**NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ INDEX NO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**CLASS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**233/3**

**CHEMISTRY**

**PAPER 3**

**(PRACTICAL)**

**2 ¼ HRS**

**TERM 1 2014 F4**

**MWAKICAN JOINT EXAM TEAM (MJET) - TERM 1 2014**

**CHEMISTRY**

**PAPER 3**

**(PRACTICAL)**

**2 ¼ HRS**

**INSTRUCTIONS TO CANDITATES**

1. Answer all the questions in the spaces provide in the question paper
2. You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hrs 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.
3. All working must be clearly shown where necessary**.**

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| **1** | **16** |  |
| **2** | **11** |  |
| **3** | **13** |  |
| **TOTAL SCORE** |  |  |

**This paper consist of 5 printed pages candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

1. You are provide with
* solution S 0.2m Hydrochloric acid solution
* N grames of anhydrous sodium carbonate
* methyl orange indicator

You are required to prepare a solution of sodium carbonate and then standardize it with hydrochloric acid solution.

**Procedure**

Transfer all the N grammes of sodium Carbonate into a 250ml volumetric flask Add 100cm3 of distilled water and shake till all the solid dissolves. Add more distilled water up to the 250ml mark and lebel it solution P using a measuring cylinder, transfer 50cm3 of solution P into a clean 250ml beaker and add 50cm3 of distilled water. Stir well with a glass rod and label it solution T. Pipette 25.0cm3 of solution T and place it into a conical flask, add 3 drops of methyl orange indicator and titrate with solution S from the burette. Record your results in the table I below. Repeat the titration two more times and complete the table below. (3mks)

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

1. Calculate the average volume of solution S used (1mk)
2. i) Calculate the number of moles of solution S used. (2mks)

ii) Write a balanced chemical equation for the reaction between solution T and S (1mk)

iii) Calculate the number of moles of sodium carbonate solution in 25cm3 of solution T. (2mks)

iv) Calculate the number of moles of sodium carbonate in 100cm3 of solution T (2mks)

v) Calculate the number of moles of sodium carbonate in 50cm3 of the original solution P (1mk)

1. Given that Na =23.0, C= 12.0, O = 16.0 Calculate
2. The mass of sodium carbonate N grams that were dissolved to make solution P (2mks)
3. The concentration of sodium carbonate solution P in moles per litre (2mks)
4. You are provided with 1m sodium hydroxide solution F. 0.5m Solution of an acid solution G. You are required to determine the molar heat of neutralization of sodium hydroxide with acid G.

**Procedure**

Place six test tubes on the test tube rack. Using 10cm3 measuring cylinder measure 5cm3 portions of solution G and place them into each of the six test tubes. Measure 25cm3 of solution F using a 50cm3 measuring cylinder and place it into a 100cm3 beaker. Measure the temperature of this solution F and record it in table II below. Pour the first portion of the 5cm3 of solution G from the test-tube into the beaker containing 25cm3 of solution F. Stir with the thermometer and record the highest temperature of the mixture pour the second portion of solution G, stir carefully and record the highest temperature of this mixture. Continue with this procedure using the remaining portions of solution G to complete table II below

**TABLE II**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Total volume of G added (cm3) | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Volume of F (cm3) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Highest temperature (0°c) |  |  |  |  |  |  |  |

 (3mks)

1. On the grid provided, plot a graph of temperature (vertical axis) against volume of solution G added (3mks)
2. From the graph determine
3. The volume of solution G required to neutralize the 25cm3 of sodium hydroxide solution F (1mk)
4. The highest temperature change, T. (1mk)
5. Calculate the number of moles of sodium hydroxide solution F used (1mks)
6. Calculate the molar heat of neutralization of the sodium hydroxide solution F (specific heat capacity of water = 4.2Jg-1 k-1, density of water = 1g/cm3 ) (2mks)
7. you are provided with solid C carry out the tests below to identify the ions present in substance C

|  |  |  |
| --- | --- | --- |
| **TEST** | **OBSERVATIONS** | **INFERENCES** |
| a) dissolve one spatula end full of solid C in about 10cm3 of distilled water divide the solution into 4 portions |  |  |
| i) To the first portion add 3 drops of aqueous NaoH and then to excess |      (1mk) | (1mk) |
| ii)To the second portion add 3 drops of ammonia solution and then to excess |     (1mk) | (1mk) |
| iii)To the third portion add 4 drops of sodium chloride solution and warm |     (2mk) | (1mk) |
| iv) To the fourth portion add 3 drops of sulphuric(vi)acid |     (1mk) | (1mk) |

1. You are provided with solid p carry out the tests below to identify the solid

|  |  |  |
| --- | --- | --- |
| **TEST** | **OBSERVATIONS** | **INFERENCES** |
| a) Scoop a little of solid P using a clean metallic spatula and ignite it with a flame  |      (1mk) | (1mk) |
| b) Place the remaining solid P in a test –tube. Add 2cm3 of distilled water. Add all the solid sodium carbonate provided |      (1mk) | (1mk) |