

Telangana University



5 years Integrated
M.Sc Pharmaceutical Chemistry
Syllabus

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : **M.PCH T 1.13**

Title : ***BASICS OF INORGANIC AND ORGANIC CHEMISTRY-I***

Unit-I

Periodic properties, alkali and alkaline earth elements, hydrides, oxides and oxyacids of groups 13-17. 15 hrs

Atomic radii and ionic radii-covalent radius-single, double, triple bond, Vander wall radius, radii of cation, anions and isoelectronic ions

Ionization energy, electropositivity, basic nature, reducing behavior, electron affinity

Electronegativity-methods of determination and evaluation- Pauling's approach

Mullikens approach, application in predicting and explaining chemical behavior nature of bond, bond length and bond angles, diagonal relationship.

Comparative study of hydrides-ionic and covalent, polynuclear, complex hydrides

Reducing properties of hydrides- Comparative study of oxides-monoxides peroxides

Superoxides-oxides-basicity, oxidizing nature, complexation tendencies

Classification and synthesis of hydrides-ionic, covalent, metallic and complex hydrides

Covalent hydrides-electron deficiency – Diborane and Decaborane

Boron hydrides-reactivity stability, hydrolysis and reducing properties of hydrides.

Classification of oxides-normal, mixed, suboxides, peroxide and superoxide, acidic, basic, amphoteric and neutral oxides.

Structures of oxides of Carbon and Nitrogen

Structures of oxides of Phosphorous and Sulphur

Structures of oxides of Chlorine- reactivity of oxides-thermal stability and hydrolysis

Oxyacids of Boron, Carbon, Nitrogen- Structures- acidic nature

Oxyacids of phosphorous, Sulphur- Structures- acidic nature

Oxyacids of Chlorine- Structures- acidic nature, classification of halides-ionic, covalent, complex halides.

Unit-II

Halides of groups 13-17, Carboranes, Carbonyls, Carbides, Silicones, Interhalogens and Pseudohalogens and Noble gases **15 hrs**

Halides of Boron and Carbon-Structures-Reactivity-Stability and hydrolysis-Lewis acid strength of Boron Halides

Halides of Silicon and Nitrogen- Structures-Stability and hydrolysis

Halides of Phosphorous, Sulphur- Structures-Stability and hydrolysis

Carboranes- Nomenclature, Classification-closo, nido and archano-preparation and structure. Borazole-Preparation, properties, structure-general

Carbonyls- general preparation, classification-mono and polynuclear, structure and bonding in $\text{Ni}(\text{CO})_5$, $\text{Fe}(\text{CO})_5$ and $\text{Co}_2(\text{CO})_8$

Carbides- classification-ionic, covalent interstitial-synthesis- structure-reactivity

Silicones- classification-straight chain, cyclic, cross linked, preparation-use of Grignard reagent

Silicones uses- oils, greases, rubbers-hydrides-classification-ionic, covalent and interstitial- structure of Boron nitride reactivity-hydrolysis

Interhalogens-definitions, general preparation, classification – AX , AX_3 , AX_5 , AX_7 , structure, reactivity

Basic nature of Iodine, Polyhalides

Pseudo halogens- different-examples, their structure, properties, similarities with halogens

Chemistry of Noble gases

General preparation of Xenon oxides, halides and oxyhalides

Structure, bonding and reactivity of Xenon oxides, halides and oxyhalides

Unit-III

Structural theory in organic chemistry and alicyclic hydrocarbons 15 hrs

Brief review of structural theory of organic chemistry, hybridization, bond length, bond angle, bond energy, curved arrow rotation, drawing electron movements with half headed and doubled headed arrow. Types of bond fission, Organic reagents (electrophilic, nucleophilic and free radicals reagents including neutral molecules like H_2O , BF_3 , NH_3 and AlCl_3)

Bond polarization: factors influencing the polarization of covalent bonds, electronegativity-inductive effect. Application of inductive effect: (a) basicity of amines, (b) Acidity of carboxylic acids, (c) Stability of carbonium ions

Resonance or Mesomeric effect, application to (a) acidity of phenol, (b) acidity of carboxylic acids

Hyperconjugation and its application to stability of carbonium ions, free radicals and alkenes.

