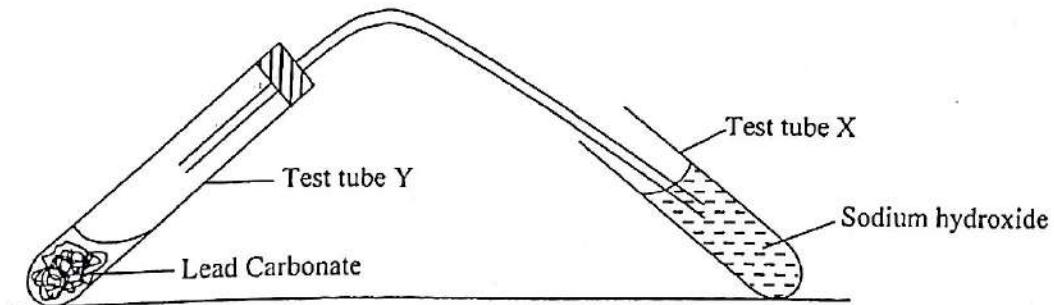
   (i) Emperical formular of W. (02 marks)

   ....

   ....

   (ii) Molecular formular of W. (01 mark)

   ....

   ....

   ....

   ....

(b) Hydrocarbon Y has C_4H_8 as its molecular formular.
   (i) Write down the structure of Y. (01 mark)

   ....

   ....

   (ii) State the structural difference between Y and W. (01 mark)

   ....

   ....

   ....

   ....

6.

Test tube X
Sodium hydroxide
Test tube Y
Lead Carbonate

(a) (i) State what was observed when the content of test tube Y was strongly heated until no further change and then left to cool. (01 mark)

   ....

   ....

   ....

   ....

(ii) Write equation for the reaction that took place in test tube Y. (1½ marks)

....

....

(b) (i) State what was observed when the gaseous product from test tube Y was bubbled through sodium hydroxide for a long time. (01 mark)

....

....

....

....

(ii) Write equation(s) for the reaction that took place. (1½ marks)

....

....

7. (a) Define the term Electrolyte. (1 mark)

....

....

(b) Name one substances that uses the following for conducting electricity.

(i) Free electrons (½ mark)

....

....
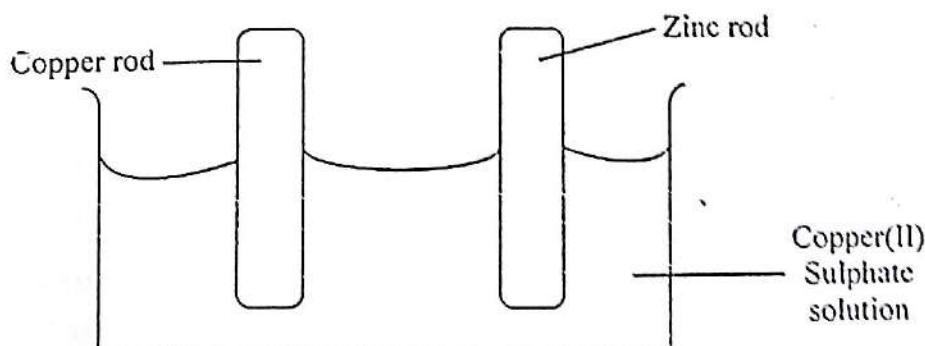
(ii) Ions (½ mark)

....

....

(c) Figure 1. Shows an electrolyte cell, study it and answer the questions below;

State what was observed at
(i) Zinc Rod (1 mark)

....

....

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(ii) Copper Rod (1 mark)

....

....

(iii) Briefly explain your observation in; a (i) and (ii) (1 mark)

....

....

8. 7.5g of methane was completely burnt in air according to the following equation.

$$CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$$

$$\Delta H = {}^-890 kjmol^{-1}$$

(a) Calculate the volume of carbon dioxide formed at s.t.p (2 marks)

....

....

(b) The heat evolved (2 marks)

....

....

9. (a) Barium sulphate can be prepared by reacting sodium sulphate and Barium chloride.

(i) State the method of preparation being used. (1 mark)

....

....

(ii) Write ionic equation for the reaction that takes place when the two compounds are reacted. (½ mark)

....

....

(b) Excess Barium chloride was added to a solution containing 3.55g of sodium sulphate and the mixture filtered.
Calculate the mass of the precipitate formed. Na = 23, S = 32, O = 16, Ba = 137 (3 marks)

....

....

....

....

10. Impure alcohol can be prepared from a solution of glucose $C_6H_{12}O_6$ mixed with yeast.
(a) (i) Name the process by which glucose in the presence of yeast can be converted to alcohol. (1 mark)

....

....

(ii) State the role of yeast. (1 mark)

....

....

(iii) Write equation for the reaction leading to the formation of the alcohol. (1 mark)

....

....

(b) State;
(i) how alcohol can be purified. (1 mark)

....

....

....

(ii) One method that can be used to test for the purity of the alcohol. (1 mark)

....

....

SECTION B   30 MARKS

11. (a) Using a diagram, describe the laboratory preparation of dry chlorine by oxidation of potassium manganite (VII) (5 marks)

(b) Litmus solution was poured into a gas jar of chlorine gas
(i) State what was observed. (1 mark)
(ii) With the aid of suitable equation, explain your observation in b(i) above. (4marks)

(c) Chlorine gas was bubbled through water and the resultant solution exposed to bright sunlight in an inverted tube.

(i) State what was observed (1 mark)

(ii) Write equation for the reaction that took place when the solution was exposed to sunlight. ($1\frac{1}{2}$marks)

(d) A gas jar of hydrogen sulphide was inverted over a gas jar of chlorine.

(i) State what was observed (1mark)

(ii) Write equation for the reaction that took place. ($1\frac{1}{2}$ marks)

12. (a) (i) Describe how pure sample of sodium carbonate can be obtained in the laboratory starting with dilute hydrochloric acid.
(your answer should include equations for the reaction) (5 marks)

Turn Over

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(b) A concentrated solution of sodium carbonate was added to water containing calcium ions.
   (i) State what was observed.
   (ii) Write equation for the reaction that took place. (3½ marks)

(c) 15.0g of a mixture of sodium carbonate and sodium sulphate was added to distilled water in a volumetric flask and the solution made up to 1000cm³ with distilled water. 25cm³ of this solution required 12.5cm³ of 0.2M sulphuric acid for complete reaction.
   (i) Write equation for the reaction that took place. (1½ marks)
   (ii) Calculate the mass of sodium carbonate in the mixture. (3½ marks)
   (iii) Find the percentage of sodium carbonate in the mixture. (1½ marks)

13. (a) What is meant by the term rate of reaction (1 mark)

(b) Briefly describe an experiment that can be carried out to determine the effect of concentration on the rate of reaction between sodium thiosulphate and dilute hydrochloric acid. (5marks)

(c) In order to determine the rate of reaction between magnesium and 0.1M hydrochloric acid. The acid was added to magnesium powder.
   (i) Sketch a graph of volume of gas produced against time for the above reaction and label it X. (2 marks)
   (ii) Using the same axes sketch a graph of volume against time if magnesium ribbon is used instead of magnesium power and label it Y. (1 marks)
   (iii) Explain the difference between the two curves X and Y. (2 marks)

(d) Magnesium ribbon was put in a test tube containing 120cm³ of 5.2m nitric acid until the evolution of the gas stopped. Calculate the mass of magnesium that reacted with the acid. (4 marks)

14. Explain each of the following observations;

(a) A solution of Barium chloride reacts with sodium sulphate solution to give a white precipitate insoluble in dilute hydrochloric acid, where as a solution of Barium chloride reacts with sodium sulphite solution to give a white precipitate that dissolves in dilute hydrochloric. (4½marks)

(b) At low temperature (10⁰C) nitrogen does not react with magnesium. However it reacts with Burning magnesium to form a white solid which dissolves in water evolving a colourless alkaline gas. (5marks)

(c) When sodium hydroxide solution is added to a solution containing zinc sulphate a white precipitate soluble forming a colourles solution is formed. (3½ marks)

(d) Dilute sulphuric acid conducts electricity but concentrated sulphuric acid does not. (2 marks)

END

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545/2
CHEMISTRY
Paper 2
July /August2014
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES

- *Section A consists of 10 structured questions. Answer* **all** *questions in this section.*

  Answers to these questions **must** *be written in the spaces provided.*

- *Section B consists of 4 semi – structured questions. Answer any* **two** *questions from this section.*

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- *Show all your working clearly in both sections.*
  Where necessary use;
  [1F = 96500C, C = 12, H = 1, O = 16, N = 14, Ca = 40, S = 32, K = 39
  Molar gas volume at s.t.p = 22.4dm³]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

Turn Over

SECTION A (50 MARKS)
Answer all questions in this section.

