**Name………………………………………………………… Index No…………………/…….**

**School………………………………………… Candidates Signature…………… Date…………………………….**

**233/2**

**CHEMISTRY**

Paper 2

(THEORY)

**TIME 2 HOURS**

**NZAUI SUB COUNTY FORM 4 ENTRANCE EXAM 2015**

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

**233/2**

**CHEMISTRY**

Paper 2

(THEORY)

**TIME: 2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and Index Number in the spaces provided above.
* Sign and write date of examination in the spaces provided above.
* Answer **ALL** questions in the spaces provided.
* KNEC Mathematical tables and silent electronic calculators may be used.
* All workings **must** be clearly shown where necessary.
* Candidates should answer the questions in English.
* This paper consists of 11 printed pages
* Candidates should check the question paper to ensure that all the papers are printed as indicated and no questions are missing

|  |  |  |
| --- | --- | --- |
| **Questions** | **Maximum Score** | **Candidate’s Score** |
| 1 | 8 |  |
| 2 | 24 |  |
| 3 | 15 |  |
| 4 | 10 |  |
| 5 | 12 |  |
| 6 | 12 |  |
| 7 | 9 |  |
| TOTAL | 80 |  |

1. Read the information in the grid below and answer the questions that follow. Letters do not represent actual symbols.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A |  |  |  |  |  |  |  |  |
| D |  |  |  |  | C |  | B |  |
|  |  |  | F | G |  | H |  |  |
| K | L |  |  |  |  |  |  |  |
|  |  |  |  | R | Q |  |  |  |
| P |  |  |  |  |  |  |  |  |

1. Select an element that can form an ion with a charge of-2. Explain. (2 marks)

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1. Giving reasons, select the metallic element with the lowest melting point. (1 mark)

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1. Write the formula of the Oxide of P. (1 mark)

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1. Explain the following observations.
2. L is a hard solid with a higher melting point than K. (1 mark)

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1. First ionization energy of L is greater than the first ionization energy of K (1 mark)

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1. Select any two elements which form a compound that conducts electricity in both fused (molten) state and in solution form. (1 mark)

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1. Select any two elements which react to form a product that dissolves in water to form an acidic solution. (1 mark)

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1. A student set up the arrangement below to prepare and collect dry hydrogen gas.

Zinc granules

Dilute Sulphuric (VI) acid

1. Identify one error from the section of the arrangement shown above. (1 mark)

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1. Complete the diagram to show how dry hydrogen gas can be collected. (2 marks)
2. Write a balanced chemical equation for the reaction that takes place in the round bottomed flask.

 (1 mark)

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1. Determine the relative atomic mass of zinc given that when 6.54g of zinc were used, 2.4 dm3 of hydrogen gas was produced. (molar gas volume=24dm3) (2 marks)

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1. State two uses of hydrogen. (2 marks)

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1. Dry hydrogen was passed over heated lead (II) oxide in a combustion tube as shown below.

Lead (II) Oxide

Dry H2

Heat

Flame

Ice – cold water

Liquid x

1. State and explain the observations made in the combustion tube. (2 marks)

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1. Identify liquid X. (1 mark)

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1. What property of hydrogen is being investigated in the experiment above? (1 mark)

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1. State two gases that can be used in place of hydrogen gas in the above experiment. (2 marks)

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1. (I). The flow chart below shows the manufacture of sodium carbonate. Study it carefully and answer the questions that follow..

NH3(aq)

Ammoniacal brine

Solvay tower

Q

P

Heat

Na2CO3

NH4Cl

Ca(OH)2

CaCl2

Slaker

KILN

R

Water

1. What is ammoniacal brine? (1 mark)

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1. (i) Ammoniacal brine reacts with Carbon (IV) oxide to form a mixture of two salts which produce

 Q. write the equation for the formation of Q. (1 mark)

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1. Name two processes that are used to separate Q into NH4Cl and P. (2 marks)

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1. Give two uses of Sodium Carbonate. (2 marks)

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(II) (i) Name substance R that reacts with water in the slaker. (1 mark)

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1. What happens at the kiln. (1 mark)

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1. Write an equation for the reaction that occurs when P is heated to form solid Sodium Carbonate.

 (1 mark)

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1. Name two substances that are recycled in the process. (2 marks)

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III. The diagram below is a set up that was used in the preparation and collection of Carbon (II) oxide.

