**545/2**

**CHEMISTRY**

**Paper 2**

**Jul/Aug 2016**

**2 Hours**



**MUKONO EXAMINATIONS COUNCIL**

**Uganda Certificate of Education**

**CHEMISTRY**

Paper 2

**2 Hours**

**INSTRUCTIONS TO CANDIDATES**

* *Answer all questions in section* ***A*** *and All answers must be written in the spaces provided.*
* *Answer only 2 questions from section* ***B.***

**SECTION A**

1. In each case state what would be observed and write equation for the reaction if the following salts were heated strongly
2. Anhydrous iron (II) sulphate
3. Observation. ***(1 ½ marks)***

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1. Equation ***(1 ½ marks)***

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1. Calcium nitrate crystals
2. Observation ***( 1 ½ marks)***

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1. Equation ***( 1 ½ marks)***

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1. a) Other than gas bubbles, state what would be observed when dilute sulphuric acid is added dropwise until excess to;
2. Zinc powder ***(01 mark)***

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1. Calcium carbonate ***(01mark)***

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1. Give a reason to explain your observations in a(i) and a(ii) above. ***(01mark)***

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1. Gaseous products in the reaction a(i) was collected in a different test tube and a burning match stick was introduced into it. State what was observed? ***(01mark)***

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1. Hydrocarbon D whose molecular mass was found to be 42grams contains 85.7% of carbon.
2. (i) determine the empirical formula of D. (H=1, C=12) ***(2 ½ marks)***

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(ii) Determine the molecular formula for hydro carbon D? ***(01mark)***

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1. Write the possible structural formula of D. ***(01mark)***

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1. If a solution of bromine in Tetra Chloromethane is added onto D.

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

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(ii) Explain the observation in c(i) above. ***( ½ mark)***

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1. a) What is electrolysis? ***(01mark)***

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b) (i) Draw a labelled diagram of an experimental set up used to electrolyse

lead II bromide. ***(2 ½ marks)***

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(ii) State what would be observed at the anode? ***(01mark)***

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1. Write an equation to show electrode reaction that represents a reduction reaction. ***(1 ½ marks)***

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1. a) A mixture of iron fillings and sulphur was subjected to strong heating.
2. Write the equation of reaction between the resultant product and dilute hydrochloric acid? ***( 1 ½ marks)***

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b) (i) State what would be observed if a mixture of iron fillings and Sulphur is

warmed with dilute sulphuric acid. ***(02marks)***

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1. Name the gaseous product formed in this reaction. ***( ½ mark)***

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1. a) Name one substance that can be used in the laboratory preparation of hydrogen chloride gas from sodium chloride. ***( ½ mark)***

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b) State the conditions under which such a reaction occurs. ***(1mark)***

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c) Write equation of reaction between substance you have named in (a) and

sodium chloride. ***(1 ½ marks)***

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1. In each case, state what would be observed if aqueous lead (II) nitrate added to
2. dilute sulphuric acid ***(1mark)***

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1. sodium iodide solution ***(1mark)***

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b) write ionic equation for the reaction in

(i) a(i) above ***(1 ½ marks)***

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(ii) a (ii) above  ***(1 ½ marks)***

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1. Glucose, a carbohydrate undergoes a process of fermentation in the presence of an enzyme so as to form ethyl alcohol.
2. (i) Write equation for the fermentation of glucose. ***(1 ½ marks)***

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(ii) Name the enzyme used in the fermentation process of glucose. ***(1mark)***

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1. Ethyl alcohol is a fuel that can be combusted to release heat energy as shown below in the presence of oxygen.

C2H5OH(l)  + 3O2(g) 2CO2(g) + 3H2O(g) + Heat

466.5KJ of heat energy was produced when 15.07grams of ethyl alcohol completely burnt in oxygen. Calculate the molar enthalpy of combustion of ethyl alcohol. (note: H=1, C=12, O=16) ***(2 ½ marks)***

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1. Comparison of copper and silver reactivities was made using an electrochemical cell shown in the diagram below:-

Salt Bridge

Aqueous solution having silver ions

Aqueous solution having copper II ions

Copper rod

x

1. On the diagram, draw an arrow to show the direction of electron flow. ***( ½ mark)***
2. (i) Name substance x ***( ½ mark)***

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(ii) Identify one substance that was used to make the electrolyte containing silver

ions. ***( ½ marks)***

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1. State the purpose of the salt bridge.  ***( 1 mark)***

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1. Write equation for the reaction occurring at;
2. Copper electrode ***(1mark)***

