**NAME: ………………………………………….ADM NO: …………… CLASS:……………….**

**JULY, 2024**

**MOKASA II JOINT EVALUATION EXAMINATION**

***Kenya Certificate of Secondary Education (K.C.S.E.)***

**CHEMISTRY PAPER ONE**

**233/1**

**TIME: 2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your Name, Admission Number and class in the spaces provided.
* Answer all the questions in the spaces provided in the question paper.
* Mathematical tables and silent scientific calculators may be used.
* ALL the working must be clearly shown where necessary.
* This paper consists of 12 pages.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAX SCORE** | **CANDIDATE’S SCORE** |
| 1 – 28 | 80 |  |

1. An extract colouring matter was placed at the centre of a filter paper and allowed to dry. Drops of ethanol were added to the centre and eventually the following was observed.

**Paper**

1. Name a process by which dilute extract can be made more concentrated. **(1mk)**

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1. Give the name of the process by which the circles were produced. **(1mk)**

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1. Explain why water is not suitable for this process. **(1mk)**

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1. Study the table below and answer the questions that follow.

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| --- | --- | --- | --- | --- | --- |
| **Solution** | **N** | **P** | **K** | **L** | **Q** |
| **PH** | **1.0** | **14.0** | **6.5** | **7.0** | **8.0** |

1. Which of the solutions would be suitable for use in the manufacture of anti-acid tablets?

**(1mk)**

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1. Give a pair of the above solutions for which zinc oxide can dissolve. Give a reason.

**(2mks)**

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1. In an experiment to prepare oxygen gas, black **solid B** was added to hydrogen peroxide solution. The oxygen produced was then used to produce **gas D** which changes orange acidified potassium dichromate (VI) to green. Gas D was prepared by heating a yellow **solid A** in oxygen.
2. Identify

Solid B **(1/2mk)**

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Gas D **(1/2mk)**

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1. Write an equation for formation of oxygen gas from the above experiment. **(1mk)**

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1. What volume of oxygen gas would be produced at r.t.p of 20 cm3 of 2M hydrogen peroxide was used in the experiment? (M.G.V at r.t.p = 24000 cm3) **(2mks**)

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1. Given:

ΔH1att LiCl = 891 kJmol-1

ΔH hyd  Li+ (g) = 484 kJmol-1

ΔH hyd 2Cl- (g) = 800 kJmol-1

1. Determine the enthalpy of solution of lithium chloride. **(2mks)**

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1. Draw an energy level diagram to represent the above information **(2mks)**
2. 65 g of a solution contains 5 g of solute. The solubility of the salt is 25 g per 100cm3 of water at

20 0C. 30 g of the salt was added to the solution at 20 0C. Determine the mass of the salt that remained undissolved. **(3mks)**

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1. Using dots ( . ) and crosses (X) to represent electrons show bounding in phosphonium ion (PH4+) **(2mks)**
2. (a) Describe how you can prepare a dry sample of ammonia (Na2CO3.NaHCO3.2H2O) in the laboratory, starting with sodium carbonate solid. **(2mks)**

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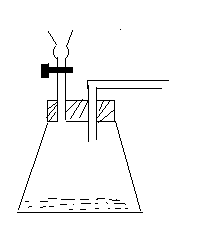
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(b) If the crystals prepared above are left exposed overnight. It is observed that it turns into a white powder. Explain. **(1mk)**

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1. The set-up below was used in the laboratory preparation of carbon (II) oxide.



**Liquid H**

**Ethanedioic acid (H2C2O4)**

1. Complete the set up to show how carbon (II) oxide was collected. (**2mks)**
2. Identify liquid **H** and state its function **(1mk)**

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1. Write an equation for the reaction producing carbon (II) oxide gas. **(1mk)**

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1. A student electrolyzed magnesium sulphate solution graphite electrodes.
2. Calculate the amount of current required to liberate 1.2dm3 of the gas produced at the anode at r.t.p. (M.G.V at r.t.p = 24dm3, 1F = 96500C). **(3mks)**

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1. Explain the changes in concentration of the electrolyte as the electrolysis progresses.

**(1mk)**

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1. (i) State Graham’s law of diffusion **(1mk)**

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(ii) 100 cm3 of ozone (O3) diffused through a certain apparatus in 96 seconds. Calculate the time taken by 100 cm3 of carbon (IV) oxide to diffuse through the same apparatus under same conditions. (O = 16.0 C = 12.0) **(3mks)**

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1. In an experiment to confirm the presence of nitrate ions in a solution, a student added a certain solid M followed by sodium hydroxide solution the warming. He then tested the gases produced using litmus papers.
2. Identify solid M **(1mk)**

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1. Complete the table below by listing down the observations that lead to the conclusion that nitrate ions were present.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| …………………………………………………………………….  ……………………………………………………………………..  ……………………………………………………………………  **(2mks)** | NO3- present |

1. Acertain metal carbonate, QCO3 , reacts completely with 20 cm3 of 1M hydrochloric acid according to the equation below.

