

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 sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) containing 25 gm per litre of the solution.
- (b) **C-11** is a solution prepared by dissolving 27 gm of impure sample of copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) crystals per litre of the solution.

PROCEDURE

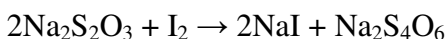
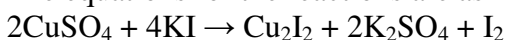
Rinse and fill the burette with the given solution **C-10**. Pipette out 20 cm^3 or 25 cm^3 of solution **C-11** into a clean conical flask. To it add **C-12** solution (sodium carbonate) drop wise with shaking until turbidity is formed. Now add **C-13** solution (acetic acid) in drops till the turbidity disappears and a clear solution is obtained. Add about 20 cm^3 of **C-14** solution (10% KI solution) and cover the content with a piece of paper. Allow the solution to stand for about 5 minutes till the solution becomes reddish brown in colour. Run down C-10 from the burette till the solution turns light yellow. Add $2\text{-}3 \text{ cm}^3$ of freshly prepared **C-15** (starch solution). The colour of the solution changes to dark blue. Continue adding C-10 drop wise with constant shaking till the blue colour disappears. 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.

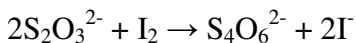
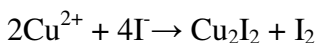
State the:

- (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:



The ionic equation for the reaction is as follows:



Relative atomic masses:

Cu = 63.5 S = 32 O = 16 H = 1 Na = 23

Calculate the following:

- (i) The **molarity** of sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$), solution C-10.
- (ii) The **molarity** of copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$), solution C-11.

- (iii) The **strength** of copper sulphate solution in gram per litre.
- (iv) The **percentage purity** of the impure sample of copper sulphate.

Question 2.**[5]**

Substances **C-16** and **C-17** 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-16

- (i) Take 1 cm³ of Schiff's reagent and add 1 cm³ of C-16.
- (ii) Take 1 cm³ of C-16 and add Tollen's reagent and heat it in a water bath for 5 minutes.
- (iii) To 3 cm³ of C-16 in a test-tube, add about 1 cm³ of 1% phenylhydrazine followed by 1 cm³ of freshly prepared sodium nitroprusside solution. To this add excess of sodium hydroxide solution.

(b) Substance C-17

- (i) To a few drops of blue litmus solution in a test-tube, add a few drops of substance C-17.
- (ii) To 1 cm³ of aqueous solution of C-17 in a test-tube, add a pinch of sodium carbonate.
- (iii) To 1 cm³ of aqueous solution of C-17 in a test-tube, add 3 cm³ of ethanol solution followed by a few drops of H₂SO₄ and heat it in a boiling water bath for 10 minutes. Cool and pour it in a beaker containing 10 cm³ of cold water.
- (iv) To 1 cm³ of aqueous solution of C-17 in a test-tube, add 1 cm³ of neutral ferric chloride solution.

Question 3.

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

Identify these ions.

[8]

- (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 example given below.

Sl. No.	Experiment	Observation	Inference
1.			
2.			