**3KNT**

**END TERM I EXAM 2017**

**FORM FOUR CHEMISTRY**

**PAPER 3 (PRACTICAL)**

**233/3**

**TIME : 21/4 HOURS**

NAME…………………………………INDEX NO…………………….

**Instructions to candidates**

* Write your name and index number in the spaces provided above
* Answer all questions in the space provided below each question
* You are not allowed to start working with the apparatus for the first 15 minutes of 21/4 hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemical and apparatus that you may need.
* All working must be clearly shown where necessary.
* Mathematical table and electronic calculators may be used

FOR EXAMINERS USE ONLY

|  |  |  |
| --- | --- | --- |
| QUESTIONS | MAXIMUM SCORE | CANDIDATES SCORE |
| 1a1b | 1610 |  |
| 2 | 10 |  |
| 3 | 4 |  |
| Total score | 40 |  |

1A. You are provided with;

* Sodium hydroxide solution A
* Dilute hydrochloric acid solution B
* A dibasic acid, containing 6.3g per litre of the acid, H2C2O4.2H2O Solution C

You are required to;

* Standardize solution A. sodium hydroxide
* Use the standardized solution A to determine the concentration of solution B

Procedure 1;

* Place solution C in a clean burette up to the make.
* Pipette 25cm3 of solution A into a clear conical flask and add 3 drops of phenolphthalein indicator. Titrate with solution C from the burette till end point and record your results in table 1. Below

Table I (a)

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

(41/2mks)

b.Calculate the

1. Average volume of solution C used (1mk)
2. Calculate the concentration of solution c in moles per litre (H=1,O=16,C=12) (1mk)
3. Moles of solution C used (1mk)
4. Moles of a in the 25cm3, sodium hydroxide solution (1mk)
5. Concentration of solution A in moles per litre (1mk)

Procedure II

* Using a clean measuring cylinder, measure 25cm3 of solution B and transfer into 250ml volumetric flask.
* Top up the solution in the volumetric flask with distilled water up to the mark. Label it as solution D.
* Rinse the burette with distilled water
* Place solution D into the burette up to the mark.
* Pipette 25cm3 of A into a clean conical flask and add 3 drops of phenolphthalein indicator.
* Titrate the solution in the conical flask with solution D. record your results in the table 2 below. Repeat two more time and complete the table

Table 2

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

(31/2mks

1. Calculate the average volume of solution d used (1mk)
2. Calculate the morality of solution D (1mk)
3. Calculate the number of moles in the average volume of solution D used (1mk)
4. Determine the no. of moles of B in 25cm3. (1mk)
5. Determine the morality of solution B (1mk)

1B.You are provided with 3.0g of solid F. you are required to determine the molar heat of solution of F .

Procedure:

* Measure 30cm3 of distilled water using 50ml measuring cylinder into a plastic beaker.
* Stir the water gentle with a thermometer and record the temperature after every half a minute. Record the readings in the tables below.
* At Exactly two minutes add all solid F to the water at once. Stir well the mixture with the thermometer and take the temperature after every half a minute up to the 4th minute and record in the table 3

Table 3

a.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (minutes) | 0 | 1/2 | 1 | 11/2 | 2 | 21/2 | 3 | 31/2 | 4 |
| Temperature (0C) |  |  |  |  | X |  |  |  |  |

b.Plot a graph of temperature against time on the grid provided (3mks)

ci.On the graph show change of temperature as Dt and give its value (1mk)

ii.Given the molar mass of F as 101, determine the number of moles of F used (1mk)

iii.Assume the density of solution is 1g/cm3 and specific capacity of the solution is 4.2g/k, calculate the heat change (1mk)

iv.Calculate the molar heat of solutions of solid F. (indicate the sign of ∆H (1mk)

2a. you are provided with solid C. carry out the tests below. Write your observation and inferences in the spaces provided

a.Place a spatula full of C in a boiling tube and heat gently.

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)

b.Place all the remaining solid c in a boiling tube. Add 10cm3 of distilled water and shake well.

Divide the resulting mixture into five portions

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)

i.To the first portion add ammonia solution drop wise till in excess

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1mk) |

(1mk)

ii.To the second portion add sodium hydroxide dropwise followed by 3 drops of hydrogen peroxide

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1mk) |

(1mk)

iii.To the third portion add drops of lead (II) nitrate and warm

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1mk) |

(1mk)

iv.To the fourth portion add 3 drops of barium nitrate

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1mk) |

(1mk)

v.To the fifth portion add all the zinc powder provided and warm

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1mk) |

(1mk)

3. You are provided with solid Q. Carry out the tests below and record your observation and inferences in the spaces provided

a.Place a small amount of Q in a metallic spatula and ignite it over a Bunsen burner flame.

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)

b.Place all the remaining solid Q in a boiling tube

Add 8cm3 of distilled water ad shake well. Divide the resulting solution into three portions

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)

c.To the first portion add acidified potassium manganate (VII)

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)

Test the third portion with a pH indicator

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  | (1/2mk) |

(1/2mk)