QCO3(s) + 2 HCl(aq) QCl2(aq)+ CO2(aq)+ H2O(l)

Determine the relative atomic mass of Q is 1g of the carbonate reacted completely.

(C=12, O = 16) **(3mks)**

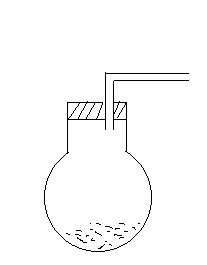
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1. **(a)** Draw and name all the possible isomers of butene. **(2mks)**

**(b)** The diagram below shows an incomplete set-up of the laboratory and collection of propane.



**Solid X + sodium hydroxide solid + calcium oxide**

1. Complete the set-up to show how the gas is collected. **(2mks)**
2. Identify solid X **(1mk)**

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1. What is the role of calcium oxide in the mixture? **(1mk)**

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1. (a) An element P consist of three isotopes with mass number 39, 40, 41 with percentage

abundance of P-40 being 60%. If the R.A.M of P is 39.8, determine the percentage

abundances of the other two isotopes. **(2mks)**

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(b) If the atomic number of P is 9, illustrate the structure of an ion of P-39. **(2mks)**

1. Hydrogen sulphide gas reacts with chlorine gas according to the following equation.

H2S(g) + Cl2(g) 2HCl(g) + S(s)

Use oxidation numbers to identify the reducing agent in the equation. **(2mks)**

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1. (i) Write a balanced chemical equation for the reaction between chlorine gas and hot concentrated sodium hydroxide solution. **(1mk)**

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(ii) Give one use of the major product formed in (i) above. **(1mk)**

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1. Write PTFE in full. **(1mk)**

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1. (a) Identify the acid in the backward reaction. Give a reason for your answer.

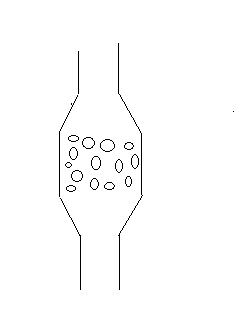
NH4+ (aq) + H2O (l) NH3(aq) + H3O+(aq)  **(2mks)**

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1. The column below was used to soften hard water.

**Hard water**



**Permutit containing Na+ ions**

**Soft water**

1. Briefly explain how the resin works. **(1mk)**

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1. How is the resin re-activated after some time? **(1mk)**

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1. Hydrogen chloride gas dissolved in water conducts electric current while hydrogen chloride gas dissolved in methylbenzene does not. Explain. **(2mks**)

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1. (a) Name the chief one from which lead is extracted. **(1mk)**

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(b) State two uses of copper metal. **(2mks)**

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1. Describe the process of preparation of soap. **(2mks)**

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1. (i) Name the type of polymerization by which the polymer nylon– 6, 6 below is formed.

O

║

C (CH2)4 C N (CH2)6 N

║

O H H

**………………………………………………………………………………………(1mk)**

( ii ) Write the equation for the process taking place in (b) above. **(1mk)**

1. (a) Distinguish between nuclear fusion and nuclear fission. **(1mk)**

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(b) Z1 Ս + 1n 94 Sr + 140 Sr +2 1n

92 0 38 Z2   0

Find the value of Z1 and Z2 in the nuclear equation above. **(1mk)**

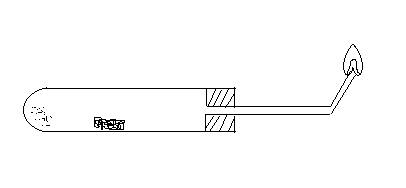
(c) 100g of radioactive 23191 Pa was reduced to 12.5g after 81 days. Determine the half-life of Pa (2mks)

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1. Study the set-up below and use it to answer the questions that follow.



**Iron filings**

**Wet sand**

1. Why is it necessary to heat the wet sand before heating the iron filings? **(1mk)**

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1. Write down an equation for the reaction involving the iron filings. **((1mk)**

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1. What precaution is necessary during the reaction? **(1mk)**

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1. A student was provided with two solutions of sodium chloride and aluminium chloride in an experiment. He accidentally removed the labels from the beakers containing the solutions. Describe how he can use potassium hydrogen carbonate to distinguish between the two solutions. **(2mks)**

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1. One mole of hydrazine gas (NxHy) reacts completely with oxygen to from 40 cm3 of nitrogen gas and 80 cm3 of steam.
2. Determine the volume of oxygen gas used in the reaction. (**2mks)**

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1. Write the equation for the reaction. **(1mk)**

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**27.** A student accidentally added potassium chloride into a mixture of zinc oxide and iron (III) chloride. Describe how you can help him obtain pure potassium chloride from the mixture. (3mks).

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28. Draw and name an apparatus used to support a crucible while heating in the laboratory. (1mk)

**END.**