



6th Semester

BRANCH	Subject Title	Subject Code
B.Sc. (CHEMISTRY) DSE - 2	Laboratory skill, techniques & management	CHDSE2-161

Course Objective - The course aims to give knowledge to students with the foundational skills necessary for success in various laboratory settings. Topics within Laboratory Skills Fundamentals will focus on safety, pipetting techniques, measurement and volume, dilutions, quality control, and data recording. Develop experimental and data analysis skills. Learn to use scientific apparatus. Learn to estimate statistical errors and recognize systematic errors. Develop reporting skills (written and oral). To acquire skills for Laboratory management and routine analysis of Soil, Water and Food. To improve working ability in analytical laboratory.

Course Learning outcomes (CLO)

At the end of the course, the learners will be-

- Familiarized with the basic facilities available in laboratories .
- Expected to gain knowledge of the basic skill of organization and management of science laboratories.
- Enabled to expertise in the procedures of procurement and storage of laboratory equipment & material.
- Trained in the operation and maintenance of simple instruments used in science laboratories.
- Enabled to develop skills in common laboratory techniques.
- Trained to adopt appropriate disposal procedures and safety methods suitable for Laboratories

Content

Unit – 1

Laboratory organization and management

Science laboratory: Science laboratory: scientific temper, scientific reporting, significance values accuracy/ attitude, interaction with pupil present in the lab, dignity of work of lab staff

Important components of a science laboratory: features of a science: laboratory, services in a science laboratory

Organization of science labs: preparation room, arrangement of stores, safety provisions, Labels- a cautionary note

Day-to-day management of laboratories: day to day cleaning up, routine inspection and maintenance of laboratory, cleaning of laboratory and preparation rooms, colour coding of services, emergency switch services, security and vandalism.

Stock control and purchase: arranging stock, naming and maintenance of stock register, receiving of goods, processing of bills, accounting, controlling budget, information about equipment & miscellaneous records, purchase rules.

File and records: sources of information in the lab, filing system for chemical's requests for equipment & special files

Use of computer in science laboratory: component of a computer, overall function & application software



Unit – 2

HAZARDS IN LABORATORY & LABORATORY SAFETY

Electricity and gas hazards: electricity hazards in the laboratory (selection of proper fuse, selection of proper flex, safe conduct, earthing & other dangers associated with electrical equipment's). Gas hazards in the laboratory (LPG. high pressure gas hazards, detection and handling of gas leakage & low pressure gas hazards).

Fire hazards: fire hazards in the laboratory, classification of fire, precaution of fire prevention & extinguishing a fire and types of fire extinguishers.

Chemical hazards: classification of hazardous chemicals, handling of chemicals, storage of chemicals, transport of bulk chemicals & transfer from large containers.

Personal safety: Code of behavior for the laboratory staff. personal protective devices, disposal of waste materials, check-in & shut down sequences & Shifting Dad

Accidents and first aids: accident reporting, procedure, first aid box, general features of first aid procedure, first aid procedures for chemical accidents, first aid treatment for shock & first aid treatment of localized injuries

Unit – 3

BASIC LABORATORY APPARATUS AND EQUIPMENT IN CHEMISTRY

BASIC APPARATUS: Identification of apparatus, apparatus for heating (Bunsen burner, water bath. Oil bath, hot plate & heating mantie), laboratory glassware, laboratory centrifuge, use and description

Measuring Apparatus: Measurement in chemistry lab, errors, precision and accuracy of measurement, volume, types of volume, measuring devices, burettes & pipettes, accuracy of burettes & pipettes, volumetric flask, mass and weight, balances analytical and electronic, pH meter and conductometer.

Common laboratory glassware: laboratory glass ware and its types, cleaning methols, storage and handling of glass apparatus, assembly of glass apparatus, gas pressure in glass, safety measures for storage, caring & handing of glassware.

Unit – 4

BASIC LABORATORY TECHNIQUES IN CHEMISTRY

Solutions and their preparation: Water and its types, types of solution, solubility, concentration of solutions- percentage, molarity, molality, normality & ppm calculation of mass and volumes to prepare solutions, general guidelines for preparation of solution, general methods of preparation, labeling. exceptions to the general method, notes on other solution reagents for chemistry. bench reagents, standard solutions

Common laboratory techniques: Heating, refluxing, filtration, small scale methods, recrystallization and determination of melting point, distillation and determination of boiling point



Unit – 5

GOOD LABORATORY PRACTICES: BASIC EXERCISES

- Ex. 1 procedure for purchase of laboratory related items, inventory management
- Ex. 2 supply of gas, electricity and water in a laboratory
- Ex. 3 fire safety measures in a laboratory
- Ex. 4 Classification and handling hazardous chemicals Ex. 5 disposal of unserviceable and obsolete items
- Ex. 6 safe disposal of laboratory wastes
- Ex. 7 attending to emergency situation
- Ex. 8 preparation of standard of oxalic acid solution
- Ex. 9 determination of strength of NaOH
- Ex. 10 preparation of stock solutions and dilution
- Ex. 11 preparation of water and alcohol based reagents (Fehling A & B. starch solutions)
- Ex. 12 preparation of distilled water
- Ex. 13 preparation of buffer solution
- Ex. 14 determination of pH using pH paper

Practical's

Unit I

1. Preparation of standard of oxalic acid solution
2. Determination of strength of NaOH
3. Determination of concentration of solutions- percentage, molarity, molality, normality & ppm

Unit II

4. Determination of melting point
5. Distillation
6. Determination of boiling point

Unit III

7. Preparation of stock solutions and dilution
8. Preparation of water based and alcohol-based reagents (Fehling A & B, starch solutions)
9. Preparation of distilled water

Unit IV

10. Preparation of buffer solution-Acidic and Basic Buffers
11. Preparation of Nessler's reagent, Molisch reagent, Schiff's base

Unit V

12. Determination of pH using pH paper, pH meter
13. Conductometric titration-Acid Base