Name………………………………………………………Index Number……………………………………Class………………

Candidate's signature……………………………………………………… Date…………………………………………………..

CHEMISTRY
233/2
THEORY
2Hours

BUSIA COUNTY JOINT EVALUATION TEST-2014

JULY 2014

INSTRUCTIONS TO CANDIDATES:

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

For Examiner's Use Only:

Question	Maximum score	Candidate's score
1	08	
2	13	
3	11	
4	08	
5	15	
6	12	
7	13	
Total	80	

This paper consists of 12 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. The grid below is part of the periodic table. (The letters do not represent the actual symbols of the elements). Use the information to answer the questions that follow.

	A					B	C		D
	E			F	G			H	
I	J								
								Y	

a) State the chemical family to which the following elements J and D belong.   (1 mark)

   J………

   D………

b) i) Write the formula of the compound formed when J reacts with B.   (1 mark)

   ………

   ii) Write an equation for the reaction between the compound formed in (i) and water.   (1 mark)

   ………

c) How does the reactivity of E compared with that of F? Explain.   (2 marks)

   ………

   ………

   ………

d)   On the grid show by using letter L the first longest period and give a reason why you think it is the first longest period.   (2 marks)

   ………

   ………

e)   Write the formula of the ion of F and give the equation of its formation.   (1 mark)

   Ion ……….

   Equation……..

2

2 a) You are provided with the following reagents; dilute nitric acid, dilute sulphuric acid, and lead (II) oxide. Describe how you would prepare a sample of lead (II) sulphate. (3 marks)

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……

b) Given a mixture of lead (II) chloride, iodine, ammonium chloride and sodium chloride crystals. Describe how you would separate all he four solids using methyl benzene, a source of heat and water. **(Hint; Step one involves addition of methyl benzene)** (3 marks)

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………..

c) 8.4g of sodium hydrogen carbonate is completely decomposed by heat. Calculate;

i) Mass of residue produced. (3 marks)

……..

……

……

ii) Volume of carbon (IV) oxide produced at s.t.p
   (H =1, C = 12, O = 16, Na = 23, Molar gas volume = 22.4dm^3)

……..

……..

……..

……..

3

d) Study the reaction scheme below and answer the questions that follow.
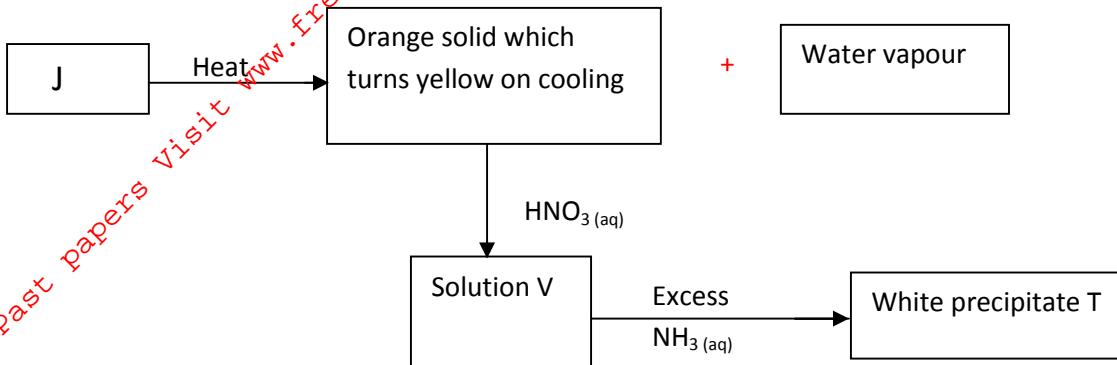
I)   Identify   (2 marks)
  i)   Solution V
        ....
  ii)   White precipitate T
        ....
II) Write an equation for the reaction forming solution V   (1 mark)
        ....
III) Write an ionic equation to show how the white precipitate T is formed.   (1 mark)

        ………

3. A compound Z has a molar mass of 56g and contains 85.7% carbon and 14.3% hydrogen by mass.
   (C = 12, H = 1)

a) i) Determine the molecular formula of compound Z.   (2 marks)

   ....

   ....

   ....

   ....

   ....

 ii) Give the structural formula of the sixth member of the homologous series to which Z belongs.