1. Large scale preparation of nitrogen is done by passing air through solution A and then over heated metal Z.

   (a) Identify

      (i)   solution A .... (½ mark)

      (ii) metal Z .... (½ mark)

   (b) State the role of solution A and metal Z in the above process.

      (i)   Solution A .... (½ mark)

      (ii) Metal Z .... (½ mark)

   (c) Write equation of the reaction that took place when air was passed

      (i)   through solution A .... (½ mark)

      (ii) Over heated metal Z .... (½ mark,

2. a) Steam was passed over heated iron fillings in a combustion tube.

    i) State what was observed. (1 mark)

    ....
    ....

    ii) Write equation for the reaction that took place (1½ marks)

    ....
    ....

  b) The gaseous product in a (i) was dried and burnt in excess air to form substance Q.
    i) Name one compound that can be used to identify Q. (½ mark

    ....

    ii) State what is observed when Q is treated with the compound named in b (i)
    (1 mark

    ....
    ....

    iii) Write equation for the reaction that took place in b(ii) (1 mark

    ....
    ....

3. a) Define the term relative atomic mass. (1 mark

    ....
    ....
    ....

b) An element W has mass number 27 and 14 neutrons.
   i) Write down the electronic configuration of W. (1 mark)

   ....

   ii) W combines with oxygen to form compound R, write down the formula of R and state the type of bond in R.
   Formula (½ mark)

   ....

   Type of bond (½ mark)

   ....

c) R was dissolved in dilute hydrochloric acid and to the resultant solution was added ammonium hydroxide drop wise until in excess.
   i) State what was observed. (1 mark)

   ....

   ii) Write ionic equation to explain the observation made in c (i) above. (1½ mark)

   ....

4. a) Water was dropped onto Calcium oxide placed on a petri dish.
   i) State what was observed (1 mark)

   ....

   ii) Write equation for the reaction that took place (1½ mark)

   ....

   b) To the resultant solid was added ammonium chloride and the mixture heated.
   i) Write equation for the reaction that took place. (1½ mark)

   ....

   ....

   ii) State how the gaseous product in b(i) above can be identified. (1 mark)

   ....

5. 1.5g of a hydro carbon M consists of 1.2g of carbon.

   a) Calculate the empirical formula of M. (2 marks)

   ....

   ....

   ....

   ....

   ....

Turn Over

b) 0.125g of hydro carbon M occupies a volume of $100cm^3$ at room temperature and pressure (1 mole occupies $24000cm^3$ at rtp).
   i) Calculate the relative molecular mass of M. (1½ mark)

   ....

   ....

   ....

   ....

   ....

   ii) Determine the molecular formula of M (1½ mark)

   ....

   ....

6. Carbon monoxide can be prepared by dehydration of substance W using concentrated sulphuric acid.
   a) i) Name substance W. .... (½ mark)

   ii) Write equation for the reaction leading to the formation of carbon monoxide (1½ mark)

   ....

   ....

   b) Carbon monoxide was passed over heated iron (iii) oxide..
   i) Write equation for the reaction that took place. (1½ mark)

   ....

   ....
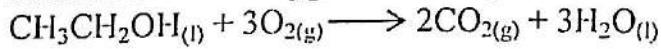
   ii) State how the gaseous product in b (i) above can be identified. (1½ mark)

   ....

   ....

7. a) Define the term heat of combustion. (1 mark)

   ....

   ....

   ....

   b) Ethanol burns in oxygen according to the following equation.
   $$CH_3CH_2OH_{(l)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$$
   $$\Delta H = -154KJmol^{-1}$$

   Calculate
   i) Heat evolved when 11.5g of ethanol reacted with oxygen at s.t.p (1½ marks)

   ....

   ....

   ....

ii) The volume of carbon dioxide produced at stp (C = 12, H = 1, O = 16)

(2 marks)

....

....

....

8. Electrolysis of 1M sulphuric acid was carried out using Zinc cathode and copper anode.

a) State what was observed at the anode. (½ mark)

....

b) Write equation for the reaction that took place at the

i) Cathode ....

....

(1½ marks)

ii) Anode ....

....

(1½ marks)

c) Write an equation for the overall cell reaction. (1½ marks)

....

....

9. Hydrogen is produced in the laboratory according to the following equation.

$$2HCl_{(aq)} + Zn_{(s)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$$

a) i) State two ways in which the rate of production of hydrogen can be increased.

(2 marks)

....

....

ii) Sketch a graph to show how the rate of production of hydrogen varies with time.

(1½ marks)

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b) Calculate the volume of hydrogen produced at s.t.p when $25cm^3$ of 2M hydrochloric acid was completely reacted with Zinc granules.
(1mole of gas at s.t.p occupies $22400cm^3$) (2 marks)

....

....

....

10. a) i) Name one reagent that can be used to identify iodide ions in the laboratory.
(½ mark)

....

ii) State what is observed when the solution containing iodide ions is treated with the reagent names in a(i) above. (½ mark)

....

b) Write equation for the reaction that took place in a (ii) (1½ marks)

....

....

c) Chlorine gas was bubbled through a solution of Sodium iodide

i) State what was observed (½ mark)

....

ii) Write equation for the reaction that took place. (1½ marks)

....

....

....

SECTION B (30 MARKS)

Any two questions in this section.

11. Glucose $C_6H_{12}O_6$ can be converted into ethanol by a catalytic reaction caused by the enzymes produced by yeast.
a) Name
i) the reaction in which yeast converts glucose into ethanol. (1mark)
ii) the enzyme produced by yeast during the above reaction. (1mark)
iii) write equation for the reaction leading to the formation of ethanol by the process named in a(i). (1½ marks)

b) When Ethanol was strongly heated together with concentrated sulphuric acid, gas W was formed.
i) Identify gas W (1mark)
ii) Write equation for the reaction leading to the formation of gas W. (3 marks)

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c) i) Name one reagent that can be used to identify W in the laboratory. (6 marks)

ii) State what is observed when the reagent is treated with Gas W. (1mark)

iii) Write equation for the reaction that took place in c(ii) (1½ marks)

d) W when treated with high pressure and heat, in the presence of a catalyst reacts to form a plastic P with a high molecular mass.

i) Identify P (1 mark)

ii) Write equation leading to the formation of P from W. (1½ marks)

iii) State one domestic use of P. (1 mark)

e) Differentiate between thermosetting and thermosoftening plastics. (2 marks)

12. a) Describe how a pure dry sample of Sulphur dioxide can be prepared in the laboratory (Diagram not required) (4 marks)

b) Describe how Sulphur dioxide can be used to obtain pure sulphuric acid.
(Your answers should include equations for the reactions). (7 marks)

c) Concentrated sulphuric acid was added to a beaker containing crystals of sucrose

i) state what was observed (1 mark)

ii) write equation for the reaction that took place (1½ marks)

d) State how sulphate ions can be tested for in the laboratory (1½ marks)

13. Explain the following observations.

a) Diamond and graphite are both allotropes of carbon. However, diamond is very hard while graphite is soft.

b) Potassium chloride conducts electricity in both fused state and in aqueous solution whereas hydrogen chloride conducts electricity only in aqueous solution and not in gaseous state.

c) Aluminum chloride solution is acidic but when evaporated to dryness and the residue dissolved in water, the resultant solution is alkalinic.

d) Addition of sodium hydroxide solution to a solution of Zinc nitrate gives a white precipitate which is soluble in excess forming a colourless solution.

