

CHEMISTRY
PAPER – 2
(PRACTICAL)
(Three hours)

*(Candidates are allowed additional 15 minutes for **only** reading the paper.
They must NOT start writing during this time.)*

*ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOKLET PROVIDED
SEPARATELY.*

***Question 1** is an oxidation-reduction titration in which sufficient working details are given.
All essential working must be shown.*

***Question 2** is an experiment on the rate of reaction.
Sufficient working must be shown.*

***Question 3** is an exercise in qualitative analysis.*

Read the questions carefully and follow the given instructions.

*Attempt **all** questions.*

*All working, including rough work, should be done on the same sheet as the
rest of the answer.*

The intended marks for questions or parts of questions are given in brackets [].

*Attempt **all** questions.*

Question 1

[8]

You are provided with two solutions as follows:

- **C-10** is a solution prepared by dissolving 1.55 gms of potassium manganate (VII) KMnO_4 per litre.
- **C-11** is a solution prepared by dissolving 20.7 gms of hydrated ammonium iron (II) sulphate crystals, $(\text{NH}_4)_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot x\text{H}_2\text{O}$ per litre.

PROCEDURE:

Rinse and fill the burette with the solution **C-10** (KMnO_4). Pipette out 20 ml or 25 ml of **C-11** (hydrated ammonium iron(II) sulphate) into a clean conical flask. To this, add 20ml of dilute sulphuric acid **C-12**, specially provided for titration.

Titrate the solution with **C-10** (KMnO_4) till one drop of this gives a light permanent pink colour to the solution in the conical flask. Ensure that the pink colour does not disappear on shaking the contents of the conical flask.

Repeat the experiment to get at least two concordant readings.

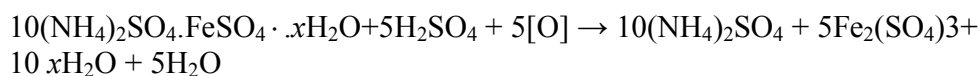
Tabulate your readings.

State:

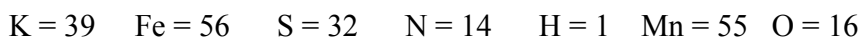
- (a) The capacity of the pipette used.
- (b) The titre value you intend to use in your calculations.

Show the titre value to the Visiting Examiner.

The equations for the above reactions are as follows:



Relative atomic masses:



Calculate the following:

- (i) The **molarity** of potassium manganate (VII) solution **C-10**.
- (ii) The **molarity** of hydrated ammonium iron(II) sulphate solution **C-11**.
- (iii) The **molecular mass** of hydrated ammonium iron(II) sulphate deduced from the experimental data.
- (iv) The **numerical value** of x .

Question 2**[5]**

In this exercise, you are required to study the effect of change in concentration of the reactants on the rate of reaction between magnesium and dilute sulphuric acid.

You are provided with the following:

- (a) Five pieces of magnesium ribbon of 3 cm length.
- (b) A solution of 1 M H_2SO_4 C-13.

Proceed as follows:

In a 250 ml beaker, place 75ml of C-13 noting the time in your wrist watch, simultaneously immerse a magnesium ribbon. Note the time taken for the ribbon to completely dissolve in the acid.

Repeat the experiment with 60ml, 40ml, 30ml, and 20ml of the acid diluting it with distilled water, up to 75 ml. and note the time in each case. Tabulate your results as follows:

Expt.no	Volume of the solution C-13	Volume of water	Time in secs
1.	75 ml.	0 ml.	
2.	60 ml.	15 ml.	
3.	40 ml.	35 ml.	
4.	30 ml.	45 ml.	
5.	20 ml.	55 ml.	

From your results:

- (i) Plot a graph between the concentration of sulphuric acid (in terms of the volume of acid taken) and the time taken for the ribbon to completely dissolve in the acid.
- (ii) From the graph, find out the time taken for the reaction when 25 ml of solution **C-13** is used.
- (iii) Predict the effect of change in concentration of acid on the rate of the above reaction from the nature of your graph.

Show the result to the Visiting Examiner.

Question 3**[7]**

Analyse qualitatively the substance **C-15** which contains *two* anions and *two* cations. Identify these ions.

(a) While testing for **anions** you must mention:

- (i) How the solution/soda extract was prepared.
- (ii) How the gases were identified.
- (iii) The confirmatory test for anions.

Show the results as required to the Visiting Examiner.

(b) While testing for **cations** you must mention:

- (i) How the original solution for group analysis was prepared.
- (ii) The formal group analysis with pertinent group reagents.
- (iii) The confirmatory test for each anion.

Show the results as required to the Visiting Examiner.

Note: *Use of qualitative analysis booklet/table is not allowed.*

Question 4

Show the following to the Visiting Examiner for assessment:

- (a) Project **[7]**
- (b) Chemistry Practical File. **[3]**