                                                                                                                (1 mark)

4

b) Draw and name 2 isomers of Z. (2 marks)

………

………

………

………

………

c) Compound Z reacts with a few drops of acidified potassium chromate (VII) solution.

i) State the observation made during the reaction. (1 mark)

………

………

ii) Name the organic product formed in the reaction on (c) above. (1 mark)

………

d) Z reacted with liquid bromine in the dark (room conditions)

i) State the observation made during the reaction. (1 mark)

………

ii) Write the equation for the reaction in (d) above. (1 mark)

………

iii) Name the organic product formed in (d) above (1 mark)

………

iv) State the type of reaction in (d) above. (1 mark)

………

5

4. Study the schematic diagram below and use it to answer the questions that follow
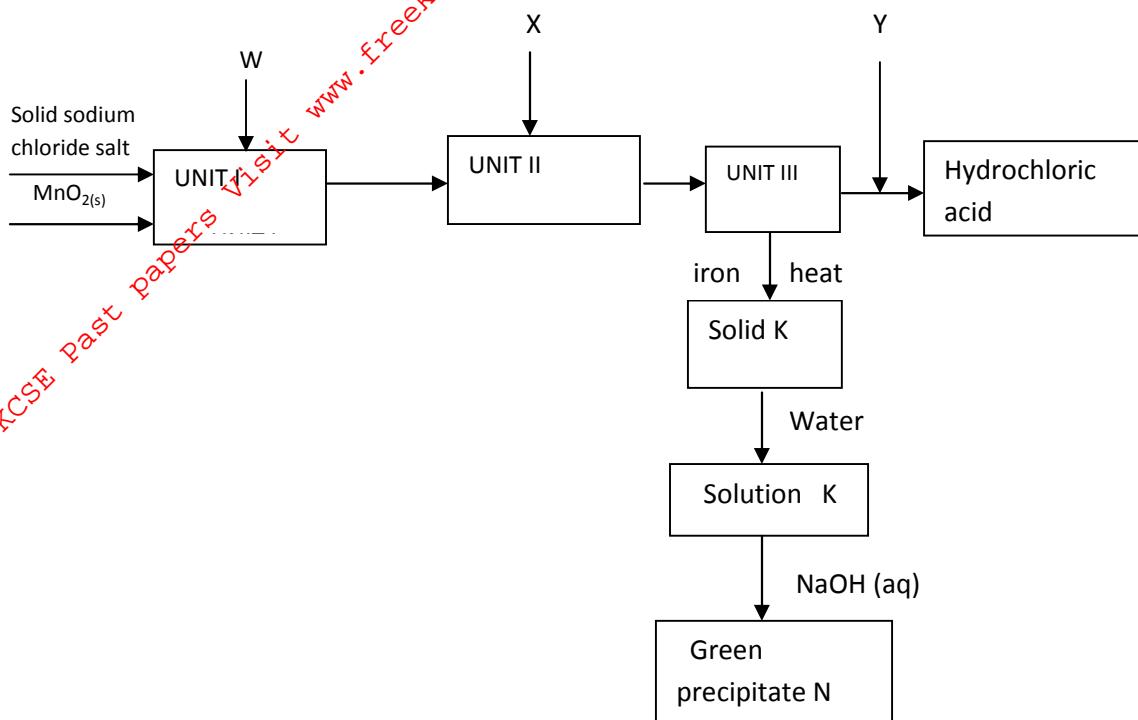
a) Identify substances : (3 marks)

W ....

X ....

Y ....

b) Write an equation for the reaction between solid sodium chloride and substance W.
(1 mark)

....

c) State the role of manganese (IV) oxide, MnO_2, and substance W. (2 marks)
....
....
....

d) Write chemical equations for the reaction ; (2 marks)
i) Forming solid K
....

ii) Producing green precipitate N

6

5. (I) Faith, a form four student, carried out an experiment to determine the solubilities of salts P and Q and obtained the following results. Use them to answer the questions that follow.

Salt P:

Temperature (^{o} C)	0	10	40	60	80	100	120
Solubility,g/100 g of water	36	33	30	28	26	23	18

Salt Q

Temperature (^{o} C)	0	10	20	30	40	50	60
Solubility,g/100 g of water	10	21	36	50	63	81	97

