**OUR LADY OF PEACE GIRLS SEC SCHOOL**

**Name …………………………………………… School ………………………………….**

**Index Number ………………………………….Adm No………………Class……………..**

**Kenya Certificate of Secondary Education**

**233/1**

**CHEMISTRY**

**TIME – 2 HOURS**

**INSTRUCTIONS TO THE CANDIDATES**

* Write your ***name*** and ***indexnumber***in the spaces provided above.
* ***Sign*** and write the ***date*** of examination in the spaces provided.
* Answer ***all*** questions in the spaces provided.
* Mathematical table and silent electronic calculators may be used.
* All workings ***must*** clearly be shown where necessary.

**For Examiner’s Use Only:-**

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| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| **1 – 30** | **80** |  |

1. a) Name two major components of air? (1mark)

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b) Write an equation for the reaction that would take place when one of the components of air

named in (a) above is passed over heated magnesium. (2marks)

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1. The figure below shows the variation in rates of the following reaction,

2NO(g) + O2(g) 2NO2(g) H = +Ve

Curve II

Curve I

Time (minutes)

Rate of reaction

Other than concentration of either reactants or products, identify two other factors that can affect the rate of reaction above. Explain your answer. (2marks)

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1. (a) Radioactive materials pollutes the environment with great effects. State two ways of

controlling the effects of radioactive material to the environment (2marks)

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(b)In a sample, there are 5.12x1020 atoms of Krypton 92 initially. If the half-life of Krypton is 3.0

seconds, determine the number of atoms that will have decayed after 6 seconds. (2marks)

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1. (a) Give the structural formula of 3, 3 – dimethyl pent-1-yne. (1mark)

b) Name the following compounds using the IUPAC system. (2marks)

i) CH3CH2 CH C = CH2

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Br CH3

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ii) H2C = CH - CH = CBr- CH3

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1. Given below are bond energies.

Bond type Bond energy KJmol-1

C – C 346

C = C 610

C – H 413

C – Br 280

Br – Br 193

* 1. **Calculate** the heat change for the reaction;

C2H4  + Br2 C2H4Br2 (3marks)

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(b)Name the type of reaction that occurred in (a) above. (1mark)

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

Compound W

Gas Y

Polymer Z

Alkanol X

Propanoic acid

Compound E

Sodium

Metal

Con. H2 SO4(i) Heat /1800C

Process

High Pressure

Alkanol X

1. Name compound E (1mark)

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1. State two uses of polymer Z (1mark)

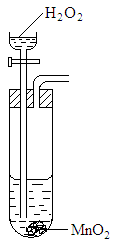
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1. Write and equation for the production of compound W (1mark)

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1. The set up below was used to prepare a sample of oxygen gas. Study it and answer the questions that follow.



* 1. **Complete** the diagram to show howdry Oxygen gas can be collected. (2marks)
  2. **Write** a chemical equation of the reaction that produced oxygen. (1mark)

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1. A student was asked to determine the percentage of zinc metal in a mixture of zinc metal and zinc oxide. He reacted the mixture with excess hydrochloric acid and accurately collected the gas evolved, which was then used to calculate the amount of zinc in the mixture.

(a) Name the gas that was evolved? (1 mark)

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* 1. Apart from the reaction liberating the gas write a balanced equation for the other reaction

that took place . (1 mark)

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(c) Why would dilute nitric acid not suitable for this reaction? (1 mark)

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1. When excess chlorine is bubbled through cold dilute sodium hydroxide solution, the resulting solution is a bleaching agent.
2. Write a chemical equation for the reaction that produces the bleaching agent. (1 mark)

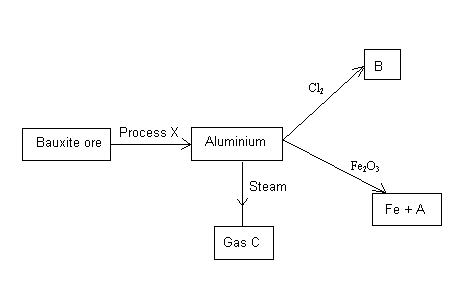
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1. Name the bleaching compound and show how it bleaches using an equation.(1mark)

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1. The extraction and some properties of aluminium are summarized in the flow chart below.



1. **Give** the chemical formula of Bauxite. ( ½ mark)

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(ii) **Name** the substances A, B and C in the diagram above. (1 ½marks)

A: ……………………………………………………………………………………

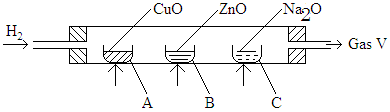
B: …………………………………………………………………………………….

C: …………………………………………………………………………………….

(iii) Explain the use of Cryolite in the extraction of Aluminum. (1mark)

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1. Hydrogen gas was passed over heated oxides of metals as shown.