14. Sodium is extracted industrially by the down's process.

a) Briefly describe the process leading to the extraction of sodium. (5 marks)
(diagram not required)

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b) Sodium metal was dropped into a trough of water
    i) state what was observed   (1½ marks)
    ii) write equation for the reaction that took place   (1½ marks)

c) The resultant solution in (b) was Separately treated with solutions of aluminium and lead ions.

    i) state what was observed.   (1mark)
    ii) write ionic equation(s) to explain your observations in C(i)   (3marks)

d) i) Name one reagent that can be used to differentiate between lead and aluminium ions.   (1mark)

    ii) State what is observed when the named reagent is separately treated with the solutions of lead and aluminium ions.   (2 marks)

END

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545/2
CHEMISTRY
Paper 2
July /August 2013
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES

- *Section A consists of 10 structured questions. Answer all questions in this section.*

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  Molar gas volume at s.t.p = 22.4dm³]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (50 MARKS)

Answer all questions in this section

1. (a) State one difference between compounds and mixtures.   *(1mark)*

    ....

    ....

    (b) State whether the following substances are elements, compounds or mixtures.
    i) Diamond   *(01 mark)*

    ....

    ii) Common salt   *(01 mark)*

    ....

    iii) Duralumin   *(01 mark)*

    ....

    (c) Copper and Zinc were mixed to form a solid W
    i) Name the solid W formed   *($^1/_2$ mark)*

    ....

    ii) State one use of solid W   *($^1/_2$ mark)*

    ....

2. An element X has an atom whose symbol is $^{24}_{12}X$
    (a) i) Draw the electronic structure of X   *(01mark)*

    ....

    ....

    ....

    ii) Write the formula of the oxide of X   *(01mark)*

    ....

    ....

    (b) The oxide of X was dissolved in water and the aqueous solution tested with litmus solution.
    i) State what was observed   *($^1/_2$ mark)*

    ....

    ....

    ii) Write equation for the reaction between the oxide of X and water.

                                                                               ($1^1/_2$ mark)

    ....

    ....

(c) When a piece of X was ignited and lowered into a gas jar of carbon dioxide, black particles were observed.

  i)   Write equation for the reaction that took place.   *(1¹/₂ mark)*

   ....

   ....

3. (a)   Oxygen gas can be prepared in the laboratory by dissolving a solid compound Y in water.

  i)   Name compound Y.   *(01 mark)*

   ....

  ii)   Write equation leading to the formation of oxygen from compound Y.

                     (1¹/₂ mark)

   ....

 (b)   The resultant solution in (a) was added to Iron (II) Sulphate solution.

  i)   State what was observed.   *(01 mark)*

   ....

   ....

  ii)   Write ionic equation for the reaction that took place.   *(1¹/₂ mark)*

   ....

   ....

4. An organic compound P whose molecular mass is 46 contains 54.80% carbon, 32.90% oxygen and 12.30% hydrogen by mass. (C=12, H=1, O=16)

 (a)   Calculate

  i)   The Empirical formula of P.   *(02 marks)*

   ....

   ....

   ....

   ....

  ii)   Molecular formula of P.   *(01 mark)*

   ....

   ....

 (b)   P can react with concentrated sulphuric acid to form gas Q.

  i)   State one other condition necessary for the formation of gas Q.

                      (¹/₂ mark)

   ....

   ....

ii) Write equation leading to the formation of gas Q.   (01 mark)

....

....

(c) i)   Name one reagent which can be used to identify gas Q in the laboratory.

($^{1}/_{2}$ mark)

....

....

ii)   State what would be observed when gas Q is treated with the reagent you have named in C(i).   (01 mark)

....

....

5. When a magnesium ribbon was ignited and burnt in air, two products Z and Y were formed. Y dissolved in water with evolution of a colourless alkaline gas W.

(a) Identify the substances

i)   Z   ($^{1}/_{2}$ mark)

....

ii)   Y   ($^{1}/_{2}$ mark)

....

iii) Gas W   ($^{1}/_{2}$ mark)

....

(b) Write equation leading to the formation of gas W   ($1^{1}/_{2}$ mark)

....

(c) Gas W was passed over heated copper (II) oxide.

i)   Write equation for the reaction that took place.   ($1^{1}/_{2}$ mark)

....

....

6. (a) Sulphuric acid is a strong dibasic acid.

i)   State what is meant by the term dibasic acid.   (01 mark)

....

....

ii) Write equation to show how sulphuric acid ionizes in water. (1½ mark)

....

....

(b) Sulphuric acid reacts with ammonia according to the following equation.

$$H_2SO_{4(aq)} + 2NH_{3(g)} \longrightarrow (NH_4)_2SO_{4(S)}$$

If 20.0 cm³ of a 2M solution of sulphuric acid were reacted with ammonia, calculate the mass of the solid formed. (2½ mark)

....

....

....

....

....

7. Carbon dioxide gas was passed over red hot charcoal as shown in figure 1. The excess carbon dioxide was passed through sodium hydroxide solution.
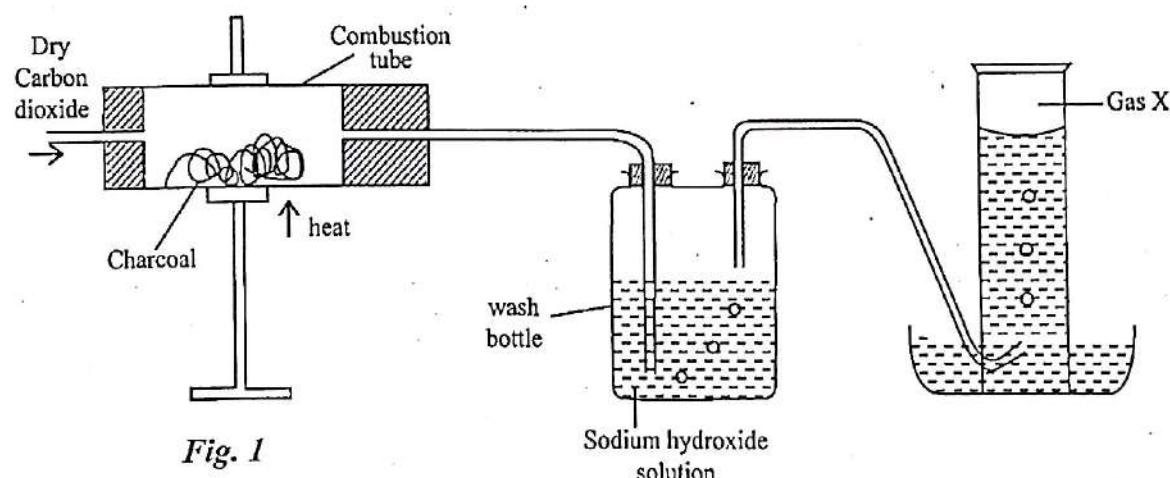
Fig. 1

(a) Write equation for the reaction.

i) between charcoal and carbon dioxide gas. (1½ mark)

....

....

ii) that took place in the wash bottle. (1½ mark)

....

....

(b) Gas X was collected and passed over heated Iron (III) oxide

  i) Name gas X.   (¹/₂ mark)

  ....

  ii) Write equation for the reaction that took place between Iron (III) oxide
       and gas X.   (1¹/₂ mark)

  ....

  ....

8. (a) A sample of hydrogen sulphide gas can be prepared in the laboratory using
        dilute hydrochloric acid and solid Q.

  i) Identify solid Q.   (¹/₂ mark)

  ....

  ....

  ii) Write equation for the reaction leading to the formation of hydrogen
       sulphide from solid Q.   (1¹/₂ mark)

  ....

  ....

  (b) A gas jar of hydrogen sulphide was inverted over a gas jar of chlorine gas

  i) State what was observed.   (01 mark)

  ....

  ii) Write equation for the reaction that took place.   (1¹/₂ mark)

  ....

  ....

9. (a) State what is meant by the term enthalpy of solution.   (01 mark)

  ....

  ....

  (b) 1.10g of calcium chloride was dissolved in 50cm³ of water and the
      temperature of water increased from 20.9°c to 24.2°c

  i) Give a reason why there was a temperature rise in the water.   (01 mark)

  ....

