

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.

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

Question 1. **[8]**

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 30 gms per litre of the solution.
- (b) **C-11** is a solution prepared by dissolving 6.5 gms of an impure sample of potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) per litre of the solution.

This booklet contains 4 pages.

PROCEDURE

Rinse and fill the burette with the given solution **C-10**. Pipette out 20 cm³ or 25 cm³ of the solution **C-11** into a clean conical flask. To this, add about 20 cm³ of **C-12** (dilute sulphuric acid) and about 20 cm³ of **C-13** (potassium iodide, 10%) solution in the titration flask. Now add about 20 cm³ of distilled water followed by a pinch of sodium hydrogen carbonate **C-14**.

Shake the contents of the flask and cover it with a piece of paper. Allow the solution to stand for about 5 minutes till the solution becomes dark reddish brown.

Titrate this solution by running **C-10** from the burette till the solution turns yellowish green. Add about 2 to 3 cm³ of freshly prepared **C-15** (starch solution). The colour of the solution changes to dark blue. Continue adding **C-10** drop wise till the addition of one drop of **C-10** changes the colour from dark blue to light green.

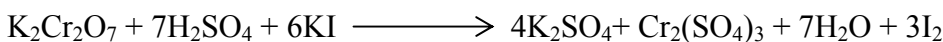
Repeat the titration to get at least three concordant reading.

Tabulate your readings.

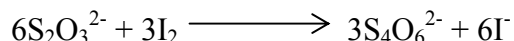
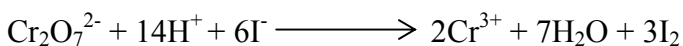
State the:

- (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:

K = 39 Cr = 52 Na = 23 S = 32 O = 16 H = 1

This booklet contains 4 pages.

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 potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) solution C-11.
- (iii) The **strength** of potassium solution in gm per liter.
- (iv) The **percentage purity** of the sample of potassium dichromate.

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) To about 5-6 drops of C-16 add 1cm^3 of Fehling's solution and warm.
 - (ii) Take about 0.5cm^3 of C-16 and add about 1cm^3 of Tollen's reagent and heat in a water bath for about 10 minutes.
 - (iii) To 2cm^3 of C-16 add 2cm^3 of alcoholic α -naphthol and then add 1cm^3 of concentrated H_2SO_4 down the side of the test tube.
 - (iv) To 1cm^3 of the substance C-16 add a crystal of resorcinol and shake. Then slowly add about 1cm^3 of concentrated sulphuric acid down by the side of the test tube.
- (b) Substance **C-17** is an organic compound
 - (i) Add 3-4 drops of C-17 to moist blue litmus paper.
 - (ii) Take about 4-5 drops of C-17 in a test tube and add a pinch of sodium carbonate.

- (iii) To 1 cm³ of C-17 in a test tube, add about 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 0.5 cm³ of C-17 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.

[7]

- (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 each anion.
- (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 cation.

Note:

1. Use of qualitative analysis booklets/tables are not allowed.
2. Dry tests are not accepted as confirmatory tests.