a) On the same axes, plot the graphs for the solubility curves of the two salts.   (5 marks)
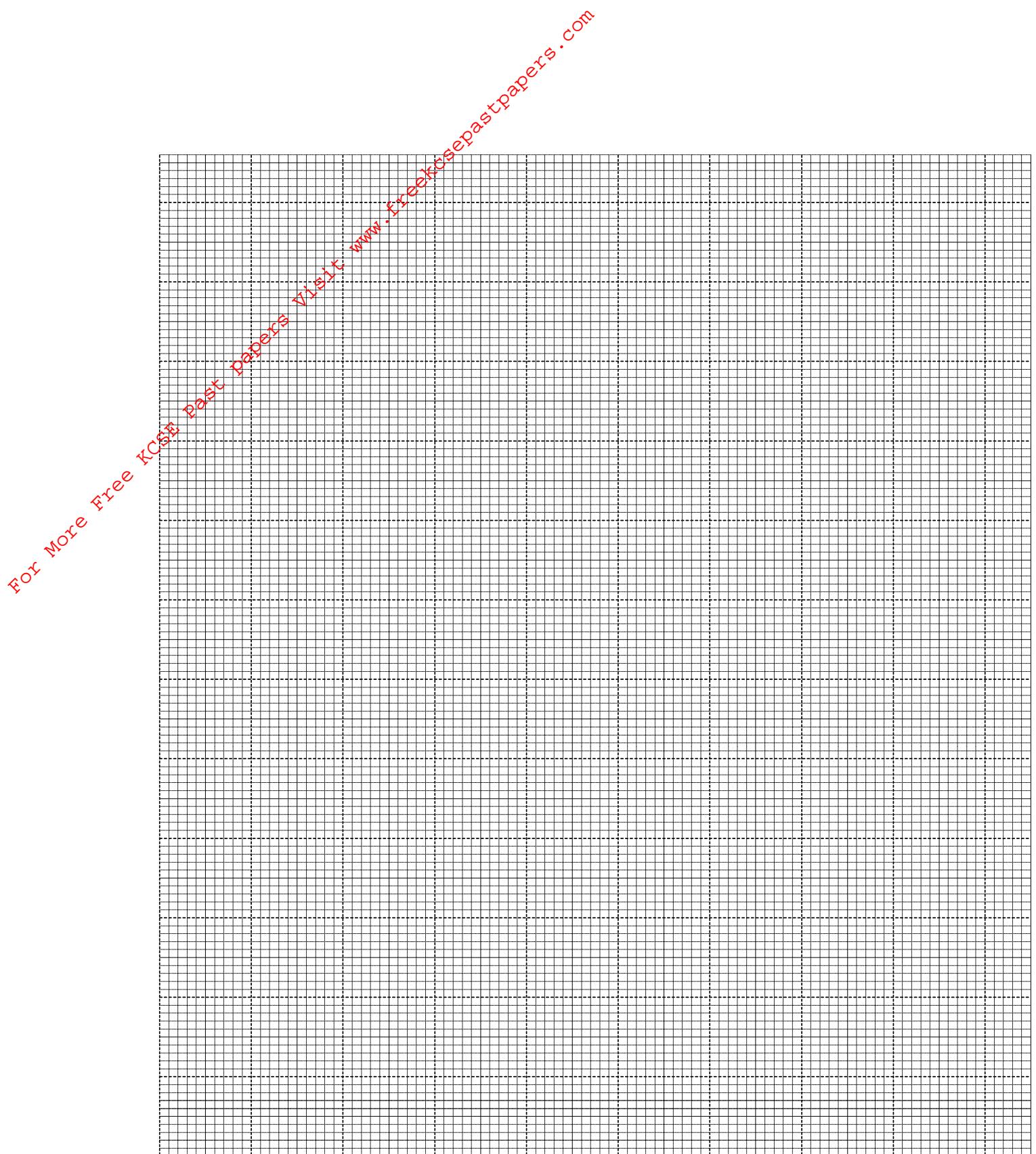
b) From your graph determine the temperature at which equal amount of P and Q dissolve in 100 g of water. (1 mark)

………

c) Explain how to prepare a saturated solution containing 70 g of Q in 100g of distilled water. (1 mark)

………

………

………

………

d) 12.5 g of Q and 30 g of P were dissolved in 50 g of water at 50 ^{o}C. Describe how a pure sample of Q can be obtained. (2 marks)

………

………

………

………

………

e) Give one practical application of the process applied in (d) above and name the process. (2 marks)

………

………

………

II. (i) Give two factors that determine the stability of a nuclide. (2 marks)

………

………

………

(ii) A certain nuclide has a half-life of two and half hours. What percentage of a given nuclide will be

left after seven and half hours? (2 marks)