  ....

  ii) Calculate the molar heat of solution of calcium chloride (Ca = 40, Cl =
       35.5 density of water 1g/cm³, heat capacity of water = 4.2 J/g/°c).

                                                                          (2¹/₂ mark)

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10. A solution containing calcium ions was mixed and shaken with a known volume of soap solution and solid M was formed.

(a) I) Name solid M that was formed. (½ mark)

....

II) Write ionic equation for the reaction leading to the formation of M. (1½ mark)

....

....

(b) Name one:

I) Physical process. (01 mark)

....

II) Compound that can be used to stop the formation of solid M in the mixture. (½ mark)

....

(c) Write equation for the reaction that would take place when the mixture is treated with the compound named in b (ii). (1½ mark)

....

....

SECTION B: (30 MARKS)

Answer any two questions from this section.

*Additional questions answered will **not** be marked.*

11. a) Briefly describe how a dry sample of potassium nitrate crystals can be prepared in the laboratory. (06 marks)

b) The table below shows the variation of solubility of potassium nitrate with temperature.

Solubility/100g of water	22	32	42	55	70	90
Temperature °C	12	20	28	36	44	52

i) Plot a graph of solubility of potassium nitrate against temperature.

(4½mark)

c) From the graph determine;
   i) the solubility of potassium nitrate at 30°C. (01 mark)

   ii) the mass of potassium nitrate precipitated when the solution is
   cooled from 50°C to 30°C. (01 mark)

d) Calculate the concentration of potassium nitrate in moles per dm^3 at 25°C
   Assuming the density of water is 1g/cm^3. (2½mark)

12. a) Write equation for the reaction between ammonia and;

   i) hydrogen chloride gas. (1½mark)

   ii) aqueous solution of lead (II) nitrate. (1½mark)

   b) Briefly describe how nitric acid can be manufactured from ammonia

   (K = 39, N = 14, O = 6) (Your answer should include equations of reaction)
   (7½mark)

   c) State what would be observed when;

   i) Copper (II) nitrate, (01 mark)

   ii) Silver nitrate, (½mark)
      are strongly heated.

   d) Write equation(s) of reaction(s) that would take place in c (i) and (ii) above.
   (03 marks)

13. (a)(i) State what is meant by the term electrolysis. (01 mark)

   (ii) State two factors that can determine the product formed at the
   electrodes during electrolysis. (02 marks)

   (b) Briefly describe how chlorine gas can be produced by electrolysis of
   concentrated sodium chloride. (5½mark)

   (c) Explain why moist chlorine bleaches the colour of dyes where as dry chlorine
   does not. (03 marks)

   (d) Draw a labeled diagram of a setup of apparatus that can be used to prepare
   Iron (II) chloride in the laboratory. (3½mark)

14. (a) Sewage is a mixture of effluent and sludge.
   i) State the difference between effluent and sludge. (02 marks)
   ii) State one use of sludge. (01 mark)

   (b) i) Briefly describe the processes involved in water purification. (6 marks)
   ii) State how water can be detected in the laboratory. (1½mark)

   (c) State what would be observed and write equation for the reaction that
   would occur when;
   i) a piece of sodium metal is lowered into a trough of water. (2½mark)

   ii) steam is passed over heated iron fillings. (02 marks)

END

Name.. Signature.................................

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545/2
CHEMISTRY
Paper 2
July /August 2011
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES

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						For examiner's use only									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total	

Turn Over

SECTION A (50 marks)

Answer all questions in this section.

1. A mixture of ethanol and a substance A was heated as shown in the diagram below. A colourless gas B was evolved.

a) i) Identify substances A and B   (1 mark)

A ....

B ....

ii) Write an equation for the reaction between ethanol and substance A.

(1½ mark)

....

....

b) i) State what was observed in the test tube containing bromine water.

(1 mark)

....

....

ii) Write an equation for the reaction in b (i) above

(1 ½ mark)

....

....

2. Ammonia was mixed with oxygen and the mixture passed over heated platinum. A colourless gas X was evolved. The mixture was cooled forming a reddish brown gas Y. Y dissolves in water forming a yellow liquid.

    a)   i)   Identify X, Y and the yellow liquid   (1½ mark)

X...

Y ....

Yellow liquid ....

         ii)   Write an equation leading to the formation of the yellow liquid.

                                                                         (1 ½ mark)

....

....

    b)   A small amount of the pale yellow liquid was added to a beaker containing distilled water. To the resultant mixture was added solid sodium carbonate.

         i)   State what was observed   (½ mark)

....

         ii)   Write an equation for the reaction that took place.   (1½ mark)

....

....

3. The structure of an atom of element Z is $^{25}_{12}Z$.

    a)   State

         i)   the number of protons and neutrons in an atom of Z.

Neutrons.. (½ mark)
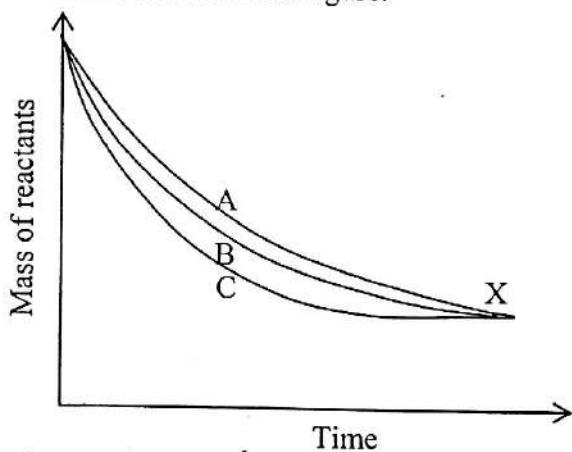
Protons .... (½ mark)

         ii)   the group of the Periodic Table to which Z belongs   (1 mark)

....

....

Turn Over

b) Chlorine gas was passed over heated Z.

 i) State what was observed (½ mark)

....

....

 ii) Write an equation for the reaction between Z and Chlorine (1½ mark)

....

....

 iii) The product of the reaction between Z and Chlorine was dissolved in water. State whether the resultant solution is neutral, acidic or alkaline.

(½ mark)

....

4. The variation of mass of reactants with time when calcium carbonate is reacted with dilute hydrochloric acid is shown in the figure.

a) If B is for the reaction at 30^0C, which curve would be obtained if the reaction is carried out at.

 i) 25^0C .... (½ mark)

 ii) 45^0C .... (½ mark)

b) Explain why the curves meet at point X. (1 mark)

....

....

c)   i)   How can the decrease in mass of reactants be increased?   (2 marks)

....

....

....

ii)   If 1.0g of calcium carbonate reacted completely with 20 cm^3 of the dilute hydrochloric acid. What is the molar concentration of the acid?   (3 marks)

....

....

....

....

5.   Complete the table below.   (3 marks)

	Mixture	Method of separation	Principle behind method of separation
a)	Ethanol and Water		
b)	Ink		

6.   When a green solid Q is heated, a colourless liquid which condenses on the cooler parts of the test tube is formed. A colourless gas which turns acidified potassium dichromate (VI) solution green is evolved and a reddish brown residue S is formed. If chlorine gas is bubbled into a solution of Q in water the solution turns to yellow.

a)   Identify the colourless gas, Q and S

Q ....   (½ mark)

S ....   (½ mark)

Turn Over
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b)   Name

i)   The cation in the yellow solution   (1mark)

....

....

ii)   The reagent that can be used to confirm the anion in Q.   (1mark)

....

....

c)   Write an ionic equation for the reaction between the anion in Q and the reagent in b (ii)   (1½ mark)

....

....

7.   Water was added to sodium peroxide powder.

a)   State what was observed   (1mark)

....

....

b)   i)   Write an equation for the reaction.   (1½ mark)

....

....

ii)   State what would be observed if a litmus paper is dropped into the resultant solution.   (1 mark)

....

....

c)   One drop of the resultant solution was added to an aqueous solution of lead(II) nitrate.

i)   State what was observed.   (½ mark)

....

....

ii) Write an equation for the reaction (1 mark)

....

....

8. An electric current was passed through sodium chloride solution using a graphite anode and a platinum cathode.

   a) i) State what was observed at each electrode

   Cathode .... (½ mark)

   Anode.. (½ mark)

   ii) What is the volume ratio of the products? (½ mark)

   ....

   b) Write an equation for the reaction if any
   i) at the anode (1mark)

   ....

