

CHEMISTRY VOCATIONAL - I

GOOD LABORATORY PRACTICES

(3 Credit)

Unit I

Part: A (Theory: 1 Credit)

Introduction to lab safety-regulatory requirements-labels, material safety. Knowledge of hazard warning information and symbols. Explosive compounds(idea), potentially dangerous mixtures- Fire hazards(idea about flammable solvents, ignition sources used in laboratories, metal hydrides), Emergency procedures in chemical splashes to skin and eyes, burns and electric shock. Reactive inorganic reactants and their toxicity (strong acids, bases, halogens, chromates). Hazards due to chemicals, toxic- solids, liquids, gases, and other harmful substances - carcinogenic substances.

Solutions and their Preparation: Water and its Types; Solutions: Components of a Solution, Types of Solution, Solubility; Concentration of Solutions: Percentage, Molarity, Molality, Normality, ppm; Calculation of Masses and Volumes to Prepare Solutions: Solids, Liquids, More Concentrated Solutions; Accuracy and Precision of Measurements of Solutes; General Guidelines for Preparation of Solutions; Methods of Preparing Solutions: General Methods of Preparation, Labelling, Exceptions to the General Method; Notes on Other Solutions: Reagents for Chemistry, Bench Reagents, Standard Solutions.

Unit II

Stock Control and Purchase: Arranging Stock - Locating and Referencing, Shelf Arrangement of Stock by Nomenclature; Stock Control - The Two Bin System, The Constant Cycle System; Record Keeping - Bin Cards, Order Books, Inventory, Service Register; Maintenance of Stock Register; Receipt of Goods - Taking Delivery, Sale of Goods Act 1930 (Update Act), Processing of Bills; Accounting: Records of Expenditure Controlling Budget - Petty Cash/Imprest Money; Information about Equipment - Serial Number, Maintenance Record, Electrical Checks; Miscellaneous Records - Accident/incident Record, Orders and Accounts, Key to Unknown.

Files and Records: Sources of Information in the Lab; Filing Systems - Aims of Filing Systems, Maintaining Files, Filing Methods, Filing System for Equipment, Filing System for Chemicals; Filing of Printed and Written Material - Work sheets/Instruction for Experiment, Technical Communication, Instruction for Use of Apparatus, Correspondence, Orders, Requests for

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Equipment; Special Files - Safety Files, Technician's File; Records Stock Records, Location, Recording Loans; Recording Stock Used and Misused - Record of Use of Listed Poisons, Record of Use of Alcohol, Record of Breakages.

Part: B (Practical: 2 Credit)

Practicals

1. Determination of heat capacity of calorimeter for different volumes
2. Determination of integral enthalpy of solution of salts (KNO_3 , NH_4Cl)
3. Preparation of Standard and Stock Solutions, Dilution, Preparation of Water Based and Alcohol Based Reagents (Fehling A and B, Starch Solutions)
4. Fire Safety Measures in a Laboratory
5. Classification and Handling of Hazardous Chemicals
6. Disposal of Unserviceable and Obsolete Items
7. Safe Disposal of Laboratory Wastes
8. Organisation of Laboratory Store
9. Procedure for Stock Verification and Maintenance of Apparatus

References:

1. Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C.(1989),Vogel's Textbook of Quantitative Chemical Analysis,John Wiley and Sons.
2. Dean, J.R.; Jones, A.M.; Holmes, D.; Reed, R.; Jones, A.Weyers, J. (2011),Practical skills in chemistry, Prentice-Hall.
3. Hibbert, D.B.; Gooding, J.J. (2006),Data analysis for chemistry, Oxford University Press.
4. Topping, J.(1984),Errors of observation and their treatment, Chapman Hall, London
5. The Official Laboratory Research Notebook Edition 2by Jones & Bartlett Learning
6. Essentials of Inventory Managementby Max Muller
7. Warehouse Distribution and Operations Handbookby David Mulcahy

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CHEMISTRY VOCATIONAL II

BUSINESS SKILLS FOR CHEMISTS AND LABORATORY TECHNIQUE

(3 Credit)

Part: A (Theory: 1 Credit)

Unit I

Business Basics; Key business concepts, Business plans, Market need, Project management, Routes to market, Concept of entrepreneurship.

Chromatography: The Need for Chromatography; Definition, Underlying Principle, Mechanism of Separation, Terminology; Types of Chromatography: Partition Chromatography; Paper Chromatography; Other Chromatographic Methods

Unit II

Basic Apparatus: Identification of Apparatus; Apparatus for Heating: Bunsen Burner, Water Bath, Oil Bath, Hot Plate, Heating Mantle; 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 and Pipettes: Accuracy of Pipettes and Burettes, Volumetric Flask; Mass and Weight; Balances: Installation and Care of Top-Pan Balances, Double Pan Analytical Balance and Electronic Balance, Accuracy of Balances. pH meter and Conductometer.

Part: B (Practical: 2 Credit)

Practical

1. Group of 4-5 students may be asked to prepare business plan based on some innovative ideas and submit as a project / presentation discussing its complete execution.
2. Students can be taken for industrial visits for practical knowledge and experience.
3. Balances: Types, Use and Care Preparation of Standard Oxalic Acid Solution and Determination of Strength of NaOH.
4. Preparation of Buffer Solution and Determination of pH using pH Paper and pH meter
5. Separation of Pigments from Leaves (palak, dub ghas) or Flower Extract by Paper Chromatography and Determination of R_f value.
6. Preparation of Potash Alum or Ferrous Ammonium Sulphate or Potassium Ferric Oxalate
7. Preparation of hand sanitizer.
8. Preparation of H₂S.

References:

1. Nwaeke, L.I.(2002), Business Concepts and Perspectives, Springfield Publishers.
2. Silva, T. D. (2013), Essential Management Skills for Pharmacy and Business Managers, CRC Press.
3. Khopkar, S. M. (2008), Basic Concepts of Analytical Chemistry, New Age International Publisher.
4. Skoog, D.A.; Holler F.J.; Nieman, T.A. (2005), Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd.
5. Christian, G.D. (2004), Analytical Chemistry, John Wiley & Sons.
6. Harris, D. C. (2007), Exploring Chemical Analysis, W.H. Freeman and Co.

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