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1. Electrode labelled x ***(1mark)***

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1. a) Write the molecular formular for the following compound.
2. Calcium hydrogen phosphate. ***( ½ mark)***

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1. Calcium phosphate ***( ½ mark)***

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b) (i) Write ionic equation leading to formation of calcium phosphate. ***(1mark)***

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(ii) Calculate the percentage of phosphorous in calcium phosphate

(Ca = 40, P=31, O=16) ***(2marks)***

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1. (i) Compounds in a(i) and a(ii) above can be used as fertilizers. Which one of them is a better fertilizer? ***( ½ mark)***

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(ii) Give reason for your answer in c(i) above. ***(1mark)***

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**SECTION B**

*Answer any* ***two*** *questions*

1. Iron can be extracted from Iron (III) oxide in a blast furnace.
2. (i) Other than haematite which is a common iron ore, name one ore of iron.

***(1mark)***

(ii) Name one major impurity that can be found in the ore you have named in a(i) above. ***(1mark)***

1. Briefly outline the reactions which occur in the blast furnace during extraction of iron from Iron III oxide. ***(7marks)***
2. (i) Name the major components of Iron alloy called stainless steel.

***(1 ½ marks)***

(ii) State only one use of stainless steel. ***( ½ mark)***

(iii) Give a reason why stainless steel is more used than pure iron.

***(1mark)***

1. Common compounds of iron are either those of iron (II) or Iron (III)

Write the formula of one compound of;

1. Iron (II)  ***( ½ mark)***
2. Iron (III) ***( ½ mark)***
3. Name one reagent that could be used to distinguish Iron (II) compound and Iron (III) compound. In each case, state what would be observed if the reagent you have named was added to iron (II) compound and Iron (III) compound respectively. ***(2 ½ marks)***
4. a) Briefly outline how you can prepare zinc sulphate 7-water crystals in the laboratory. ***(5 ½ marks)***
5. With the help of equations, describe the effect of heating zinc sulphate 7-water crystals gently in initial stages and strongly until no further change.  ***(3 ½ marks)***

c) The residue from (b) above was dissolved in dilute nitric acid to make a solution. (i) Write equation to represent the reaction that took place. ***( 1 ½ marks)***

(ii) State and explain what is observed when dilute sodium hydroxide was added

dropwise until in excess to the solution obtained in c(i) ***(4 ½ marks)***

1. a) (i) Make a well labelled diagram of the apparatus used in the preparation of nitric acid under laboratory conditions.

(ii) Write a balanced chemical equation to represent the reaction occurring during the

laboratory preparation of nitric acid. ***(1 ½ marks)***

(iii) Write an equation of reaction for thermal decomposition of nitric acid. ***(1 ½ marks)***

b) Briefly explain why freshly prepared nitric acid shows a characteristic yellow colour

compared to pure nitric acid which is colourless. (***1 ½ marks)***

c) Describe the effect of heat on the following compounds and in each case write an

equation for the reaction that is taking place

1. mercury (II) nitrate ***(2marks)***
2. Lead II nitrate ***(2marks)***

d) When 40cm3 of 2M nitric acid was mixed with 40cm3 of 2M sodium hydroxide solution

at an initial temperature of 25.8°C, the temperature of the solution rose to T°C.

Calculate the value of T ***(4marks)***

***Note:*** = specific Heat capacity of water is 4.2Jg-1K-1

= density of water is 1gcm-3

= Enthalpy of neutralization of nitric acid by sodium hydroxide is 56.5KJmol-1

1. a) (i) Without the use of a diagram(s) and equations briefly outline an experiment that can be carried out to show that the rate of reaction between dilute hydrochloric acid and calcium carbonate depends on the surface area of the calcium carbonate.***(7marks)***

(ii) Other than surface area, state 2 conditions that can affect the rate of the reaction in

a(i) above. ***(1mark)***

b) A reaction between magnesium ribbon and dilute sulphuric acid was carried out to study the rate of reaction. The flask in which magnesium and the acid reacted was weighed at time interval of 10 minutes for a total time duration of 50 minutes. The table of results got is as follows;

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time (Minutes) | 0 | 10 | 20 | 30 | 40 | 50 |
| Mass of Flask + Contents (g) | 95 | 64.5 | 39 | 24.4 | 15 | 11.9 |

1. Plot a graph of mass of flask + contents against time. ***(5marks)***
2. Determine the rates of the reaction after 15 minutes and 27.5 minutes respectively and give a comment about your results. ***(2marks)***

***End -***