   ....

   ii) between the product at the anode and potassium bromide solution

   (1 ½ mark)

   ....

   ....

   c) Briefly explain why the anode must be: made of graphite and not platinum

   (1 mark)

   ....

   ....

9. A hydrocarbon Y consists of 82.76% by mass of carbon.

   a) i) Determine the empirical formula of Y (3 marks)

   ....

   ....

   ....

   ....

ii)   0.58 g of Y occupies 240 cm^3 at room temperature. Determine the
molecular formula of Y. [Molar gas volume at room temperature = 24
dm^3]   (3 marks)

....

....

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....

c)   Compound Z has molecular formula C_4H_{10} but a different structure. What name
is given to compound Y and Z?   (½ mark)

....

....

10.   State what would be observed and write an equation when carbon dioxide gas
a)   is bubbled into sodium hydroxide solution for a long time.   (2 marks)

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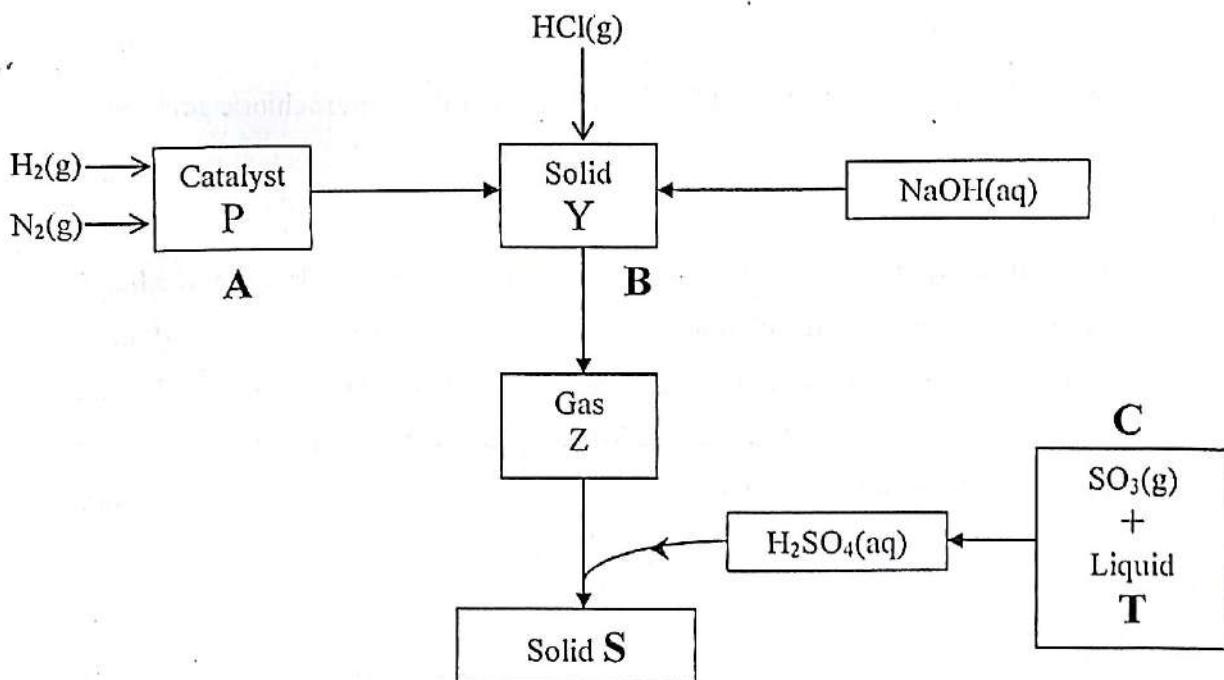
b)   is bubbled into 2 cm^3 of distilled water and to the resultant solution is added blue

litmus.   (2 marks)

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SECTION B (30 marks)

11. a) Describe how you would prepare zinc sulphate crystals in the laboratory using zinc granules. Write an equation for the reaction that takes place. (8 ½ mark)

    b) The crystals in a) were dissolved in water to form an aqueous solution. The solution was divided into two portions. To the first portion was added ammonia solution drop wise until in excess.

       i) State what was observed (1½ mark)

       ii) Write equation(s) for the reaction(s) that took place. (1½ mark)

    c) Carbon dioxide gas was bubbled into the second portion.

       i) State what was observed (1 mark)

       ii) Write an equation for the reaction that took place (1½ mark)

    d) How can an aqueous solution containing zinc sulphate and zinc nitrate be separated. (1 mark)

12. The figure below summarizes a number of chemical processes. Study it and use it to answer questions that follow.

$HCl(g)$

$H_2(g) \longrightarrow$ | Catalyst **P** | $\longrightarrow$ | Solid **Y** | $\longleftarrow$ | NaOH(aq) |
$N_2(g) \longrightarrow$

A **B**

Gas **Z**

C

| $H_2SO_4(aq)$ | $\longleftarrow$ | $SO_3(g)$ + Liquid **T** |

Solid **S**

a)   i)   Identify catalyst **P**   (1 mark)

     ii)   Identify solids **Y** and **S**   (2 marks)

     iii) Write the conditions for optimum yield at **A**   (2 marks)

b)   Write equations for the reactions leading to

     i)   Gas Z   (1½ mark)

     ii)   Solid S   (1½ mark)

c)   i)   Identify liquid **T**   (1mark)

     ii)   Write an equation for the reaction in **C**   (1½ mark)

     iii) State one use of **S**   (1mark)

d)   **S** was dissolved in water to form an aqueous solution. The resultant solution was divided into two portions

     i)   Blue litmus paper was dipped into the first portion. State what was observed.   (½ mark)

     ii)   A few drops of lead(II) nitrate solution were added to the second portion. State what was observed and write an ionic equation for the reaction that took place.   (2 marks)

     iii) Explain why in the test for the anion in **S** dilute hydrochloric acid must be added.   (1 mark)

13. a)   Describe with the aid of a diagram how the molar heat of combustion of ethanol can be determined in the laboratory.   (9 marks)

     b)   25 cm³ of a solution containing 2.65 g of sodium carbonate in 250 cm³ of solution required 20 cm³ of a monobasic acid for complete neutralization. Determine the molar concentration of the acid.   (6 marks)

14. a) Explain the following observations

   i) When silver nitrate solution is added to an aqueous solution of hydrogen chloride gas, a white precipitate is formed but there is observable change when silver nitrate is added to a solution of hydrogen chloride in methyl benzene. (3 marks)

   ii) 2M hydrochloric acid reacts faster with calcium carbonate powder than marble chips. (3 marks)

   b) Iron can be extracted from haematite in a blast furnace.
      i) Write the chemical formula of haematite (1 mark)
      ii) Name any other two ores from which iron can be extracted. (1 mark)
      iii) Write an equation for the reaction leading to formation of iron in the blast furnace. (1½ mark)
      iv) Name the major impurity in haematite (1½ mark)
      v) Explain how limestone removes earthy impurities from the ore. (4 marks)
      vi) Name a metal that is purified by electrolysis (1mark)

END

Name.. Signature..................................

School.. Index No.................................

545/2
CHEMISTRY
Paper 2
July /August 2010
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

Instructions to Candidates

- Section A consists of 10 structured questions. Attempt all questions in this section.

- Answers to these questions must be written in the spaces provided.

- Section B consists of 4 semi – structured questions. Attempt any two questions from this section.

- Answers must be written on the answer sheet/booklet and stapled at the back of the question paper.

- Show all your working clearly in both sections.

  [1F = 96500C, C = 12, H = 1 O = 16, molar gas volume at s.t.p = 22.4dm^3]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

Turn Over

SECTION A (50 marks)

Answer all questions in this section.

1. Below is a section of the Periodic Table. The symbols used are not the usual symbols.

	I	II	III		IV	V	VI	VII
1								
2		X	Y					Z
3								

a) Write the electronic configuration of

    i)   X... (1 mark)

    ii   Z... (1 mark)

b) Write
    i)   an equation for the reaction between X and Z. (1 ½ mark)

....