Types of organic reactions: addition-electrophilic, nucleophilic and free radical

Substitution- electrophilic, nucleophilic and free radical

Elimination-examples

Alicyclic hydrocarbons

IUPAC nomenclature of hydrocarbons (review) – Alkanes, alkenes and alkynes

Alkanes: Methods of preparation : Hydrogenation of alkynes and alkenes, Wurtz reaction (Symmetrical alkanes), Kolbe's hydrolysis (symmetrical alkanes), Corey-House reaction (symmetrical and unsymmetrical alkanes)

Chemical reactivity-inert nature, free radical substitution- mechanism of chlorination of methane, reactivity, selectivity and orientation with respect to the nature of carbon- primary, secondary and tertiary – examples-2-methyl butane and with respect to halogens

Conformational analysis- conformations of ethane- staggered and eclipsed- relative stabilities- energy profile diagram. Conformation of n-butane – fully eclipsed (syn), eclipsed, Gauche and anti- relative stabilities- energy profile

Alkenes- preparation of alkenes (a) by dehydration of alcohols- acid catalysed dehydration, (b) dehydrohalogenation of alkyl halides using alc. KOH, Zaitsev's rule- brief mechanism, (c) by dehalogenation of 1,2 dihalides.

Properties: addition of hydrogen- heat of hydrogenation and stability of alkenes- example- 1-butene and 2-butene. addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O , HOX, H_2SO_4 .

Addition of HBr in presence of peroxide (anti- Markonikov's addition)

Hydroboration –oxidation, Oxidation – Cis- hydroxylation by $KMnO_4$, OsO_4 , trans- hydroxylation by per acids (via epoxidation)

Ozonolysis- location of double bond

Dienes- types of dienes- cumulated, conjugated and isolated, reactions of conjugated dienes-1,2 and 1,4 addition of HBr to 1,3 –butadiene and Alder reaction – example – 1,3 butadiene and maleic anhydride

Alkynes- preparation by dehydrohalogenation of dihalides, dehalogenation of tetra halides, acetylene from CaC_2 .

Properties: acidity of terminal alkynes (formation of metal acetylides), preparation of higher acetylenes, metal – ammonia reductions.

Physical properties- chemical reactivity- electrophilic addition of X_2 , HX, H_2O (tautomerism), oxidation (formation of enediol, 1,2 diones and carboxylic acids)

Reduction- (a) to alkanes, (b) to alkenes-cis- product with Lindlars catalyst and trans product with Na or Li and Liq. NH_3

Polymerization reaction of acetylene

Unit- IV

Acyclic hydrocarbons (cycloalkanes), benzene and its reactivity, arenes and polynuclear hydrocarbons

15 hrs

Nomenclature, preparation by Freund's method, heating dicarboxylic metals salts

Properties- reactivity of cyclopropane and cyclobutane by comparing with alkanes

Stability of cycloalkanes- Baeyer's strain theory

Sachse and Mohr Predictions and Pitzer's Strain theory

Conformations of cycloalkanes- cyclobutane-planar and folded, cyclopentane-planar and envelop, cyclohexane- chair, boat, half chair and twist boat. Relative stabilities- chair conformations- interconversions- axial and equatorial hydrogens.

Benzene and its Reactivity

Structure of benzene-molecular formula of benzene, cyclic structure by Kekulé, dynamic equilibrium, evidence based on ozonolysis experiment, concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of benzene, mention of C-C bond lengths and orbital picture of benzene.

Concept of aromaticity- aromaticity (definition), Huckel rule- application to Benzenoid (benzene, naphthalene, anthracene and Phenanthracene) and non-benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Reactions- general mechanism of electrophilic substitution, mechanism of nitration, sulphonation, halogenation, Friedel-Craft's alkylation and Friedel-Craft's acylation

Orientation of aromatic substitution- definition of ortho, para and meta directing groups. Rings activating and deactivating groups with examples. Electronic interpretation of various groups- (a) ring activating groups- hydroxyl, amino, methoxy and methyl groups, (b) ring deactivating groups- carboxy, nitro, nitrile, carbonyl and sulphonic acid groups, (c) halogens an exception.

Arenes and Polynuclear aromatic hydrocarbons

Polynuclear hydrocarbons- structure of naphthalene and anthracene (molecular orbital diagram and resonance energy). Reactivity towards electrophilic substitution. Nitration and sulphonation as examples.

