**Name of School:……………………………………………………………………………**

**Candidate’s Name:……………………………………………………………………………**

**Centre No./Index No: ……………………………………………. Signature:………**

P525/3

Chemistry

PAPER 3

3 ¼ HOURS

**ELITE JOINT MOCK EXAMINATION BOARD 2016**

**Uganda Advanced Certificate of Education**

**CHEMISTRY**

**PAPER 3**

**3Hours 15Minutes**

**INSTRUCTIONS TO CANDIDATES**

* *Answer all questions*
* *Record your answers in the space provided*
* *Mathematics tables and non programmable scientific calculator should be provided.*
* *Reference books should not be used*
* *You are not allowed to start working with the apparatus for the first 15 minutes but read the question paper to understand what to do.*

**For examiners use only**

|  |  |  |  |
| --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Total** |
|  |  |  |  |
|  |  |  |  |

**1.** You are provided with the following

**FA 1**: A solution containing a mixture of anhydrous sodium carbonate and

 sodium hydroxide.

**FA2**: 0.1M hydrochloric acid.

You are required to determine the percentage by mass of sodium hydroxide in FA1. (Na = 23 C = 12 O = 16)

**Theory**

When a mixture of sodium carbonate and sodium hydroxide is titrated with hydrochloric acid using phenolphthalein indicator, all the sodium hydroxide reacts but the sodium carbonate reacts halfway during which it is converted to sodium hydrogen carbonate. Then the hydrogen carbonate reacts when methyl orange indicator is added to the resultant solution and the titration is continued.

**Procedure**

Pipette 25 or 20cm3 of **FA1** into conical flask and add 2 drops of phenolphthalein indicator. Titrate with **FA2**. Record the result in **table I**, then add 2 drops of methyl orange indicator and continue with the titration until another endpoint. Record the result in **table II**. Repeat the titrations to obtain consistent titre values.

**Results:**

Volume of pipette used = ………………………………….cm3.

**Burette readings:**

|  |  |  |
| --- | --- | --- |
|  | **Table I****(Using Phenolphthalein)** | **Table II****(Using methyl orange)** |
| Final readings/cm3  |  |  |  |  |  |  |
| Initial reading/cm3 |  |  |  |  |  |  |
| Volume of FA2 used/cm3 |  |  |  |  |  |  |

Average volume (V1) of FA2 used in table I

………………………………………………………………………………………………………………………………………………………………………………………………………………

Average volume (V2) of FA2 used in table II

………………………………………………………………………………………………………………………………………………………………………………………………………………

**Questions**

1. Determine the volume of FA2 required for reaction of.
2. Sodium carbonate

……………………………………………………………………………………………………………………………………………………………………………………………………

1. Sodium hydroxide

……………………………………………………………………………………………………………………………………………………………………………………………………

1. Calculate the concentration in grams per litre of;
2. Sodium carbonate

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

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1. Sodium hydroxide

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1. Hence determine the percentage of sodium hydroxide in FA1

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

**2.** You are provided with substance **Q** which contains two cations and two anions. Carry out the tests below to identify the ions. Record your observations and deductions in the table below. Identify any gases that may be produced.

|  |  |  |
| --- | --- | --- |
| **Tests** | **Observations** | **Deductions** |
| 1. Put two spatula endfuls of **Q** in a hard dry test tube and heat first gently, then strongly until there is no further change.
 |  |  |
| 1. To two spatula endfuls of Q in a test tube, add about 8cm3 of distilled water and shake well. Then filter. Divide the filtrate into 3 portions.
 |  |  |
| 1. to the first portion add 3 drops of lead (II) nitrate solution
 |  |  |
| 1. To the second portion add 3 drops of silver nitrate followed by ammonia solution dropwise until in excess.
 |  |  |
| 1. To the third portion, add 3 drops of concentrated sulphuric acid followed by ¼ spatula endful of manganese (IV) oxide. Heat gently.
 |  |  |
| 1. Transfer the residue into a test tube and add dilute nitric acid little at a time to dissolve.
 |  |  |
| 1. To about 3cm3 of the solution in (c) add sodium hydroxide solution drop wise until in excess. Shake well and filter. Keep both filtrate and residue.
 |  |  |
| 1. To about 3cm3 of the filtrate in (d), add dilute nitric acid slowly until the solution is just acid. Then divide into four portions.
 |  |  |
| 1. To first portion of the acidic solution add sodium hydroxide drop wise until in excess.
 |  |  |
| 1. To second portion add ammonia solution drop wise until in excess.
 |  |  |
| 1. To third portion add 3 drops of dilute sulphuric acid.
 |  |  |
| 1. Use the forth portion to confirm the cation present

……………………………………………………………………………………………… |  |  |
| 1. Transfer the residue in (d) into a test tube and dissolve in about 5cm3 of dilute nitric acid. Then divide into 3 portions.
 |  |  |
| 1. To the first portion add sodium hydroxide drop wise until in excess.
 |  |  |
| 1. To the second portion add ammonia solution drop wise until in excess.
 |  |  |
| 1. To the third portion, add 3 drops of potassium hexacyanoferrate (II) solution.
 |  |  |

Cations in Q = ………………………………… and …………………………………………

Anions in Q = ………………………………… and …………………………………………

**3.** You are provided with substance **T** which, is organic. You are required to identify the nature of **T**. carry out the following tests and record your observations and deductions in the table below.

|  |  |  |
| --- | --- | --- |
| **Tests** | **Observations** | **Deductions** |
| 1. Burn a small amount of **T** on a spatula end
 |  |  |
| 1. To 5cm3 of **T** in a test tube, add 8cm3 of distilled water and shake well. Then test with litmus paper and divide into four portions
 |  |  |
| 1. To first portion, add 2 drops of iron (III) chloride solution.
 |  |  |
| 1. To second portion add 3 drops of acidified potassium permanganate and warm.
 |  |  |
| 1. To the third portion add 3 drops Brady’s reagent.
 |  |  |
| 1. To the fourth portion, add 3 drops of Tollen’s reagent and warm gently.
 |  |  |
| 1. To 1cm3 of the fifth portion, add 10 drops of iodine solution followed by sodium hydroxide dropwise until the brown colour of iodine has disappeared. Warm and cool.
 |  |  |

Comment on the nature of **T**.

………………………………………………………………………………………………………………………………………………………………………………………………………………

**END**