....

    ii)   the formula of the sulphate of Y. (1 mark)

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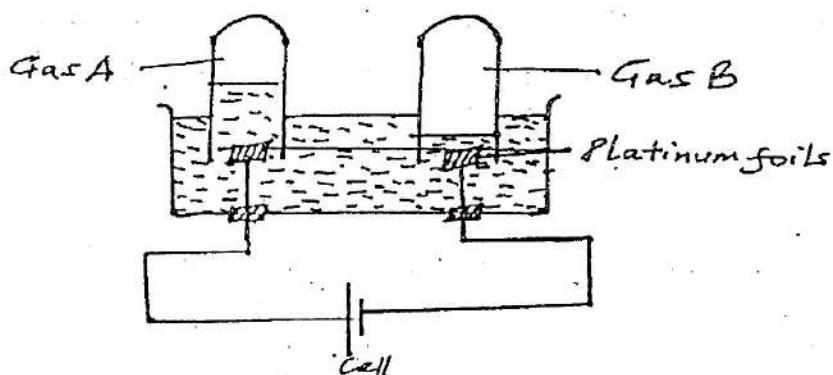
c) Comment on the size of atoms of elements X, Y and Z (1 mark)

....

....

2. Complete the table below. (4 marks)

Mixture	Method of separation	Principle behind method of separation
Water and ethanol		
Ink		

3.   A current of 0.2A was passed for 60 minutes through dilute sulpheric acid using the set up below.

a)   i)   Identify gas A.   (1 mark)

....

....

       ii)   Write an equation of the reaction leading to formation of gas B   (1 ½ mark)

....

....

b)   Calculate the number of moles of gas A evolved.   (2 ½ mark)

....

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4.   A pale yellow solid M dissolves in water with evolution of a colourless gas that re-lights a glowing sprint.

a)   i)   Identify M.   (1 mark)

....

....

       ii)   Write the equation for the reaction.   (1 ½ mark)

....

....

Turn Over

b) i) State one use of the colourless gas (1 mark)

....

....

ii) Write an equation for the reaction between the colourless gas and ammonia.

(1 ½ mark)

....

....

5. a) i) Define the term heat of combustion of a substance. (1 mark)

....

....

ii) Write an equation for the complete combustion of ethane. (1 ½ mark)

....

....

b) When 448 cm^3 of ethane measured at standard temperature and pressure is completely burnt in oxygen the heat produced raises the temperature of 100 g of water by 12^0C [specific heat capacity of water = 4.2 Jg^{-1} $^0C^{-1}$] Calculate the heat of combustion of ethane. (2 ½ mark)

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6 a) Define the term neutralization reaction. (1 mark)

....

....

b) 25.0 cm^3 of 0.1M hydrochloric acid solution required 10.0 cm^3 of sodium carbonate solution for complete reaction.

    i) Write an equation for the reaction between sodium carbonate and hydrochloric acid. (1 ½ mark)

....

....

    ii) Calculate the concentration of sodium carbonate in moldm^{-3}. (3 marks)

....

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7. Sulphur dioxide gas can be prepared in the laboratory by reacting hydrochloric acid with substance X.

    a) Name X. (1 mark)

....

    ii) Write an equation for the reaction between X and hydrochloric acid. (1 ½ mark)

....

    iii) State conditions for the reaction in (ii) to take place. (1 mark)

....

    b) Copper metal reacts with sulphuric acid evolving a colourless gas

    i) Identify the colourless gas (1 mark)

....

    ii) State the property of sulphuric acid illustrated in its reaction with copper metal. (1 mark)

....

....

Turn Over

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8. Ammonia is produced on the industrial scale by the reversible reaction between hydrogen and nitrogen.

    a)   i)   Name the process by which ammonia is prepared.   (1 mark)

....

....

           ii)   Write an equation for the reaction.   (1 ½ mark)

....

....

           iii)   State the conditions for the reaction to take place.   (3 marks)

....

....

....

....

    b)   Calculate the percentage of nitrogen in ammonium phosphate.   (1 mark)

....

....

....

....

9. A white powder X when heated decomposes evolving a colourless gas Y which turns lime water milky. X reacts with dilute hydrochloric acid evolving Y. An aqueous solution containing cations in X forms a white precipitate insoluble in excess sodium hydroxide.

    a)   i)   Identify the possible anions in X.   (1 mark)

....

....

           ii)   Name the actual anion in X   (1 mark)

....

....

           iii)   Identify the possible cations in X.   (1 mark)

....

....

    b)   Write an equation for the reaction between one of the cations in a) iii) and sodium hydroxide
                    (1 ½ mark)

....

....

10. Hydrogen is prepared in the laboratory by reacting Zinc with hydrochloric acid,
    a)   i)   Write an equation for the reaction .   (1 ½ mark)

....

....

          ii)   State the conditions for the reaction.   (1 mark)

....

....

    b)   How can the rate of the reaction be increased?   (1 mark)

....

....

SECTION B (30 marks)

Answer any two questions from this section

11. a)   Hydrogen chloride gas can be prepared from common salt.
         i)   Name the other reagent used.   (1 mark)
         ii)   State the condition for the reaction.   (1 mark)
         iii) Write an equation for the reaction.   (1 ½ mark)
         iv)   Sate how hydrogen chloride gas can be tested in the laboratory.   (1 mark)

    b)   Hydrogen chloride reacts with iron filings to form solid X.
         i)   Name solid X.   (1 mark)
         ii)   Write an equation for the reaction.   (1 ½ mark)
         iii) Draw a diagram to show how the reaction can be carried out.   (2 ½ marks)

    c)   Solid X was dissolved in water to form an aqueous solution. To the solution was added
         aqueous ammonia drop wise until in excess.
         i)   State what was observed.   (1 ½ mark)
         ii)   Write ionic equation for the reaction(s) that took place.   (1 ½ mark)
         iii) State what would be observed and write an equation for the reaction that takes place
               when lead (II) nitrate is added to an aqueous solution of X.   (2 ½ marks)

12. A metal nitrate X when heated decomposes forming a yellow residue when hot; the residue turns
    white on cooling. Reddish brown fumes Y and colourless gas Z are evolved.

    a)   Identify X, Z and Y.   (3marks)

    b)   Write equation
         i)   for the decomposition of X.   (1 ½ mark)

         ii)   the reaction of Y with water.   (1 ½ mark)

c) The residue was dissolved in dilute hydrochloric acid and to the resultant solution was added aqueous ammonia drop wise until in excess.

    i) State what was observed. (1 mark)

    ii) Write equation for the reaction(s) that took place in (c) above. (3 marks)

d) Describe how the residue can be used to prepare hydrated Zinc sulphate. (5 marks)

13. a) i). Explain the term addition polymerization. (2 marks)

    ii) Name the natural polymer and one synthetic polymer formed by addition polymerization. (2 marks)

    iii) State one limitation of synthetic polymers. (1 mark)

b) Organic compound A contains 66.7% carbon, 13% hydrogen, the rest being oxygen. 0.46 g of A on vaporization occupied 224 cm^3 at s.t.p.

    i) Determine the empirical formula of A. (2 ½ mark)

    ii) Calculate the molecular mass and hence the molecular formula of A. (2 ½ mark)

c) Describe how A can be prepared from millet flour. (5 marks)

14. a) Name a reagent that can be used to distinguish between each of the following pairs of compounds / ions. In each case state what will be observed.

    i) SO_4^{2-}(aq) and CO_3^{2-}(aq). (2 ½ mark)

    ii) C_2H_6 and C_2H_4 (2 ½ mark)

b) Excess carbon dioxide gas was bubbled into an aqueous solution of calcium hydroxide.

    i) State what was observed. (1 mark)

    ii) Write equations for the reactions that took place. (3 marks)

    iii) Burning magnesium was plunged into a gas jar of carbondioxide. State what was observed and write an equation for the reaction. (2 ½ marks)

c) i) What is an ore? (1mark)

    ii) Name two ores from which iron can be extracted. (1 mark)

    iii) Write an equation leading to the formation of iron in the blast furnace. (1 ½ marks)

END

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Name........:...........................   Signature...........................

School.............................   Index No..............................