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : **M.PCH T 1.14**

Title : ***BASICS OF PHARMACEUTICAL CHEMISTRY***

Unit-I

Introduction of Drugs

Definition, sources, Nomenclature (chemical, generic & trade names with examples), types (generic & prescription) and classification of drugs based on therapeutic action: history of evolution of drugs.

Unit-II

Drugs Formulations

Need of conversion of drugs into medicines: drug additives (excipients) and their role: classification of formulations: formulations of tablets, capsules, syrups, suspensions, parenterals, ointments and creams

Unit-III

Dosage forms

Definitions, advantages and limitations of dosage forms: principles involved and procedure adopted in preparation labeling and dispensing the typical products: liquids, semi solids and incompatibilities, calculation of doses.

Unit-IV

Industrial pharmacy

Introduction to Indian pharmacopoeia (IP), , British pharmacopoeia (BP), and US pharmacopoeia (USP) and their monographs

Errors in pharmaceutical analysis: introduction, classification accuracy, precision, minimization of systemic errors: weighing-selection and care of weights and balances, sensitivity, calibration and standard operating procedures SOP's).

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : **M.PCH T 1.15**

Title : **FUNDAMENTALS OF BIOTECHNOLOGY-I**

Unit-I **15 hrs**

Introduction to biotechnology – history, nature, scope and future perspectives in biotechnology

Ultra structure of prokaryotic cell, bacteria- structure, genome organization, genetic recombination

Virus- structure, life cycle (lytic and lysogenic)

Growth requirements of bacteria, bacterial growth, growth curves

Microbial techniques- media preparation, sterilization,, isolation of pure cultures

Preservation of cultures

Unit-II **15**

hrs

Ultra structure of eukaryotic cell-plant and animal cells (cell wall cell membrane, mitochondria, chloroplasts, endoplasmic reticulum, golgi apparatus and vacuoles.

Chromosome organization and specialized chromosomes (polytene and lamp brush) in eukaryotes.

Cell division and cell cycle- mitosis and meiosis

Unit-III **15**

hrs

Experiments to prove DNA as genetic material – Griffith experiment on transformation of streptococcus Pneumoniae. Avery, Mcleod and McCarty experiment. Hershey and Chase experiments with radio labeled T2 bacteriophage

RNA as genetic material- tobacco Mosaic virus- RNA structure

Structure of DNA- Watson and Crick model

Forms of DNA- A,B and Z forms-super coiled and related DNA- role of topoisomerases

DNA replication (conservative, semiconservative and dispersive), mechanism of DNA replication

hrs

Measures of central values and dispersion. Graphical presentation data.

Concept of probability, basic laws and its application to Mendelian segregation. Concept of probability distribution, binomial and poisson distributions, normal distributions and their applications.

Concept of sampling and sampling distribution. Concept of test of hypothesis. Application of statistics to biological problems/ data, chi, square statistics applications in biology.

Simple regression and correlation. Concept of analysis of variance (one way classification)

Introduction to computers-hardwire, software, central processing unit (constants and varia.. expression, flow charts)

Programming C language, application of computers in biology.

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : **M.PCH P 1.16**

Title : ***BASICS OF INORGANIC AND ORGANIC CHEMISTRY-PRACTICALS***

Calibration of weights and glassware, weighing and preparation of standard solution

Acid-base titrations:

- 1) Estimation of carbonate in baking soda
- 2) Carbonate and bicarbonate in washing soda
- 3) Alkali content in antacid using HCl
- 4) Acetic acid in commercial vinegar using NaOH

Redox titrations

- 1) Permagnometry- estimation of calcium ion in chalk
- 2) Dichrometry- estimation of (i) ferrous and (ii) ferric ions
- 3) Iodometry- (i) standardization of $\text{Na}_2\text{S}_2\text{O}_3$ by $\text{K}_2\text{Cr}_2\text{O}_7$ and (ii) estimation of copper ion

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : M.PCH P 1.17

Title : *BASICS OF PHARMACEUTICAL CHEMISTRY- PRACTICALS*

List of Experiments:

- 1) Dispensing procedures involving pharmaceutical calculation, dosage calculations for pediatric and geriatric patients.
- 2) Incompatibility studies in few simple dosage forms
- 3) Preparation of aromatic waters
- 4) Preparation of spirits
- 5) Preparation of different types of iodine solution
- 6) Preparation of compound sulphur and calamine lotion
- 7) Preparation of turpentine liniment
- 8) Preparation of gargles and throat paint
- 9) Preparation of sulphur ointment
- 10) Preparation of cresol soap solution
- 11) Preparation of simple ointment
- 12) Preparation of Whitfield ointment
- 13) Preparation of non staining iodine ointment
- 14) Preparation of creams and pastes
- 15) Preparation of any glycerogelatin based suppository
- 16) Preparation of tragacanth jelly
- 17) Preparation of effervescent granules
- 18) Preparation of simple syrup (Benadryl syrup)
- 19) Preparation of eye/ ear drops.

