

# 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).*

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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.*

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***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 [ ].*

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#### **Question 1.**

**[7]**

You are provided with two solutions as follows:

- (a) **C-10** is a solution containing 15 gm of impure sample of hydrated sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ ) per liter of the solution.
- (b) **C-11** is a solution of potassium dichromate ( $\text{K}_2\text{Cr}_2\text{O}_7$ ) containing 2 gm per litre.

**PROCEDURE**

Rinse and fill the burette with the given solution **C-10**. Pipette out  $20\text{ cm}^3$  or  $25\text{ cm}^3$  of solution **C-11** into a clean conical flask. To it add about  $20\text{ cm}^3$  of **C-12** (dilute sulphuric acid) and about  $20\text{ cm}^3$  of **C-13** (potassium iodide solution).

To the contents in the conical flask, add about  $20\text{ cm}^3$  of distilled water followed by a pinch of **C-14** (sodium bicarbonate).

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

Titrate the solution by running down the solution **C-10** from the burette till the solution turns yellowish green. To it add about  $2\text{--}3\text{ cm}^3$  of freshly prepared starch solution **C-15** till it turns 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.

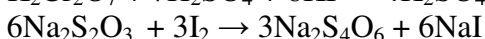
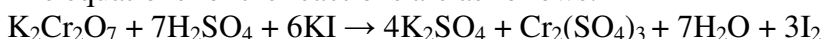
Repeat the titration to get at least two concordant reading.

Tabulate atleast three readings.

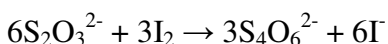
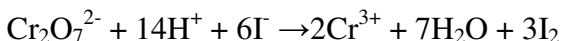
State the:

- (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:




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Relative atomic masses:

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

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Calculate the following:

- (i) The **molarity** of the potassium dichromate solution (C-11).
- (ii) The **molarity** of sodium thiosulphate solution (C-10).
- (iii) The **strength** of (C-10) sodium thiosulphate solution in gram per litre.
- (iv) The **percentage purity** of impure sample of sodium thiosulphate.

**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  $2\text{ cm}^3$  of a saturated solution of sodium bisulphite in a clean test-tube and add a few drops of C-16.
- (ii) Take about  $1\text{ cm}^3$  of C-16 in a test-tube and add  $1\text{ cm}^3$  of Schiff's reagent.
- (iii) Take  $1\text{ cm}^3$  of C-16 in a test-tube and to it add  $1\text{ cm}^3$  of dimethyl phenylamine and a few drops of conc.  $\text{H}_2\text{SO}_4$ . Warm the contents.
- (iv) To  $2\text{ cm}^3$  of C-16, add  $1\text{ cm}^3$  of  $\text{KMnO}_4$  solution drop wise followed by  $1\text{ cm}^3$  of  $\text{NaOH}$  solution. Warm the contents and filter into a test-tube containing  $2\text{ cm}^3$  of conc.  $\text{HCl}$ .

(b) Substance **C-17**

- (i) Take  $1\text{ cm}^3$  of ceric ammonium nitrate in a clean test-tube and add 2-4 drops of C-17 and shake the mixture.
- (ii) To 2-3 drops of C-17, add about 0.5 g of potassium hydrogen sulphate and heat.
- (iii) Dissolve about 0.2 g of borax in  $5\text{ cm}^3$  of water. To this solution, add 1-2 drops of phenolphthalein to obtain a pink colour.
  - 1. Add 2-3 drops of C-17 to the above solution.
  - 2. Heat the above solution.

**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:
  - (i) How the solution/soda extract was prepared.
  - (ii) How the gases were identified.
  - (iii) One 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) One 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.
3. Tabulate the experiment, observation and inference.