545/2
CHEMISTRY
Paper 2
July /August 2012
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES

- *Section A consists of 10 structured questions. Answer **all** questions in this section.*

- *Answers to these questions **must** be written in the spaces provided.*

- *Section B consists of 4 semi – structured questions. Answer any **two** questions from this section.*

- *Answers to section B must be written on the answer sheet/booklet and stapled at the back of the question paper.*

- *Show all your working clearly in both sections.*

[1F = 96500C, C = 12, H = 1, O = 16, Na = 23, Ca = 40,
Molar gas volume at s.t.p = 22.4dm^3]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

   Turn Over

SECTION A (50 MARKS)

Answer all questions in this section

1. (a) State one difference between a physical change and a chemical change.

(1mark)

....

....

(b) State whether the following are physical or chemical changes.

    (i)   Heating Iodine   (1mark)

....

    (ii)   Heating a piece of Magnesium ribbon in air.   (1mark)

....

    (iii)   Heating Sodium Carbonate   ($\frac{1}{2}$mark)

....

(c) State what was observed when Iron (III) chloride was heated   (1mark)

....

2. (a) Steam was passed over heated magnesium ribbon in a tube,

    (i)   State what was observed   (1mark)

....

    (ii)   Write an equation for the reaction that took place.   ($1\frac{1}{2}$mark)

....

....

(b) The gaseous product formed in (a) was dried and passed over heated Lead (II) oxide in an ignition tube.

    (i)   State what was observed   (1mark)

....

    (ii)   Write an equation for the reaction that took place.   ($1\frac{1}{2}$mark)

....

3. (a) Ammonia when mixed with oxygen and passed over heated platinum catalyst, steam and gas x were formed.

(i) Name gas X (1mark)

....

(ii) Write equation for the reaction leading to the formation of gas X. (1½mark)

....

(b) (i) State what is observed when excess ammonia is lowered into a gas jar of chlorine. (1mark)

....

(ii) Write equation for the reaction that took place. (1½mark)

....

4. (a) Sodium Iodide solution was added to Lead (II) nitrate solution.

(i) State what was observed. (1mark)

....

(ii) Write ionic equation for the reaction that took place. (1½mark)

....

(b) Chlorine gas was bubbled through the reaction mixture in 4(a)

(i) State what was observed. (1mark)

....

(ii) Write equation for the reaction that took place. (1½mark)

....

5. (a) When 1.34g of Copper was heated in air, 1.68g of an oxide was formed. Calculate the emperical formula of the oxide. (Cu = 63.5   O = 16) (2½mark)

....

....

....

....

(b) To the oxide formed in 5(a) was added dilute hydrochloric acid.

(i) State what was observed (1mark)

....

(ii) Write equation for the reaction that took place. $(1^1/_2 mark)$

....

6. (a) When ammonia gas was bubbled through a solution containing Zinc ions, a white precipitate was formed which later dissolved.

(i) Write equation for the reaction leading to the formation of the white precipitate. $(1^1/_2 mark)$

....

(ii) Identify the cation in the solution formed when the precipitate dissolved. (1mark)

....

(b) State two ways in which the white precipitate can be obtained from the colourless Solution. (1mark)

....

....

7. (a) What is meant by the term enthalpy of combustion? (2marks)

....

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(b) The enthalpy of combustion of methanol (CH_3OH) is 715 KJ/mole. 8grams of methanol in a lamp is used to heat $250cm^3$ of water at 25^0C. Determine the maximum temperature attained by the water after heating (Density of H_2O = $1g/cm^3$, specific heat capacity of water = $4.2Jg^{-1}K^{-1}$, Rmm of methanol is 32). $(3^1/_2$ marks)

....

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8. (a) Zinc carbonate was strongly heated in a test tube until there was no further change.

(i) State what was observed. (1mark)

....

(ii) Write equation for the reaction that took place.   *(1½mark)*

....

....

(b) To the residue in 8(a) was added dilute hydrochloric acid solution.

(i) State what was observed.   *(1mark)*

....
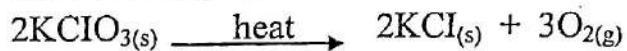
(ii) Write ionic equation for the reaction that took place.   *(1½mark)*

....

9. (a) Oxygen can be prepared in the laboratory from hydrogen peroxide and substance W. Identify substance W and state its role   *(2marks)*

....

....

(b) Potassium chlorate decomposes on heating to give oxygen according to the following equation.

$$2KClO_{3(s)} \xrightarrow{\text{heat}} 2KCl_{(s)} + 3O_{2(g)}$$

(i) Calculate the volume of oxygen produced at room temperature when 10.6g of Potassium chlorate was heated. (K = 39, Cl = 35.5, O = 16, 1 mole of a gas at r.t.p occupies 24dm^3)   *(3marks)*

....

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10. (a) (i) Name one substance which when reacted with dilute sulphuric acid can produce sulphur dioxide.   *(1mark*

....

(ii) Write equation for the reaction leading to the formation of sulphur dioxide.   *(1½mark)*

....

....

....

(b) (i) Name one reagent that can be used to confirm the presence of sulphur dioxide. *(1mark)*

....

....

....

(ii) State what is observed when the named reagent is used. *(1mark)*

....

....

....

(c) State the property of sulphur dioxide demonstrated in 10(b) above. *(½mark)*

....

....

SECTION B: (30 MARKS)

Answer any **two** *questions from this section.*

11. (a) (i) State what is meant by the term soap? *(2marks)*

(ii) Briefly describe how a dry sample of soap flakes can be prepared in the laboratory. *(4½marks)*

(b) A water sample X was boiled and on cooling was tested by shaking it with a known volume of soap solution. A greasy scum and a cloudy solution were observed.

(i) State what is meant by scum? *(1½mark)*

(ii) Write an ionic equation for the reaction leading to the formation of scum. *(1½mark)*

(c) (i) Name one compound that can be used to stop scum formation in the water sample X. *(1mark)*

(ii) Write equation for the reaction that would take place when the compound named in C (i) is used. *(1½mark)*

(d) Describe how soap can remove grease from fabrics when washed. *(1½mark)*
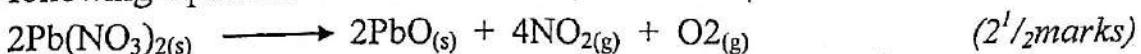
12. (a) (i) Describe how a dry sample of hydrogen chloride gas can be prepared in the laboratory. *(Diagram not required)* $(4^1/_2marks)$

(b) Draw a well labeled diagram to show that hydrogen chloride gas is highly soluble in water. *(2½ marks)*

(c) Using equations explain why when hydrogen chloride gas was bubbled into silver nitrate solution, a white precipitate Q was formed. Q dissolved in ammonia to form a colourless solution. $(4^1/_2marks)$

(d) The table below shows the variation in solubility of hydrogen chloride with temperature.

Temperature ^{0}C	0	30	40	50	60
Solubility of HCI in g/L of water	824	672	632	596	560

(i) Plot a solubility curve of hydrogen chloride in g/litre against temperature. $(4^1/_2marks)$

(ii) From your graph determine the solubility of hydrogen chloride at 20^0C *(½ mark)*

13.(a) Describe how dry crystals of Lead (II) nitrate can be prepared in the laboratory from Lead (II) oxide. $(4^1/_2marks)$

(b) State what would be observed when to an aqueous solution of Lead (II) nitrate was added.
(i) Sodium chloride solution. *(½ mark)*

(ii) Zinc powder. *(½ mark)*

(c) (i) Write equation for the reaction that took place in b(i) $(1^1/_2mark)$

(ii) Explain your answer in b (ii)

(Your answer should include equation for the reaction) $(4^1/_2marks)$

(d) Lead (II) nitrate decomposes when heated according to the following equation.
$$2Pb(NO_3)_{2(s)} \longrightarrow 2PbO_{(s)} + 4NO_{2(g)} + O2_{(g)}$$ $(2^1/_2marks)$
Calculate the total volume of the gaseous product formed at s.t.p when 3.31g of Lead (II) nitrate is decomposed. (Pb = 207, O = 16, N = 14, 1 mole of a gas occupies 22400cm^3 at s.t.p)

Turn Over

(e) Explain why during the preparation of Lead (II) sulphate, Lead (II) nitrate instead of Lead (II) oxide is reacted with sulphuric acid. *(3marks)*

14. (a) (i) State what is meant by rate of reaction? *(1mark)*

(ii) With the aid of a well labeled diagram, describe an experiment that can be carried out to determine the rate of production of carbon dioxide gas from calcium carbonate and hydro chloric acid.

