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

**Candidates Signature............................................**

**Date.............................................**

**233/3**

**Chemistry paper 3**

**Practical**

**March /april 2017**

**Time: 2¼ hours**

**Kenya Certificate of Secondary Education 2017**

**Form four evaluation examination**

**INSTRUCTIONS TO CANDIDATES:**

* Write your name and index number and school in the spaces provided.
* Sign and write the date of examination in the spaces provided above.
* Answer **ALL** questions in the spaces provided in this question paper.
* You are **NOT** allowed o start working with the apparatus for the first 15 minutes of 2¼ hours

allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.

* All workings **MUST** be clearly shown where necessary.
* Mathematical tables and electronic calculators may be used.
* **This paper has 7 printed pages**

**FOR EXAMINER’S USE ONLY:**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM** **SCORE** | **CANDIDATES** **SCORE** |
| **1** | **16** |  |
| **2** | **18** |  |
| **3** | **6** |  |
| **TOTAL SCORE** | **40** |  |

1. You are provided with the following:

* + Solution A containing 2.95 of succinic acid in 250 cm3 of solution.
	+ Solution B containing 4g of sodium hydroxide in 500 cm3  of solution.

 You are required to determine the value of X in the formula of the acid A.

 **Procedure**

1. Fill the burette with solution A.
2. Using pipette and pipette filler, place 25cm3 of solution B in a conical flask.
3. Add two drops of phenolphthalein indicator and titrate with solution A. Fill the table below.
4. Repeat the titration two more times and record the results

|  |  |  |  |
| --- | --- | --- | --- |
|  |  I |  II |  III |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution A used (cm3) |  |  |  |

 (5mks)

1. Determine the average volume of solution A used (1mk)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1. Determine the molarity of sodium hydroxide solution (2mk)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1. Calculate the number of moles of sodium hydroxide in the 25cm3 used (1 mk)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1. Given the equation of the reaction between acid A (succinic Acid) and sodium hydroxide is:

2NaOH(aq) + H2X (aq) 2H2O(l) + Na2X(aq

 Determine:

1. the number of moles moles of acid A in the average volume used.(2mks)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(ii) the molarity of acid A (1mk)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(iii) the molar mass of the acid A (2mks

----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1. Determine the mass of X in on mole of the acid. (2mk

( H= 1.0)

---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1. You are provided with solid C. Perform the following tests and write the observations and inferences.
2. Place solid C in a boiling tube and add about 1/3 full of distilled water. Shake the mixture and filter. Keep the residue for tests (b) below and the filtrate.

|  |  |
| --- | --- |
| Observations | Inferences |
|    1mk  |  1mk |

Divide the filtrate into four portions.

 (i)To the portion, add sodium hydroxide drop wise till in excess

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(ii) To the second portion, add ammonia solution drop wise until in excess.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(iii) To the third portion add 4 drops of lead (ii) solution.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(iV) To the fourth portion, add 3 drops of barium chloride solution followed by 5 drops of dilute hydrochloric acid

|  |  |
| --- | --- |
| Observations | Inferences |
|    1mk |   1mk |

1. Place the residue into attest tube and add dilute nitric acid while shaking until the solid dissolves.

Divide the solution into 3 portions.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(i) To the first portion, add sodium hydroxide drop wise until in excess.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(ii) To the second portion, add Ammonia solution drop wise until in excess.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

(iii) To the third portion, add 4 drops of sodium sulphate solution.

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |

3. You are provided with solid D. Carry out the following tests and write your observations and inferences. Divide the solid into 2 parts.

(a) Put the first portion on a dry metallic spatula and ignite it.

|  |  |
| --- | --- |
| Observations | Inferences |
|    1mk |    1mk |

1. Put the second portion in a test tube, add about ¼ full of distilled water, and shake the mixture to dissolve the solid. Divide the solution into 2 parts.

(i) To the first portion add 3drops of bromine water.

|  |  |
| --- | --- |
| Observations | Inferences |
|  1mk |  1mk |

(ii)To the second portion add 3 drops of acidified potassium manganate (vii)

|  |  |
| --- | --- |
| Observations | Inferences |
|   1mk |   1mk |