# CHEMISTRY

# PAPER – 2

## (PRACTICAL)

***(Maximum Marks: 30)***

***(Time allowed: 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**.*

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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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*Attempt **all** questions.*

**Question 1** **[7]**

You are provided with two solutions as follows:

- **C-10** is a solution containing 3·2 gms of potassium manganate (VII) ($KMnO_4$) per litre.
- **C-11** is a solution prepared by dissolving 6·85gms of impure sample of oxalic acid crystals ($H_2C_2O_4 \cdot 2H_2O$) per litre.

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PROCEDURE:

Rinse and fill the burette with potassium manganate(VII) solution **C-10** ($KMnO_4$).

Pipette out 20 ml or 25 ml of the oxalic acid solution **C-11** ($H_2C_2O_4.2H_2O$) in a clean conical flask. To this, add 20 ml of dilute sulphuric acid ($H_2SO_4$) **C-12**, specially provided for this purpose. Warm the contents of the flask to 60°C – 70°C. The heating should be continued till the first bubble appears at the bottom of the flask.

Remove the conical flask from fire and titrate this solution by running solution **C-10** from the burette. Shake the solution constantly till a permanent pale 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 to get at least **two** concordant readings.

Tabulate your readings.

State:

(a) The capacity of the pipette used.

(b) 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:

$2KMnO_4 + 3H_2SO_4 + 5H_2C_2O_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

Relative atomic masses:

K = 39 Mn = 55 C = 12 O = 16 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** oxalic acid solution in gms per litre.

(iv) The **percentage purity** of the sample of oxalic acid solution.

***Note: Molarity must be calculated upto at least 4 decimal places.***

**Question 2** **[4]**

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.

PROCEDURE:

(a) **Substance C - 13**

(i) Take 2 ml of saturated solution of sodium ($NaHSO_3$) in a test tube. To this, add a few drops of **C-13.** Shake well and gently warm the contents.

(ii) Take 1 ml of **C-13** in a test tube and add 1 ml of freshly prepared sodium nitroprusside solution , followed by 4 to 5 drops of dilute sodium hydroxide solution.

(iii) Take 2 ml of **C-13** in a test tube. To this, add a few crystals of iodine followed by a few drops of sodium hydroxide solution till the colour disappears. Warm the contents gently and cool.

(b) **Substance C-14**

Dissolve 2gm of the substance in 10 ml of hot water and perform the following tests:

(i) Take 2 ml of **C-14** in a test-tube and add a few drops of sodium bicarbonate solution.

(ii) Take 2 ml of **C-14** in a test-tube and add a few drops of concentrated sulphuric acid ($H_2SO_4$), followed by 5 ml of ethanol and heat the contents on water-bath.

(iii) Take 2 ml of **C-14** in a test-tube and add neutral ferric chloride ($FeCl_3$) solution .

***Note:*** *Question 2 will be set from any one or a combination of any two of the following:*

*(a) Rate of reaction*
*(b) Identification of Organic compounds*
*(c) pH determination*
*(d) Test for carbohydrates and protein.*

**Question 3** **[4]**

Analyse qualitatively the substance **C-15** which contains *one* anion and *one* cation. Identify these ions.

(a) While testing for **anion** you must mention:

(i) How the solution/soda extract was prepared.

(ii) How the gases were identified.

(iii) The confirmatory test for anion.

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

(b) While testing for **cation** 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 cation.

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

**Note:** *Use of qualitative analysis booklet/table is not allowed.*

**Question 4**

**Show the following to the Visiting Examiner for assessment:**

(a) Project **[10]**

(b) Chemistry Practical File. **[5]**