

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 exercise dealing with identification of organic compounds.
Credit will be given for precise observations recorded and for well-drawn deductions.*

***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.

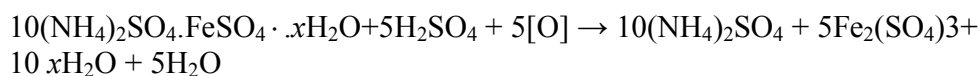
Tabulate your readings.

State:

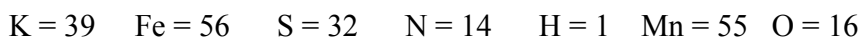
- (a) The capacity of the pipette used.
- (b) The titre value you intend to use in your calculations.

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]

Substances **C-13** and **C-14** are organic compounds. Carry out the following experiments and note all the changes taking place at each step of the experiment.

Note the smell of the substance formed, colour of the substance obtained, colour of the precipitate formed, and solubility in excess of the reagent and any other observations you may have. State the identity of each compound on the basis of the experiments and observational changes.

PROCEDURE:

(a) **Substance C - 13**

- (i) Take 2 ml of **C-13** in a test tube and add 2 to 3 drops of alcoholic α -naphthol solution. Shake and add about 1 ml of concentrated H_2SO_4 by the side of the test tube carefully.
- (ii) Take 2 ml of **C-13** in a test tube and add 1 ml of Tollen's reagent. Warm the contents in a water bath for about five minutes.
- (iii) Take about 2 ml of **C-13** and add 2 ml of lead acetate solution. Shake. Add NH_4OH solution and warm the contents in a water bath.

Show the results as required to the Visiting Examiner.

(b) **Substance C-14**

- (i) Dissolve about 0.2 g of borax in 5 ml of water. To this, add about 2 drops of phenolphthalein solution followed by few drops of compound C-14. Shake, warm and then cool.
- (ii) To 1.0 ml of compound C-14 add about 0.5 g KHSO_4 (potassium hydrogen sulphate) and heat.
- (iii) Take about 4 – 5 drops of compound C-14 in a test tube and add about 1 ml of CuSO_4 solution followed by a few drops of NaOH solution.

Show the results as required 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]