Sodium Hydroxide

Water

Ethanedioic acid

Conc. H2SO4

1. State the physical property of Carbon (II) oxide that enables it to be collected using the method shown above. (1 mark)

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1. State one precaution that must be observed before setting up this experiment. (1 mark)

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1. Write a balanced equation for the reaction that occurs in the round bottomed flask. (1 mark)

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1. State the property of concentrated sulphuric (VI) acid demonstrated in its reaction with ethanedioic acid. (1 mark)

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1. Study the following table and use it to answer the questions that follow.

|  |  |
| --- | --- |
| Hydrogen | Boiling point (K) |
| CH4 | 112 |
| C2H6 | 184 |
| C3H8 | 231 |
| C4H10 | 273 |
| C5H12 | 309 |
| C6H14 | 342 |

1. Three organic compounds belong to the same homologous series.
2. What is meant by the term homologous series? (1 mark)

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1. To which homologous series do the above hydrocarbons belong? (1 mark)

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1. What is the relationship between the boiling point and relative molecular masses of the hydrocarbons? Explain your answer. (2 marks)

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1. Give one chemical test to distinguish between C2H6 and C3H6 (2 marks)

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1. Draw the structures of all the isomers of butane and give IUPAC the name for each isomer drawn. IUP (2 marks)

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1. Write a chemical equation for the reaction that occurs when one mole of bromine reacts with one mole of propene. (1 mark)

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1. State the type of reaction represented by the reaction in b (i) above. (1 mark)

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1. Oxygen was bubbled through concentrated ammonia solution as shown in the set up below.

Conc. ammonia solution

Hot platinum wire

Oxygen gas

1. Name two reagents that can be used to prepare oxygen in the laboratory. (2 marks)

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1. What is the role of
2. Platinum wire (1 mark)

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1. Concentrated ammonia solution. (1 mark)

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(c) (i) Explain the observations made during the experiment. (2 marks)

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1. Write an equation for the reaction taking place on the platinum wire. (1 mark)

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1. (i) Ammonia solution was added to Zinc ions solution dropwise till in excess. Using balanced ionic equation explain the observation made. (3 marks)

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1. When ammonium chloride salt was heated and the products tested with moist litmus paper, it was observed that red litmus paper turned blue then later turned red again. Explain this observation

 (2 marks)

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1. The flow chart below shows how sulphuric (VII) acid is manufactured at KEL chemicals industry in Thika, Kenya.

 Study it and answer the questions that follow.

AIR

STEP 1

SULPHUR

98% H2S04

Substance P

Water

Absorption Tower

S03

Waste gases

Converter

2SO2 +02  2SO3

 Heat

 Exchanger

S03

 Drying

 Tower

Purifier

S02 +

Air

1. (i) Which other substance can be used in step I in place of sulphur? (1 mark)

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1. Why is air and Sulphur (IV) Oxide purified in step II (1 mark)

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1. State the optimum temperature and pressure required in step IV. (2 marks)

Temperature ……………………………………………..………………………………………….

 Pressure …………………………………………………………………………………………

1. Explain why Sulphur (IV) oxide produced in step IV is not dissolved in water directly to form Sulphuric (VI) acid. (2 marks)

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1. Write a balanced equation for the reaction resulting in production of substance P. (1 mark)

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1. Sate two harmful effects of Sulphur (IV) Oxide on the environment. (2 marks)

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1. State two uses of Sulphuric (VI) acid. (2 marks)

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1. State the chemical test for hydrogen sulphide gas. (1 mark)

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1. (a) Two reagents that can be used to prepare chloride gas are manganese (IV) oxide and concentrated hydrochloric acid.
2. Write an equation for the reaction. (1 mark)

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1. Give the formula of another reagent that can be reacted with concentrated hydrochloric acid to produce chlorine gas. (1 mark)

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1. Describe how the chlorine gas could be dried and collected in the laboratory. (2 marks)

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1. In an experiment, dry chlorine gas was reacted with aluminium as shown in the diagram below.

Combustion tube

Calcium oxide

Receiver

A

Heat

Aluminium

Dry Cl2 (g)

1. Name substance A (1 mark)

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1. Write an equation for the reaction that took place in the combustion tube. (1 mark)

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1. Give two reasons why calcium Oxide is used in the set up. (2 marks)

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1. State the property of the product formed in the combustion tube that makes it possible for it to be

 collected in the receiver. (1 mark)

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