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-I

Course No. : M.PCH P 1.18

Title : *FUNDAMENTALS OF BIOTECHNOLOGY-I-PRACTICALS*

General instructions for lab work

- 1) Microscope and its operation (light microscope)
- 2) Preparation of routine microbial media
- 3) Isolation of microbial pure cultures
- 4) Sterilization by autoclave, radiation and filtration
- 5) Staining techniques- simple staining and different staining (gram staining)
- 6) Estimation of DNA by diphenylamine reagent
- 7) Estimation of RNA by orcinol reagent

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : M.PCHT 1.23

Title : *PHYSICAL CHEMISTRY AND GENERAL CHEMISTRY-I*

Physical chemistry

Unit-I

15 hrs

Gaseous state, liquid state and solid state

Deviation from real gases from ideal behaviour: Boyles, Charles and Avagadro's law.

Vanderwalls equation of state: pressure and volume corrections, applicability at different pressures.

Problems

Critical phenomenon: PV-isotherms of real gases, continuity of state, Andrews isotherms of carbon dioxide. Critical constants and their units

Vanderwalls equation and the critical state, derivation of relationship between critical constants and Vanderwalls constants

Experimental determination of critical constants. Problems on calculation of critical constants from

Vanderwalls constants and vice-versa

Law of corresponding states: reduced Vanderwalls equation of state with π (reduced pressure), ϕ (reduced volume) and θ (reduced temperature)

Joule Thompson effect and inversion temperature of gas. Liquification of gases: (i) Linde's method based on Joule Thompson effect, (ii) Claude's method based on adiabatic expansion of a gas.

Liquid State

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Liquid crystals and mesomorphic state.

Classification of liquid crystals into smectic and Nematic. Differences between liquid crystals (anisotropy) and solids (isotropy). Application of liquid crystals as LCD devices, lubricants and in digestion/ assimilation of food proteins and fats.

Solid State

Introduction, laws of crystallography-(i) laws of constancy of interfacial angles (ii) laws of symmetry, symmetry elements (plane, axis and centre of symmetry) in crystals with NaCl as example. (iii) laws of rationality of indices: weiss and miller indices. Plane in simple, body centered and face centered cubic lattice and interplanar distance in a crystal system, d_{hkl} .

Definition of space lattice, unit cell, bravais lattice and seven crystal systems with examples.

X-ray diffraction by crystals: derivation of bragg's equation determination of structure of NaCl (bragg's method and powder method)

Defects in crystals: stoichiometric (Schottky and renkel) and non-stoichiometric defects (metal excess and metal deficient)

Band theory of semiconductors: extrinsic and intrinsic semi conductors, n-type and p-type and their applications in photo electro chemical cells.

Unit-II

Dilute solutions and colligative properties, colloids and surface chemistry

Dilute solutions, colligative properties, definition, ideal and non-ideal solutions, raoults law

Relative lowering of vapour pressure, its determination by Oswald's dynamic method and molecular weight determination, problems

Osmosis, preparation of artificial semi permeable membrane, any one theory of osmosis, osmotic pressure, its measurement by Berkeley and Hartley's method, determination of molecular weight from osmotic pressure, problems.

Laws of osmotic pressure, Vant hoff theory of dilute solutions, general equation for dilute solutions, solution constant, units and problems

Derivation of relationship between osmotic pressure and lowering of vapour pressure.