(3marks)

(b) The table below shows the variation in mass of calcium carbonate with time when reacted with dilute hydro chloric acid.

Mass of $CaCO_{3(g)}$	84	64	49	27	11	9	8
Time (Min)	0	1	2	4	7	8	9

(i) Sketch a graph to show how the mass of calcium carbonate varies with time. *(4marks)*

(c) From your graph determine,

(i) The rate of reaction at 3 minutes. *(2marks)*

(ii) The time taken for half of the calcium carbonate to react. *(1mark)*

(d) State at least two ways in which the rate of production of carbon dioxide can be increased. *(2marks)*

END

Name .... Centre/Index No..............................

Signature ....

545/2
CHEMISTRY
PAPER 2
July/August 2009
2 hours

WAKISSHA JOINT MOCK EXAMINATIONS
Uganda Certificate of Education

CHEMISTRY
Paper 2

2 Hours

Instructions to candidates

- Attempt all questions in section A and Two questions from section B.
- Answers to section A must be written in the spaces provided.
- Non programmable scientific calculators may be used.
- In both sections, all working must be clearly shown.

(C=12, O=16, H=1, Zn=65, S=32, Cu = 64)

Molar gas volume at room temperature = 24l
Molar gas volume at s.t.p = 22.4l

Turn Over

1. (a) Water was added to solid sodium peroxide

    (i) State what was observed   (1 mark)

    ....

    ....

    (ii) Write an equation for the reaction   (1½ mark)

    ....

    ....

    (iii) State one use of the gaseous product   (1 mark)

    ....

    ....

    (b) The solution from (a) above was added to magnesium nitrate solution.
         Write an equation for the reaction   (1½ mark)

    ....

    ....

2. (a) A hydrocarbon Z contains 85.7% carbon. Determine the empirical formula
         of Z

    ....

    ....

    ....

    ....

    ....

    ....

    ....

    ....

    (b) 2.8g of Z vaporization occupied $2.4dm^3$ at room temperature.

    (i) Determine the molecule formula of Z   (3 marks)

    ....

    ....

    ....

    ....

ii)   Write the structure of Z   (1 mark)

....

....

3.   State the method of separation and the principle behind the method of separation
      of the following mixtures.
      (a)   Iron filing and sulphur   (½ mark)
             Method ....
             Principle   (1mark)

....

....

      (b)   Water and ethanol   (½ mark)
             Method...
             Principle   (1mark)

....

....

4.   (a)   Gas X was passed over heated iron filing. Black crystals were formed
             (i)   Name the gas   (1mark)

....

....

             (ii) Write an equation for the reaction   (1 ½ mark)

....

....

      (b)   The black crystals were dissolved in water and to the resultant solution
             was added sodium hydroxide solution.

             (i)   State what was observed   (1mark)

....

....

             ii)   Write ironic equation for the reaction   (1 ½ mark)

....

....

5.   (a)   Define the term electrolyte   (2 mark)

....

....

(b)   A current of 0.2A was passed through sodium hydroxide solution for 60 minutes. Calculate the volume of gas evolved at the anode   (4 ½ mark)

....
....
....
....
....
....

6. Concentrated sulphuric acid was added to heated copper metal and the gaseous product was passed into a wash bottle containing liquid X.

(a)   State
   (i)   what was observed   (1 mark)

....
....

   (ii)   the name of X   (1 ½ mark)

....
....

   (iii)   The role of X   (1 mark)

....
....

(b)   Write equation for the reaction   (1 ½ mark)

....
....

7. When a colourless gas X is passed over heated copper(II) Oxide a brown solid is formed and an inert gas Z is given off.

(a)   Name the gasses X and Z   (1mark)
        X

....

        Z

....

(b)   Write the equation for the reaction between X and copper(II) oxide
                                                                 (1 ½ mark)

....
....

(c)   State two uses of X

        (2 marks)

        ....
        ....

8. (a)   Define the term **standard solution**   (2 marks)

        ....
        ....
        ....

    (b)   2.4g of magnesium metal reacted completely with 25cm³ of dilute
            hydrochloric acid. Calculate the concentration of hydrochloric acid in dm³.
            (4 marks)

        ....
        ....
        ....
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9. (a)   Sketch a graph of hydrogen evolved with time when excess magnesium is
            added o 100.0 cm³ of a 1.0M sulphuric acid at room temperature.
            (2 marks)

        ....
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(b) On the same graph in (a) above, sketch another graph that would be obtained when magnesium is added to 100.0cm³ of a 2.0M sulphuric acid

(i) State the factor that affects the rate of the chemical reaction being investigated. (1 mark)

....

....

(ii) Apart from the factor in c(i) above state one other factor that affects rate of chemical reactions (1 mark)

....

....

10. The atomic numbers of elements X and Q are 11 and 17 respectively. state

(a) (i) the type of bond that is formed when X and Q combine (1 mark)

....

....

(ii) the number of elections in the outer most shell of W in the compound formed in (i) above (1 mark)

....

....

(b) Write the formula of:

(i) the sulphate of X (1 mark)

....

....

(ii) the ion formed by Q (1 mark)

....

....

(c) State whether the compound formed between X and Q conducts electricity or not. Give a reason for your answer (1 mark)

....

....

Section B

Attempt any **Two** questions from this section, begin each question on a fresh page.

11. Two gasses X and W are described, X does not burn, fumes in moist air. W burns in air enriched with oxygen, turns red in turns blue.
    (a) (i)   Identify and state the drying agent used for the laboratory preparation of X and W   (2 mark)
        (ii) State the reason why sulphuric acid can not be used to dry W   (1 mark)

    (b) Write equation for the laboratory preparation of X and W   (3marks)
    (c) Write an equation for the combustion of W   (1 ½ mark)
    (d) X was bubbled into aqueous silver nitrate solution
        (i)   State what was observed   (1mark)
        (ii) Write equation for the reaction (s) that took place   (2marks)
    (e) W was dissolved in water to form an aqueous solution. The solution was added to zinc sulphate solution drop wise until in excess.
        (i)   State what was observed   (1½ mark)
        (ii) Write equation(s) for the reaction(s) that took place   (3 marks)

12. (a) Define the term **enthalpy of neutralization**   (2 marks)
    (b) Describe how the heat of neutralization of hydrochloric acid by sodium hydroxide can be determined in the laboratory. Show how the heat of neutralization can be obtained from experimental results.   (8marks)
    (c) (i)   Write an equation for the reaction between sulphuric acid and sodium hydroxide   (1 ½ marks)
        (ii) When 4.6g of ethanol, C_2H_5OH was burnt the heat produced raised the temperature of 250g of water from 28.5 to 42°C
              Calculate the enthalpy of combustion of ethanol   (3 ½ mark)

13. (a) Name
        (i)   two metals that can be extracted by electrolysis   (2marks)
        (ii) two ores from which iron can be extracted   (2marks)
    (b) Describe the process by which iron can be extracted from the ore(s) above (No diagram required). Write equations for the chemical reactions involved.   (8marks)

    (c) (i)   Define the alloy   (1mark)
        (ii) Copy and complete the following table by stating the composition of the following alloys   (2marks)

Alloy	Composition
Solder	
Steel	

14 (a) Ethene can be prepared from ethanol by reacting ethanol with sulphuric acid. State
  (i) the conditions for the reaction   (2marks)
  (ii) the property of sulphruric acid being demonstrated   (1mark)
  (iii) the test for ethene and the observations made   (2marks)

 (b) Ethene was converted into the structure $-CH_2CH_2CH_2CH_2-$
  Name:
  (i) the process by which the structure is formed   (1mark)
  (ii) the structure   (1mark)
  (iii) state one use the structure   (1mark)

 (c) Describe how you would prepare dry sample of copper(II) sulphate crystals in the laboratory. Write an equation for the reaction that takes place.   (7marks)

END

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