

# 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.)*

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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.*

*Mathematical Tables are provided.*

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*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 [ ].*

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## Question 1

[8]

You are provided with two solutions as follows:

- (a) C-10 is a solution containing 1.1 gms of potassium manganate (VII),  $\text{KMnO}_4$  per litre.
- (b) C-11 is a solution containing 3.0 gms of impure sample of oxalic acid,  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  per litre.

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This paper consists of 4 printed pages.

## PROCEDURE:

Rinse and fill the burette with solution **C-10** of potassium manganate (VII). Pipette out 20 ml or 25 ml of oxalic acid solution **C-11**, in a clean conical flask. To this, add 20 ml of dilute  $\text{H}_2\text{SO}_4$  solution **C-12**, specially provided for this purpose. Warm the contents of the flask to  $60\text{--}70^\circ\text{C}$  (till the first bubble appears at the bottom of the flask).

Remove from fire and titrate against **C-10** with constant shaking, until a permanent faint pink colour is obtained. Ensure that the pink colour obtained does not disappear on shaking the contents of the conical flask.

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

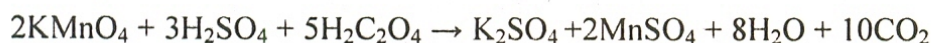
Tabulate your readings.

State:

- (i) The capacity of the pipette used.
- (ii) 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:**

$\text{K} = 39$     $\text{Mn} = 55$     $\text{C} = 12$     $\text{O} = 16$     $\text{H} = 1$

**Calculate the following:**

- (i) The **molarity** of potassium manganate (VII) solution **C-10**.
- (ii) The **molarity** of oxalic acid solution **C-11**.
- (iii) The **strength** of oxalic acid solution in gms per litre.
- (iv) The **percentage purity** of the sample of oxalic acid.

## Question 2

[5]

You are provided with two organic compounds, **C-13** and **C-14**.

Perform the experiments given below on each of the two compounds. Record the changes taking place at every step of the experiment.

Note the smell of the substance formed, if significant, the colour of the solution obtained, the colour of the precipitate produced and any other observations you may have. State the identity of each compound on the basis of the experiments and observational changes.

(a) Substance **C-13**

- (i) Take 2 ml of **C-13** in a test tube. To this, add 1 ml of Tollen's reagent. Warm the contents in a water bath.
- (ii) Take 2 ml of **C-13** in a test tube and add 1 gm of pyrogallol and 1 ml of water. Shake. Add 2 ml of concentrated hydrochloric acid and warm the contents in a water bath.
- (iii) Take 2 ml of **C-13** in a test tube and add a few crystals of resorcinol. Shake the contents. Slowly add 1 ml of concentrated sulphuric acid along the side of the test tube.

*Show the results as required to the Visiting Examiner.*

(b) Substance **C-14**

- (i) Take 2 ml of freshly prepared sodium nitroprusside solution in a test tube. To this, add 2 ml of **C-14** followed by the addition of caustic soda solution drop by drop. Warm.
- (ii) Take 2 ml of **C-14** in a test tube. To this, add 1 ml of mercuric chloride solution. Now add sodium hydroxide solution dropwise. Shake.
- (iii) Take 1 ml of **C-14** in a test tube and add 1 ml of saturated solution of sodium bisulphite and shake the mixture well.

*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 each anion.

*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 cation.

*Show the results as required to the Visiting Examiner.*

- Note:** (1) Use of **qualitative analysis booklets / tables** is not allowed.
- (2) **Dry tests** are not accepted as confirmatory tests.