………

………

………

6. a) Study the flow chart of extraction of aluminium below and answer the questions that follow.

```
                    ┌──────────┐
                    │ Bauxite  │
                    └────┬─────┘
                         │
                         ▼                    ┌──────────────┐
                    ┌────────┐   Process R  ┌→│  Residue P   │
   NaOH (aq) ──────→│   Q    │─────────────→│ └──────────────┘
                    └────────┘              │
                                            │  ┌──────────────┐
                                            └─→│  Solution  J │
                                               └──────┬───────┘
                                                      │
                                                      │ Process B
                                                      ▼
  ┌──────────────────┐  Process C  ┌──────────┐   ┌──────────────┐
  │ Aluminium liquid │←────────────│ Al₂O₃(s) │←──│ AlOH)₃ (aq)  │
  └──────────────────┘             └──────────┘   └──────────────┘
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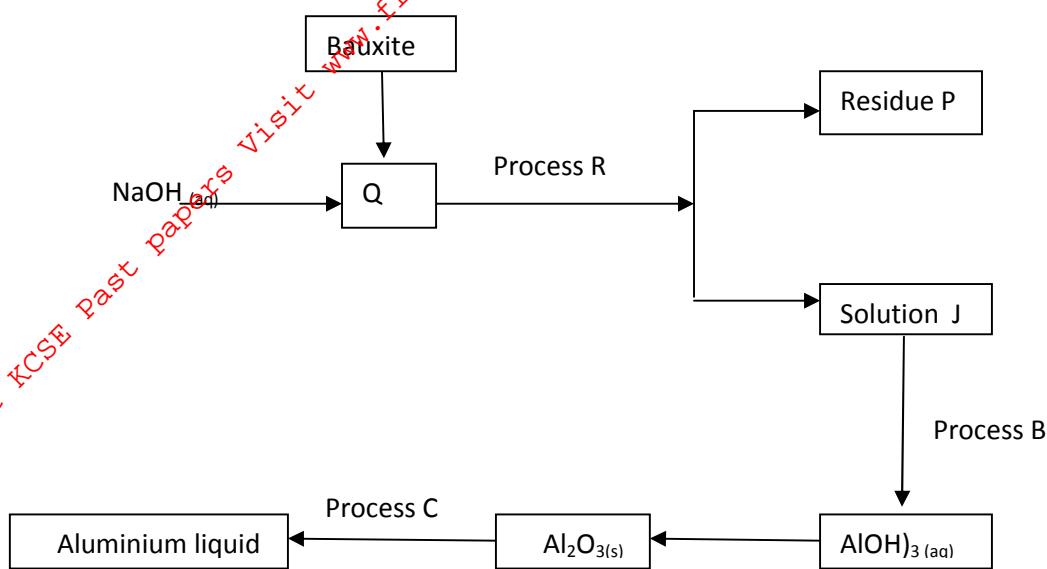
i) Write the equation for the reaction in chamber Q. (1 mark)

………

ii) Name residue P. (1 mark)

…….

iii) Name processes R and C. (2 marks)

R………..

C………..

iv) In process C, a current of 88.0A was passed through molten aluminium oxide for 8 hours. Determine the mass of aluminium produced. (3 marks)

(1 Faraday = 96 500 coulombs and Al = 27)

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………

………

………

v) State two ways by which process B is accomplished. (2 marks)

....

....

....

vi) Write an equation for the conversion of aluminium hydroxide into aluminium oxide.

(1 mark)

....

b) Explain the following observations:

i) Aluminium utensils should not be cleaned with strongly alkaline washing liquids. (1 mark)

....

....

ii)Aluminium alloys are commonly used in aeroplane construction. (1mark)

....

....

7. (a) In an experiment to determine the molar heat of reaction when magnesium displaces copper, excess magnesium powder was added to 25.0cm^3 of 2.0M copper (II) chloride solution at 23^{o}C. The temperature rose to 38^{o}C.

(i) Apart from increase in temperature, state and explain the observations which were made during the reaction (2marks)

....

....

(ii) Calculate the heat change during the reaction. (2 marks)

(Specific heat capacity of the solution =4.2 J g^{-1} K^{-1}, density of the solution =1g/cm^3).

....

....

(iii)   Write the ionic equation for the reaction.   (1mark)

………

(iv)   Determine the molar heat of displacement of copper by magnesium.   (2marks)

……

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……

……

(b)   Use the thermochemical equations below to answer the questions that follow.

1. $C_2H_{6(g)} + \frac{7}{2}O_{2(g)} \rightarrow 2CO_{2}(g) + 3H_2O_{(g)}$ $\Delta H_1 = -1560$ kJmol^{-1}

2. $C_{(s)} + O_{2(g)} \rightarrow CO_2(g)$ $\Delta H_2 = -394$ kJmol^{-1}

3. $H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(g)}$ $\Delta H_3 = -286$ kJmol^{-1}
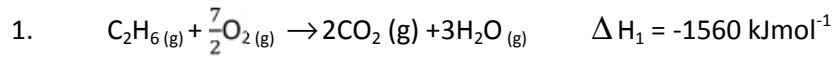
(i)   Name two types of heat changes represented by ΔH_3.   (2marks)

………

………

(ii)   Draw an energy level diagram for the reaction represented by equation 1

(2marks)

iii)   Calculate the standard enthalpy of formation of ethane.   (2marks)