* 1. **State** and **explain** the observation which can be made in the combustion tube A (1mark)

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* 1. **Identify** gas V formed. (1mark)

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* 1. **Givetwo** uses of hydrogen gas. (1mark)

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1. The solubility of salt X is 80g/100g of water at a temperature of 900C. Solution is cooled to 400C
2. **Explain** the term solubility. (1mark)

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1. **Calculate** the amount of salt crystallized if the solubility of salt X at 400C is 60g/ 100g of water. (2marks)

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1. A form one student was supplied with a colorless liquid suspected to be water.Describe one chemical test that could be carried out to show that the liquid was water. (2 marks)

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1. The scheme below represents the manufacture of a cleansing agent M.



1. Draw the structure of M. (1 mark)

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1. To which type of cleansing agent does Mbelong? (1mark)

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1. Starting with copper turning, **describe** how a solid sample of Copper (ii) Carbonate can be prepared. (3marks)

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1. In a experiment, 10.6g of a mixture of Anhydrous Sodium Carbonate and Sodium Chloride were dissolved in water to make 100cm3 of a solution required 20.0cm3 of 0.5M Hydrochloric acid solution for complete neutralization. **What** is the mass of Sodium Carbonate in the mixture? **(Na = 23.0, C = 12.0, O = 16.0, Cl = 35.5)** (3marks)

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1. Consider the chromatogram below.



A piece of chromatogram paper was spotted with colored inks obtained from pens labeled A to F.

The diagram above shows the spots after the chromatograph was developed.

1. Which two pens contained the same pigment? (1mark)

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1. According to the chromatogram which pigments are present in the inks of the pen number F

(1mark)

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1. Describe how one could get a sample of yellow pigment (1mark)

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1. The equation shows a reaction at equilibrium.



**Explain** what would be observed if a few drops of sodium hydroxide were added to the mixture. (3marks)

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1. 60cm3 of oxygen gas diffused through a porous plug in 50 seconds. How long would it take 60cm3 of sulphur (IV) oxide gas to diffuse through the same plug under the same condition? (S = 32, O = 16) (3marks)

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1. a)Explain why water molecule is capable of reacting with hydrogen ion (H+) to form hydroxonium ion (H3O+). (1mark)

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b) Using dots (**.)** and crosses (x) to represent electrons, show the bonding in hydroxonium ion (H=1 O=8). (1mark)

c) In reference to carbon (IV) oxide, distinguish between covalent bonds and Van der Waals forces. (1mark)

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1. 15cm³ of a gaseous hydrocarbon reacted completely with 45cm³ of oxygen. 30cm³ of carbon (IV) oxide were formed.Determine the formula of the hydrocarbon given that all volumes of gases were measured under the same conditions of temperature and pressure. (2marks)

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1. In an experiment, rods of metal X, Y, Z were cleaned with sand paper and placed in a beaker containing water. Another set of rods was also placed in a beaker containing dilute acid. After placing the rods in the two liquids, bubbles of gas were seen around some of the rods as shown in the diagram below.



1. Why is it necessary to clean the rods with sand paper before dipping them into the liquid?

(1mark)

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1. Arrange the three metals in order of their reactivity starting with the most reactive.(2marks)

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1. The set up below was used to investigate some properties of chlorine gas.



1. Name:

(i) Substance G (1 mark)

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(ii) A suitable drying agent. (1mark)

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1. What property of chlorine make it possible for it to be collected as shown in the diagram?

(1mark)

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1. The diagram below represents a set up that was used for electrolysis of aqueous copper (II) nitrate



1. Write ionic equations to show reactions that take place at the :

(i) Anode (1 mark)

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(ii) Cathode (1 mark)

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1. Explain how the identity of the product at the anode of this electrolysis can be confirmed.

(1mark)

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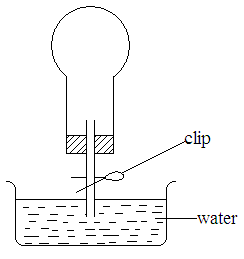
1. When gas X was bubbled into a solution of lead (II) nitrate and barium chloride, a white precipitate was formed.
   1. **Identify** gas X. (1mark)

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* 1. **Explain** why barium chloride is acidified when testing for  ions. (1mark)

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1. Dry hydrogen chloride gas was put in a hard round bottomed flask, connected to a capillary tube. The clip was opened to allow ten drops of water to enter the flask.



1. **What** would happen if the clip is opened once more? (1mark)

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1. **Explain** your observations in (a) above. (2marks)

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1. When 20cm3 of 1M sodium hydroxide was mixed with 20cm3 of 1M hydrochloric acid, the temperature rose by 6.70C. Assuming the density of the solution is 1g/cm3 and the specific heat capacity of the solution is 4.2 j/g-1/k-1.
2. Calculate the molar heat of neutralization (2marks)

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1. When the experiment was repeated with 1M ethanoic acid the temperature change was foundto be lower than that with 1M hydrochloric acid Explain (1mark)

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