Skill Enhancement Course

CHSEC 116 (T+P): Chemistry Laboratory Techniques – I

Credit – (1T+1P), Theory Hours – 15, Practical Hours – 30

Course outcomes:

After the completion of this course, student will be able to-

CO-1. Gain the basic and conceptual knowledge of preparation of different reagents.

CO-2. Understand the applications of different reagents.

CO-3. Gain the skill of how to use different glassware.

CO-PSO mapping (connecting COs with PSOs)

CO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	3	2	3
CO-2	3	3	2	3	2	3
CO-3	2	3	3	2	3	2

UNIT – I: Chemistry Laboratory Introduction **[25 Marks]**
[15 Hours]

A general introduction to the Chemistry laboratory, Standard safety guidelines for safe operations within chemical laboratories, Laboratory layout and design considerations, Proper storage methods for chemicals, Adequate ventilation and lighting within the lab, The importance of fume cupboards, Arrangement and organization of storage areas, Safety measures and provisions, The structure and organization of practical laboratory work, Maintenance protocols for laboratory equipment and apparatus, Cleaning procedures for both laboratories and preparation rooms.

Glass Apparatus

Beaker, test tube, boiling tube, conical flask, filtration flask, round-bottom flask, flat- bottom flask, Liebig Condenser, funnel, separating funnel, watch glass,

measuring cylinder, Petri dish, desiccator, measuring cylinder, glass rod, glass tube.

Volumetric apparatus:

Volumetric flask, burette, pipette, analytical balance, electronic balance.

Heating Apparatus:

Bunsen burner, water bath, sand bath, oil bath, hot air, oven, heating mantle.

Miscellaneous Apparatus:

Buchner funnel, burner, test tube stands, tong, burette stand, clamp, retort clamp, Mohr clip, china dish, wire gauze, cork, vacuum pumps, crucibles, clay pipe triangle, pestle and mortar, spatulas, thermometer, pH meter/pH paper, laboratory centrifuge.

Handling and storage of glass apparatus:

Kipp's apparatus

Unit- II: Basic laboratory Practical: **[25 Marks]**
[30 Hours]

Preparation of chemical reagents and their applications in identification of inorganic and organic analysis (**Minimum 8 from the list)**

1. Nesler's reagent (test for $NH4^{+}$ ion)
2. Sodium cobaltinitrite (test for K^{+} ion)
3. Sodium hypoiodide (test for Mg^{++} ion)
4. CO_2 gas (test with lime water)
5. H_2S gas (test with Cu^{++} ion)
6. Neutral $FeCl_3$ (Test with Salicylic acid)
7. Fehling A & B solution (test with glucose)
8. Tollen's reagent (test with benzaldehyde)
9. H_2 gas (test with nitrobenzene)

10. Nitrous acid (test with aniline-azodye)

11. Cl_2 gas (test with litmus paper)

12. Dimethyl Glyoxime reagent

13. Schiff's reagent

14. Bayer's reagent

Preparations of different types of papers used in chemistry lab (describe) and their applications in chemical analysis (to perform)

(**Minimum 4 from the list)**

1. Red litmus paper (test with acid, base & neutral compound or solutions)

2. Blue litmus paper (test with acid, base & neutral compound or solutions)

3. Dichromate paper (test with SO_3^{-2} ion)

4. Starch paper (test with Br^-)

5. Turmeric paper (test with $NH4^+$ion)

6. Lead acetate paper (test with S^{-2})

Reference Books:

1. 'Advanced university practical chemistry vol-I' by P C Kamboj, Vishal publishing house, Delhi.

2.'Vogel's Quantitative Chemical Analysis' by Svehla, Sivasankar, 7th addition, 2012, Pearson Education India.

3. 'Essentials of Physical Chemistry' by Bahl & Tuli, 22/E, S. Chand publication, New Delhi.

4. 'Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis' (Rev. by GH Jeffery and others) 5th Ed. The English Language Book Society of Longman.

5. Willard, Hobert H. et. al: 'Instrumental Methods of Analysis', 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.

6. Christian, Gary D; 'Analytical Chemistry', 6th Ed. New York- John Willy, 2004.

7. Harris, Daniel C, 'Quantitative Chemical Analysis', 3 rd Edition, W.H. Freeman and Company, New York, 2001.