

### Course Name : Bachelor of Science Discipline : Chemistry

# Self Learning Course

#### Self-Learning Course (UG Only):

Year	Semester	SELF LEARNING COURSE Subject	Credit	Ext= TOT	Subject Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchange d If Revised % of Change
III	V	COSMETICS	5	100=100	U1CHSL51	Entrepreneurship	No Change
III	V	CHEMISTRY COMPETITIVE SKILL DEVELOPMENT COURSE	5	100=100	U1CHSL52	Skill Development	New

# SELF LEARNING

#### COSMETICS

#### CODE: U1CHSL51

#### Credit: 5 Total Marks: 100

#### **Unit-I Fundamentals of Cosmetics**

Introduction - Classification of cosmetics - Lotions – Creams – Lipsticks – Eye make up – Eye shadow – Eye pencils – Eye Liners – Mascara – Eye make up removers – Antiperspirants – shaving foams – Shampoo and their formulation – dipialtory

#### **Unit-II Hair Preparations**

Hair lotions and tonics – Hair conditioners – Hair dressings – Hair creams – Hair sprays – Hair bleaching – Hair dyes – Hair waving preparation – Hair straightness

#### **Unit-III** Herbal Cosmetics

Introduction – Aloe vera – Cucumber – turmeric – Khus – Henan – Neam – Amla – Reetha – Voaltile Oils

#### **Unit-IV** Skin Preparations

Skin creams – Anti wrinkle creams - Skin protective creams - Cleansing creams – moisturizing and foundation creams- cold creams – Night and massage creams – Hand creams and lotions.

#### **Unit-V** Face Preparations

Introduction - formulation of face powder – compact face powder – talcum powder – Baby powders – face masks and packs – Evaluation and quality control –Commercially available brands.

#### **Reference:**

"Text Book of Cosmetics" by Garud-Sharma-Garud, Pragati Prakashan, 2012.



#### CHEMISTRY COMPETITIVE SKILL DEVELOPMENT COURSE CODE: U1CHSL52

#### Credit: 5 Total Marks: 100

#### **Course Outcomes:**

Students, after successful completion of the course ,will be able to

- Understand the fundamentals of chemistry concepts
- Apply and solve the chemistry problems
- Prepare for the competitive exam
- Pass the competitive exam successfully

# Unit I:

- **Theory of Gases:** Equation of state for ideal and non-ideal (van der Waals) gases; Kinetic theory of gases; Maxwell-Boltzmann distribution law; equipartition of energy.
- **Chemical Thermodynamics:** Reversible and irreversible processes; first law and its application to ideal and nonideal gases; thermochemistry; second law; entropy and free energy; criteria for spontaneity.
- Chemical and Phase Equilibria: Law of mass action; K<sub>p</sub>, K<sub>c</sub>, K<sub>x</sub> and K<sub>n</sub>; effect of temperature on K; ionic equilibria in solutions; pH and buffer solutions; hydrolysis; solubility product; phase equilibria–phase rule and its application to one-component and two-component systems; colligative properties.
- **Electrochemistry:** Conductance and its applications; transport number; galvanic cells; EMF and free energy; concentration cells with and without transport; polarography; concentration cells with and without transport; Debey-Huckel-Onsagar theory of strong electrolytes.
- **Chemical Kinetics:** Reactions of various order; Arrhenius equation; collision theory; transition state theory; chain reactions normal and branched; enzyme kinetics; photochemical processes; catalysis.
- Adsorption: Gibbs adsorption equation; adsorption isotherm; types of adsorption; surface area of adsorbents; surface films on liquids.

#### Unit II:

- **Basic Concepts in Organic Chemistry and Stereochemistry:** Electronic effects (resonance, inductive, hyperconjugation) and steric effects and its applications (acid/base property); optical isomerism in compounds with and without any stereocenters (allenes, biphenyls); conformation of acyclic systems (substituted ethane/n-propane/n-butane) and cyclic systems (mono- and di-substituted cyclohexanes).
- Organic Reaction Mechanism and Synthetic Applications: Chemistry of reactive intermediates (carbocations, carbanions, free radicals, carbenes, nitrenes, benzynes etc.); Hofmann-Curtius-Lossen rearrangement, Wolff rearrangement, Simmons-Smith reaction, Reimer-Tiemann reaction, Michael reaction, Darzens reaction, Wittig reaction and McMurry reaction; Pinacol-pinacolone, Favorskii, benzilic acid rearrangement, dienone-phenol rearrangement, Baeyer-Villeger reaction; oxidation and reduction reactions in organic chemistry; organometallic reagents in organic synthesis (Grignard, organolithium and organocopper); Diels-Alder, electrocyclic and sigmatropic reactions; functional group inter-conversions and structural problems using chemical reactions.

- **Natural Products Chemistry:** Chemistry of alkaloids, steroids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.
- Aromatic and Heterocyclic Chemistry: Monocyclic, bicyclic and tricyclic aromatic hydrocarbons, and monocyclic compounds with one hetero atom: synthesis, reactivity and properties.

# Unit III:

- **Periodic Table:** Periodic classification of elements and periodicity in properties; general methods of isolation and purification of elements.
- Main Group Elements (s and p blocks): General concepts on group relationships and gradation in properties; structure of electron deficient compounds involving main group elements.
- **Transition Metals (d block):** Characteristics of 3d elements; oxide, hydroxide and salts of first row metals; coordination complexes: structure, isomerism, reaction mechanism and electronic spectra; VB, MO and Crystal Field theoretical approaches for structure, color and magnetic properties of metal complexes; organometallic compounds having ligands with back bonding capabilities such as metal carbonyls, carbenes, nitrosyls and metallocenes; homogenous catalysis.
- **Bioinorganic Chemistry:** Essentials and trace elements of life; basic reactions in the biological systems and the role of metal ions, especially Fe<sup>2+</sup>, Fe<sup>3+</sup>, Cu<sup>2+</sup> and Zn<sup>2+</sup>; structure and function of hemoglobin and myoglobin and carbonic anhydrase.

#### Unit IV:

- **Basic Mathematical Concepts:** Functions; maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; elementary statistics and probability theory.
- Atomic and Molecular Structure: Fundamental particles; Bohr's theory of hydrogen-like atom; wave-particle duality; uncertainty principle; Schrödinger's wave equation; quantum numbers; shapes of orbitals; Hund's rule and Pauli's exclusion principle; electronic configuration of simple homonuclear diatomic molecules.
- **Chemical Bonding and Shapes of Compounds:** Types of bonding; VSEPR theory and shapes of molecules; hybridization; dipole moment; ionic solids; structure of NaCl, CsCl, diamond and graphite; lattice energy.
- Solid State: Crystals and crystal systems; X-rays; NaCl and KCl structures; close packing; atomic and ionic radii; radius ratio rules; lattice energy; Born-Haber cycle; isomorphism; heat capacity of solids.

#### Unit V:

- **Spectroscopy:** Beer-Lambert law; fundamental concepts of rotational, vibrational, electronic and magnetic resonance spectroscopy.
- Qualitative Organic Analysis: Identification of functional groups by chemical tests; elementary UV, IR and 1H NMR spectroscopic techniques as tools for structural elucidation.
- **Instrumental Methods of Analysis:** Basic principles; instrumentations and simple applications of conductometry, potentiometry and UV-vis spectrophotometry; analysis of water, air and soil samples.
- Analytical Chemistry: Principles of qualitative and quantitative analysis; acid-base, oxidation-reduction and complexometric titrations using EDTA; precipitation



reactions; use of indicators; use of organic reagents in inorganic analysis; radioactivity; nuclear reactions; applications of isotopes.