**545/4 CHEMISTRY**

**Qn1.** You are provided with the following solutions:

**FA1**- which is **a 0.1M** sulphuric acid.

**FA2**- which is a solution of sodium hydroxide of unknown concentration.

Phenolphthalein indicator.

You are required to carry out the experiment, using the solutions**, to determine the concentration of the alkali solution.**

( H=1; Na= 23; O= 16)

**PROCEDURE:**

1. Pipette 25cm3(or 20cm3) of FA2 into a clean conical flasks.
2. Add 2-3 drops of phenolphthalein indicator.
3. Titrate it with FA1 solution from the burette, drop wise, until the solution just turns colourless.
4. Repeat the titrations until you get consistent results.
5. Record down your results in the table below:

**RESULTS:**

Capacity of pipette used: 25.0 cm3. ()

|  |  |  |  |
| --- | --- | --- | --- |
| Titration number | 1 | 2 | 3 |
| Final burette reading/cm3 | 14:90 | 30.00 | 44.90 |
| Initial burette reading/cm3 | 0.00 | 15.00 | 30.00 |
| Volume of FA1 used/ cm3 | 14.90 | 15.00 | 14.90 |

**Questions:**

1. (i) Titre values used for average of FA1 used.

14.90cm3 and 14.90 cm

(ii) Average volume of FA1 used.

= 14.90 + 14.90

2

= 29.80

2

=14.90 cm3

1. Write down **the ionic equation** for the reaction that took place:

2H+ ( a q) + 20H-(a q) 2 420() (1)

1. Calculate:
2. The number of moles of FA1 that reacted with the given volume of FA2.

1000cm3 of FAI contains 0.1 moles of H2 SO4; (1 mark)

14.90 cm3 FA1 contains 0.1 x moles

= 0.00147 moles.

1. The number of moles of FA2 that reacted.

From equation: 2 moles of FA2 reacts with 1 mole of FA1

Moles of FA2 that reacted = 2 x 0.1 x

= 0.00298 moles (01 mark)

1. The concentration of FA2 in **grams per liter:**

25.00cm3 of FA2 contains 0.00298 moles of FA2

1000cm3 of FA2 contains 0.00298 x moles of FA2

= 0.1192 moles

Molarity of FA2 = 0.1192 M.

RFM of FA2 (NAoH)

= (23x1) + (16x1) + (1x1)

=23+16+1

**=**40 (04 marks)

1 mole of NaOH weighs 40g

0.1192 moles of NaOH weighs (40 x )g.

Concentration of FA2 in g

12 marks

**Qn 2.** You are provided with substance **Z** which contains **one cation** and **two onions.**

You are required to carry out tests on **Z** and identify the **cation** and **anions** present.

Identify any gas (es) produced.

Z (PbCo3 + NaC)

|  |  |  |
| --- | --- | --- |
| **TEST** | **OBSERVATION** | **DEDUCTIONS** |
| a) Heat a spatula end ful of **Z** in boiling tube;  First gently, and then strongly.  Keep your residue in the boiling tube. | -Colourless gas; turns lime –water milky; and turns wet blue litmus paper red;  -Yellow residue; when hot turned red brown on cooling;  Brown residue hot and yellow when cold | ;CO2(g)  Pb2+; PbO  marks) |
| (b) Put a little of the remaining Z in a clean test tube and add **2M** nitric acid solution. Warm gently and then allow to cool. | Bubbles of a colourless gas ; turns lime water milky; and turns moist blue litmus paper red;  White ppt; dissolves on warming; and re-appears on cooling. | ;CO2 (g)  Pb2+  C-  marks) |
| (c) To the residue obtained in (a) above in boiling tube, add**2M** nitric acid solution until there is no further change.  Filter; and divide the filtrate into five equal portions. | White ppt ;  White residue;  Colourless filtrate; | Pb2+  Zn2+  A3+  Ca 2+ |
| (i) To the first portion in a test tube, add 3 drops of silver nitrate solution. | White ppt; | C- |
| (ii) To the second portion, add barium nitrate solution. | No observable change ; | C-  (1 mark) |
| (iii) To the third portion, add dilute sodium hydroxide solution, drop wise, until in excess | White ppt; Soluble; forming colourless solution; | Pb2+  A3+  Zn2+  marks) |
| (iv) To the fourth portion, add dilute sulphuric acid and then boil. | White ppt; soluble ;on boiling; | Pb2+  ( |
| (v) To the fifth portion, carry out a test of your own choice to confirm the cations in Z. | Yellow ppt | Pb2+  (1mark) |

1. (i) The cation in P is: Pb2+

Marks)

(ii) The anions in P are: and C-

**-END-**