General chemistry

Unit-III

Atomic structure and elementary quantum mechanics and chemical bonding

Black body radiation and Planck's radiation law

Photo electric effect, heat capacity of solids and Compton effect

De Broglie's wave nature and problems

Heisenberg's uncertainty principle and problems

Schrodinger's wave equation and its importance

Physical interpretation of the wave equation

Ψ and Ψ^2 and its significance

Sinusoidal wave equation and Hamiltonian operator

Chemical Bonding

Ionic solids- lattice and hydration energy, solubility of ionic solids

Fajan's rule- Polarizability of ions and covalent nature of ionic bond

Stereochemistry of inorganic molecules- common hybridization and shapes of molecules with suitable examples

Molecular orbital theory- shapes and sign convention of atomic orbitals, modes of overlapping, concepts of sigma and pi bonds

Criteria for formation of molecular orbitals from atomic orbitals, LCAO-concept, types of molecular orbitals-bonding, antibonding and non-bonding orbitals

MOED of homonuclear- H_2 , He_2^+ , H_2^+ -bond order, magnetic behavior

O_2 , F_2 -MOED-bond order, magnetic property

Heteronuclear diatomic molecules-MOED

Bond order and magnetic property- CO , CN^- , NO , NO^- , HF

Elevation of boiling point: derivation of relation between molecular weight and elevation of boiling point. Molal ebullioscopic constant(k_b), definition and its units. Experimental method of determination of depression in freezing point by Beckmann's method. Problems.

Abnormal colligative properties and their effect on molal mass, Van't Hoff factor, degree of dissociation and association of solutes. Problems.

Colloids and surface chemistry

Definition of colloids, differences between true solutions, colloids and coarse suspensions. Classification of colloids on the basis of (i) state of two phases (ii) affinity of dispersed phase for dispersion medium: lyophobic and lyophilic sols and differences between them

Solids in liquids (sols): preparation of colloids: dispersion methods: mechanical, electrical and peptization. Condensation methods, purification of colloids: dialysis and ultra filtration

Properties of colloids: physical properties, colligative properties, kinetic properties (brownian motion), optical properties, tyndall effect, electrical properties: origin of charge on a colloid, electrical double layer, zeta potential.

Electrokinetic properties: electrophoresis and electro osmosis, stability of colloids, coagulation , flocculation value, protective action, Hardy-Schultz law and gold number.

Liquids in liquids (emulsions): types of emulsions into O/W and W/O, preparation of emulsions and emulsifier. Ionic and non-ionogenic surfactants as emulsifiers. Detergent action of soap.

Liquids in solids (gels): classification, elastic and non-elastic gels. Preparation and properties, imbibition/ swelling, syneresis/ weeping and thixotropy. General application of colloids.

Adsorption: definition, types of Adsorption: physical and chemisorption and differences. Factors influencing adsorption: temperature, pressure and nature of gas, Freundlich adsorption and its limitations.

Langmuir theory of uni- layer adsorption: derivation and limitations. Applications of adsorption.

Unit-IV

Theory of quantitative analysis and evaluation of analytical data

Principles of volumetric analysis

Introduction, standard solutions, indicators, end point, titration error and titration curves

Neutralization titrations-principle, pH indicators, equation for pH.

pH at end point, titration curves and selection of indicators- strong acid- strong base, strong acid-weak base, weak acid- strong base, weak acid acid-weak base.

Redox titrations-principle, potential at end point, detection of end point and redox indicators

Precipitation titrations- principle, detection of end point, various indicators and titration curve

Complexometric titrations- principle, metal ion indicators and pH dependence.

Principles of gravimetric analysis- nucleation, precipitation, growth of precipitate and weighing of precipitate

Evaluation of analytical data

Definition of accuracy and precision and explanation with examples

Errors classification – determinate and indeterminate errors

Propagation of errors, absolute and relative errors

Significant errors, mathematical operations-addition, subtraction, division and multiplication.

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : **M.PCHT 1.24**

Title : **PHAMACEUTICAL INORGANIC CHEMISTRY**

Unit-I

- (a) Classification of inorganic pharmaceutical based on their applications, therapeutic classes with example and uses. Quality control and tests for purity, qualitative tests for anions and cations.
- (b) Limit tests for insoluble matter, limit tests for soluble matter, limit for moisture, volatile matter, residual matter, residual solvents, limit for non-volatile matter, limit for residual on ignition, limit of loss on ignition, limit on ash value.

Limit tests for metallic impurities: lead, arsenic, iron: limit tests for acid residual impurities, chlorides, sulphates, arsenate, carbonate, cyanide, oxalate, phosphate. Limit tests for non-metallic impurities: boron, free halogens and selenium and phramcopoeial standards.

