

**Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
(Autonomous)
Affiliated to Saurashtra University, Rajkot**

Department of Chemistry

SCHEME OF INSTRUCTION AND EXAMINATIONS

For Students Admitted from A.Y. 2016-2017 & Onwards

Allied Course for other Programs

Semester – I

16UBTDA01 & 16UICDA01	Chemistry-I	3 hrs./wk	3 credits
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Objectives:

To enable the students to

- Understand elementary concepts of Atomic structure, Bonding, and Periodicity of elements
- Understand elementary concepts of Organic, Physical & Pharma. chemistry
- Develop skills in the scientific method of planning, conducting, reviewing and reporting experiments of qualitative & quantitative chemical analysis.
- Develop skills in understanding, planning and performing experiments for Chemical analysis.

Unit – 1: Fundamental Inorganic Chemistry–I

(07 Hrs.)

(1) Atomic Structure:

Bohr's Theory & its limitation, Quantum numbers, Shapes of orbital, Principles: Aufbau, Pauli, Hund, Electronic configurations.

(2) Periodic Properties:

Various periodic trends in periodic table

- Atomic radius
- Ionic radius: Effective nuclear charge
- Pauling's method for the determination of ionic radius
 - Shielding effect
 - Slater rule
- Ionization energy
- Electron affinity
- Electronegativity and Factors affecting electronegativity

Unit – 2: Fundamental Analytical Chemistry–I

(08 Hrs.)

(1) Modes of Concentration:

Introduction, Theory of Solution, Solvent, Solute, Primary & Secondary standard solutions, Determination of Molecular weight and eq. weight, Different modes of concentration - Normality, Molarity, Molality, Mole fraction, % W/W,% W/V, % V/V, ppm, ppb, ppt, Numerical.

(2) Acid- Base & Buffers

- Introduction, Definitions: Acids and Bases
- Strong and weak electrolytes
- Degree of ionization
- Ionic product of water
- Ionization of weak acid and weak base
- pH scale
- Common ion effect
- Buffers & types of Buffers
- Mechanism of Buffers
- Determination of pH of buffer by Henderson equation
- Buffer capacity

Unit – 3: Fundamental Physical Chemistry–I

(07 Hrs.)

Thermodynamics

- Introduction
- System, surrounding, types of system
- Thermodynamic processes , Macroscopic properties
- State function & Path function
- Concept of Heat & work
- Zeroth law (Statement & Mathematical expression)
- First law (Statement & Derivation)

Thermo chemistry

- Exothermic and endothermic reactions
- Heat of reaction: Combustion, Solution, Neutralization, Vaporization, Sublimation, Transition
- Hess's law
- Joule-Thomson Effect
- Bond dissociation energy

Unit – 4: Fundamental Organic Chemistry–I

(08 Hrs.)

- Organic compounds: Classification and Functional Groups, Nomenclature, hybridization, shapes of molecules, influence of hybridization on bond properties.
- Electronic displacement, Study of various effects: Inductive effect, Electromeric effect.
- Resonance, Mesomeric effect & Hyper conjugation and their applications

- **Reaction Intermediates:** Hemolytic and heterolytic bond fission, Curly arrow rules, formal charges, Nucleophile, Electrophile, Nucleophilicity & Basicity, Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.
- Types of reaction intermediates: Carbocation, Carbanion, Carbon free radical, Carbene.
- Introduction to types of organic reactions and their mechanism: Addition, Elimination (including E¹, E²) and Substitution reactions (including SN¹, SN²).

Unit – 5: Fundamental Stereo Chemistry

(06 Hrs.)

- Isomerism: Types & Details
- **Optical Isomerism:** Chirality/Asymmetry
- Wedge-Dash Formula
- Fischer projection
- Newmann and Sawhorse projection and their inter conversion
- Enantiomer
- Relative and absolute configuration
- D/L and R/S designation, CIP rules
- Molecules with Two or more chiral centre
- Meso compounds & Diastereomer
- **Geometrical Isomerism:** Cis–Trans, Syn–Anti, E-Z with CIP rules
- Optical activity & Specific rotation
- Racemic mixture & Resolution

Text Books:

1. Bansal, Raj K. (2009, Fifth) *A Textbook of Organic Chemistry*. New Delhi: New Age International (ISBN: 978-81-224-2025-8).
2. Bahl, Arun; Bahl, B. S.; Tuli, G. D. (2010) *Essential of Physical Chemistry*. New Delhi : S. Chand (ISBN No. 81-219-2978-4)

Reference Books:

1. Ahluwalia, V. K. (2011, Fourth edition) *Organic Reaction Mechanism*. New Delhi: Narosa (ISBN: 978-81-8487-115-9).
2. T.W. Graham Solomons (2011, 10th edition) *Organic Chemistry*. Hoboken: John Willey & Sons (ISBN: 978-0-470-55659-7).
3. Negi, A. S.; Anand, S. C. (2007, Second edition) *A Textbook of Physical Chemistry*. New Delhi: New age International Publisher (ISBN: 81-224-2005-0).
4. Peter Atkins (2006) *Atkin's Physical Chemistry*. Oxford: Oxford University Press (ISBN: 9780198700722).

Semester – I

16UBTDA02 & 16UICDA02	Chemistry Practical -I	2hrs./wk	1 credits
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- Volumetric Analysis Acid-Base (04)
- Inorganic QA (05)
- Determination of following Physical Properties: (02)
 - Surface tension – Parachor (01)
 - Viscosity (01)

Reference Books:

1. Jeffery, G. H.; Bassett, J.; Mendham, J.; Denny, R. C. (1989) *Vogel's Textbook of Quantitative Chemical Analysis*. Hoboken: John Willey & Sons (ISBN: 0-582-44693-7).
2. Jerry R. Mohrig (2010, Third edition) *Techniques in Organic chemistry*. London: W. H. Freeman & Company (ISBN: 1-4292-1956-4).
3. Svehla, G. (1979, Fifth edition) *Textbook of macro and semi micro qualitative analysis*. London: Logman Publishing group (ISBN: 0-582-44367-9).