

CHEMISTRY

Paper – 2

(PRACTICAL)

Three hours and a quarter

*(The first 15 minutes of the examination are for reading the paper only.
Candidates 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 workings, including rough work, should be done on the same sheet as, and adjacent to, the rest of the answer in the answer booklet.

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

Question 1.

[7]

You are provided with two solutions as follows:

- (a) **C-10** is a solution of potassium permanganate (KMnO_4) containing 1.6 gms per liter of the solution.
- (b) **C-11** is a solution prepared by dissolving 20 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 given solution **C-10**. Pipette out 20 cm^3 or 25 cm^3 of solution **C-11** into a clean conical flask. To it add about 20 cm^3 of **C-12** (dilute sulphuric acid).

Run down C-10 from the burette first quickly and then slowly with constant stirring.

Go on adding C-10 solution from the burette drop by drop till one drop added imparts a permanent pinkish tinge to the solution. Note the reading on the burette corresponding to the upper curve of the meniscus and record it.

Repeat the above procedure of titration to get atleast two concordant readings.

Tabulate atleast three readings.

State the:

- (i) capacity of the pipette you used.
- (ii) titre value you intend to use in your calculations.

The equations for the reactions are as follows:



Relative atomic masses:

K = 39 S = 32 O = 16 H = 1 Mn = 55 N = 14 Fe = 56

Calculate the following:

- (i) The **molarity** of potassium permanganate solution (KMnO_4) solution C-10.
- (ii) The **molarity** of hydrated ammonium iron II sulphate (Mohr's salt) solution C-11.
- (iii) The **molecular mass** of hydrated ammonium iron II sulphate.
- (iv) The **value** of x .

Question 2.

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

Note the smell of the substances formed, colour of the solution obtained and precipitate formed. Identify the compound on the basis of your observations and deduction.

(a) Substance C-13

- (i) Take 1 cm^3 or a few drops of the compound in a clean test-tube and add about 1 cm^3 of a saturated solution of sodium bisulphite to it and stir the contents vigorously.
- (ii) Add 4-5 drops of C-13 to about 1 cm^3 of sodium nitroprusside solution. Now make the solution alkaline by adding 4-5 drops of sodium hydroxide solution.
- (iii) Dissolve 4-5 drops of the compound in 2 cm^3 of water. Now add 1 cm^3 of 10% NaOH solution and then add a solution of potassium iodide drop wise with shaking until the solution acquires a pale yellow colour. Allow it to stand at room temperature for a few minutes with periodic shaking. If during this period the yellow colour disappears, add more I_2 (iodine crystals) solution until the colour persists. Dilute the solution with an equal volume of water and allow to stand for 10-15 minutes.
- (iv) Take 1 cm^3 of C-13, add a pinch of M-dinitrobenzene followed by 1 cm^3 of NaOH solution and shake.

(b) Substance C-14

- (i) Take 2 cm^3 of 1% aqueous C-14 solution and dip the blue litmus paper or add a few drops of blue litmus solution.
- (ii) Take 5 cm^3 of cold and dilute aqueous solution of sodium bicarbonate in a test-tube. To it add 0.1 gm of C-14.
- (iii) Take 2 cm^3 of 1% aqueous solution of C-14 in a clean test-tube and add 5-10 drops of ethyl alcohol and $1-2\text{ cm}^3$ of conc. H_2SO_4 . Heat the test-tube in boiling water for a few minutes.
- (iv) Add 2 gms of C-14 in the test-tube containing 5 cm^3 of water and warm the content and allow it to cool.

Question 3.

Analyse qualitatively the substance **C-18** which contains two anions and two cations.

Identify these ions.

- (a) While testing for **anions** you must mention:
- How the water/soda extract was prepared.
 - How the gases were identified.
 - One confirmatory test for each anion.
- (b) While testing for **cations** you must mention:
- How the original solution for group analysis was prepared.
 - The formal group analysis with pertinent group reagents.
 - One confirmatory test for each cation.

Note:

- Use of qualitative analysis booklets/tables are not allowed.
- Dry tests are not accepted as confirmatory tests.
- Tabulate the experiment, observation and inference as per the table given below.

Sl. No.	Experiment	Observation	Inference
1.			
2.			