Unit-II

Definition, preparation, properties, assay methods, limit tests and uses

(a) Gastro-Intestinal agents:

- (i) **Acidifiers and antacids:** IP: dil. HCl, sodium acid phosphate, sodium bicarbonate, sodium citrate, potassium citrate, aluminium hydroxide gel, dried aluminium hydroxide gel, magnesium oxide (magnesia), magnesium-hydroxide mixture, magnesium trisilicate, calcium carbonate.
- (ii) **Adsorbents and related drugs:** light kaolin, heavy kaolin, and activated charcoal.
- (iii) **Laxatives:** magnesium sulphate and calcium phosphate

(b) Electrolytes: sodium, potassium and calcium replenishers

- (i) Sodium, potassium replenishers: sodium chloride (compound, injection and ringer solution), sodium chloride and dextrose injection, potassium chloride and oral electrolytes
- (ii) Calcium replenishers: Calcium chloride, Calcium gluconate, dibasic Calcium phosphate.

(c) **Acid base regulators:** Sodium bicarbonate, sodium lactate injection, sodium citrate/ potassium citrate, sodium acetate, ammonium chloride, and ammonium chloride injection.

(d) **Dialysis fluids:** Haemodialysis fluids and intraperitoneal dialysis fluids

Unit-III

Definition, preparation, properties, assay methods, limit tests and uses

(a) **Mineral Nutrients:**

(i) **Haematinics:** Ferrous sulphate, Ferrous fumarate, Ferrous gluconate, Ferric ammonium citrate, iron and dextrose injection

(ii) **Metals:** Copper, Magnesium, and Zinc compounds (ZnCl)

(iii) **Phosphates:** sodium acetate phosphate and sodium phosphate

(iv) **Halogens:** iodine and iodides or fluorides

(b) **Pharmaceutical aids:**

(i) **Adsorbents and Absorbents:** activated charcoal, aluminium sulphate, and aluminium phosphate

(ii) **Antioxidants:** sodium sulphite, sodium bisulphate and sodium meta bi-sulphite

(iii) **Desiccants:** Silica gel

(iv) **Excipients:** Dicalcium and tri calcium phosphate, magnesium stearate, talc and puffed chalk.

(v) **Suspending agents:** Bentonite, colloidal silica, aluminium stearate

(vi) **Colorants:** Titanium oxide, ferric oxide

(vii) **Solvents and Vehicle:** Purified water

Unit-IV

Definition, preparation, properties, assay methods, limit tests and uses

(i) **Expectorants:** of ammonium chloride, potassium iodide.

(ii) **Emetics:** potassium antimony tartarate, copper sulphate, zinc sulphate

(iii) **Antidotes:** sodium thio sulphate, sodium thio sulphate injection, sodium nitrite.

(iv) **Inhalants:** oxygen, nitrous oxide, dilute solution of ammonia (BP), ammonium carbonate (BP)

(a) **Topical agents:**

(i) **Astringents:** zinc sulphate, zinc oxide, calcium hydroxide, copper sulphate, bismuth subcarbonate.

(ii) **Topical protectants:**

Zinc oxide, calamine, zinc stearate, talc, titanium-dioxide, heavy kaolin, and light kaolin.

- (iii) **Silicone polymers:** Activated dimethicone
- (iii) **Anti infectives:** hydrogen peroxide, potassium permanganate, silver nitrate (silver protein), iodine, (solutions, povidine-iodine), boric acid, zinc- undecylenate, mercury compounds (yellow mercuric oxide, ammoniated mercury), sulphur, selenium sulphide.

(b) Dental products:

- (i) **Fluorides:** Sodium fluoride, sodiummonoflourophosphate and stannous fluoride
- (ii) **Oral antiseptics and astringents:** Hydrogen peroxide, sodium peroxide (BP), magnesium peroxide, zinc peroxide and mouth washes.
- (iii) **Dentifrices:** Calcium carbonate, dibasic calcium phosphate, calcium phosphate, sodium Meta phosphate, and strontium chloride.
- (iv) **Cements and Fillers:** Zinc oxide
- (v) **Anti thyroid agents:** Potassium perchlorate
- (vi) **Diagnostic agent:** Barium sulphate
- (vii) **Surgical aid:** Plaster of paris

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : M.PCH T 1.25

Title : **FUNDAMENTALS OF BIOTECHNOLOGY-II**

Unit-I

Mendel's experiment- factors contributing to success to Mendel's experiments

Genotype phenotype, dominance, recessiveness, homozygotes, heterozygotes

Test cross, back cross, reciprocal cross. Laws of segregation-mono hybrid ratio, law of independent assortment-dihybrids and trihybrids.

