TERM 1

233/3

FORM 3 CHEMISTRY PAPER 3 (PRACTICAL)

MARCH

TIME: 2¼ HOURS

Instructions to candidates.

(a) Write your name and admission number on the paper.

(b) Answer all the questions in the spaces provided.

(c) Spend the first 15 minutes of the 2¼ hours to read the question paper and ensure all the chemicals and apparatus are available.

(d) All working must be clearly shown where necessary.

(e) KNEC mathematical tables and silent electronic calculators may be used.

(f) Check the question paper to ensure all the questions are printed. The paper consists of 3 questions.

(g) Answer all the questions in English.

For examiner’s use only

|  |  |  |
| --- | --- | --- |
| Question | Maximum score | Candidate’s score |
| 1 | 12 |  |
| 2 | 11 |  |
| 3 | 17 |  |
| Total score | 40 |  |

Q1 You are provided with

* Solution D which is acidified potassium manganate(VII)
* Solution E which was prepared by dissolving 23.5g of ammonium iron(II) sulphate per dm3

(NH4)2SO4 .Fe SO4 . 6H2O.

* You are required to determine the concentration of acidified potassium manganate(VII) i.e standardize solution D.

Procedure

* Fill the burette with solution D
* Pipette 25.O3 of solution E and transfer into a clean 250ml conical flask.
* Titrate solution D against solution E until a permanent colour change occurs
* Record your results in table 1 below.
* Repeat the procedure two more times.

Table 1

1 11 111

Final burete reading(cm3)

Initial burette reading (cm3)

Volume of solution D added (cm3)

(!) What were the colour changes during the titration. (1mk)

(II) Calculate the average volume of solution D used. (1mk)

(III) Calculate the number of moles of solutions E in 25cm3 (N+14,H=1,Fe=56,S=32,0=16)

(3mks)

(iv) Given that the reacting ratio(mole ratio) of D:E is 1:5 respectively, calculate the number of moles of solution D in the average volume. (1mk)

(v) Calculate the molarity of solution D. (2mks)

Q2 You are provided with

* Sodium carbonate solid Y.
* 0.125m hydrochloric acid solution Z.

You are required to determine the mass of solid Y sodium carbonate provided.

Procedure

* Put all the solid Y provided in a 100ml beaker and add about 50cm3 of distilled water.
* Stir and transfer the solution into a 250ml volumetric flask.
* Rinse the beaker with more distilled water and put the washing into the volumetric flask
* Add more water to the volumetric flask to make up to the mark, label this solution Y.
* Fill the burettle with the hydrochloric acid solution Z.
* Pipette 25.0cm3 of solution Y into a conical flask.
* Add 2-3 drops of methyl orange indicator and titrate with solution Y from the burette.
* Record in table II below
* Repeat the titration two more times.

**Table II**

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

(1) Calculate the average volume of solution Z used. (1mk)

(II) Calculate the number of moles of hydrochloric acid solution Z in the average volume.

(1mk)

(III) Write an equation for the reaction . (1mk)

(IV) Calculate the number of moles of sodium carbonate solution Y in 25cm3 . (1mk)

(v) Calculate the number of moles of sodium carbonate solution Y in 250cm3. (1mk)

(vI) Calculate the mass of sodium carbonate solid Y that you were provided with(Na=23, C=12.O=16) (2mks)

Q3(a) You are provided with a metallic oxide solid P. Carry out the tests below and answer the questions asked.

(1) Put about 2 cm3 of sulphuric (VI) acid in a test tube and add all the solid p provided. Shake well, leave to settle, filter and retain the filtrate.

(i) Write down the observation made. (1mk)

(ii) Name the salt present in the filtrate. (1mk)

(iii) Write an equation for the reaction that takes place. (1mk)

(II) Heat about 1 cm3 of the filtrate in a boiling tube until all the water evaporates. Observe and leave to cool. (1mk)

NB Do not overheat.

(III) Add about 1cm3 of distilled water to the solid when it cools and observe. (1mk)

(IV) From the observation in (II) and (III) above, what can you say about the changes that occur. (1mk)

(v) Name the method that has been used to prepare the salt formed in (i) (1mk)

(b) You are provided with solid R. Use it to carry out the tests below.

(i)(i) Heat ½ spatula of the solid in a dry test tube and observe. Test the gases produced with wet litmus papers and a glowing splint. Record all your observations. (5mks)

(II) From the observations, identify solid R. (1mk)

(II) Put the rest of solid R in a test tube and add about 2 cm3of distilled water. Shake well, retain the solution formed, and write the observation made. (1mk)

(III) Add a few drops of sodium sulphate (Na2 SO4) solution to the solution made in step(II) above. Write your observation (1mk)

(iv) Write an ionic equation for the reaction between solid R and Na2 SO4 solution. (1mk)

(v) In (iii) above, two salts have been prepared. Name the method used for preparing the salts. (1mk)