Extension-to Mendelism- incomplete dominance, co-dominance, over dominance.

Variation in Mendel's laws- gene interactions, epistasis-deviation in F₂ ratios.

Penetrance and expressivity, pleiotropism, lethals and sub lethals. Multiple alleles- A, B, O blood groups. Coat colour in mammals, pseudoalleles-Rh-factor

Gene and environment –Phenocopies

Pedigree analysis.

Unit-II

Linkage, crossing-over and recombination, discovery of linkage, cytological proof of cross over

Recombination frequency, map distances, two point and three point test cross.

Interference and coincidence

Mitotic crossing over in *Drosophila*

Mechanism of sex determination- gene balance theory- *Drosophila*

Mechanism of sex determination- homogametic and heterogametic theory (human, mammalian and plants) environmental control sex determination- Bonellia

Sex linked inheritance-X-linkage in Hemophilia, sex limited and sex influenced characters

Y-linkage- Holandric genes

Unit-III

Carbohydrates

Importance, classification and properties

Structure and configuration of monosaccharides. Monosaccharides: structure and classification. Fischer and Haworth projections, e.g. glyceraldehydes, dihydroxyacetone, glucose, fructose, galactose, mannose,- stereoisomerism and mutarotation

Disaccharides- structure of sucrose, lactose, maltose and cellobiose. Glycosidic linkage and sugars as reducing agents.

Polysaccharides- storage polysaccharides: starch and glycogen, structural polysaccharides- cellulose

Unit-IV

Lipids and membrane support

Fatty acids: nomenclature saturated and unsaturated fatty acids, classification of lipids- saponification and non-saponifiable. Triglycerols, waxes, phosphoglycerols, sphingolipids and sterols

Membrane transport:

Facilitated diffusion, passive and active transport

Carriers, channels (open and voltage gated)

Transport of ions- uniport, symport and antiport

Na^+ , K^+ pumps in animal's cells

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : **M.PCH P 1.26**

Title : ***PHYSICAL CHEMISTRY AND GENERAL CHEMISTRY-I-PRACTICALS***

Complexometry:

- 1) Standardization of EDTA
- 2) Estimation of Magnesium in talcum powder
- 3) Hardness of water
- 4) Estimation of water

Precipitation titration:

Estimation of Zn ion by ferrocyanide

Gravimetry:

Estimation of Barium as barium sulphate and Ni as Ni-dimethyl glyoxime

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : M.PCH P 1.27

Title : *PHAMACEUTICAL INORGANIC CHEMISTRY- PRACTICALS*

List of Experiments:

Limit tests:

- 1) Pharmacopoeial limit test for chlorides
- 2) Pharmacopoeial limit test for Sulphates
- 3) Pharmacopoeial limit test for lead
- 4) Pharmacopoeial limit test for iron
- 5) Preparation and purification of Boric acid
- 6) Preparation and purification of Sodium citrate
- 7) Preparation and purification of Potash alum
- 8) Preparation and purification of Yellow mercuric oxide

Assay of Pharmaceuticals:

- 1) Assay of aspirin (acidimetry)
- 2) Assay of Codeine phosphate (acidimetry)
- 3) Assay of chloride in ringers lactate (precipitation method)

5-YEAR INTEGRATED M.Sc. PHARMACEUTICAL CHEMISTRY

TELANGANA UNIVERSITY, NIZAMABAD

SEMESTER-II

Course No. : M.PCH P 1.28

Title : *FUNDAMENTALS OF BIOTECHNOLOGY-II - PRACTICALS*

List of Experiments:

- 1) Problems on monohybrid ratios
- 2) Problems on dihybrid ratios
- 3) Problems on gene interactions
- 4) Problems on linkage, crossing over and chromosome mapping
- 5) Measures of central tendency
- 6) Measures of Dispersion
- 7) Test of hypothesis- Chi-square, T-test. Graphical representation of data
- 8) Fitting of binomial and poisson distribution