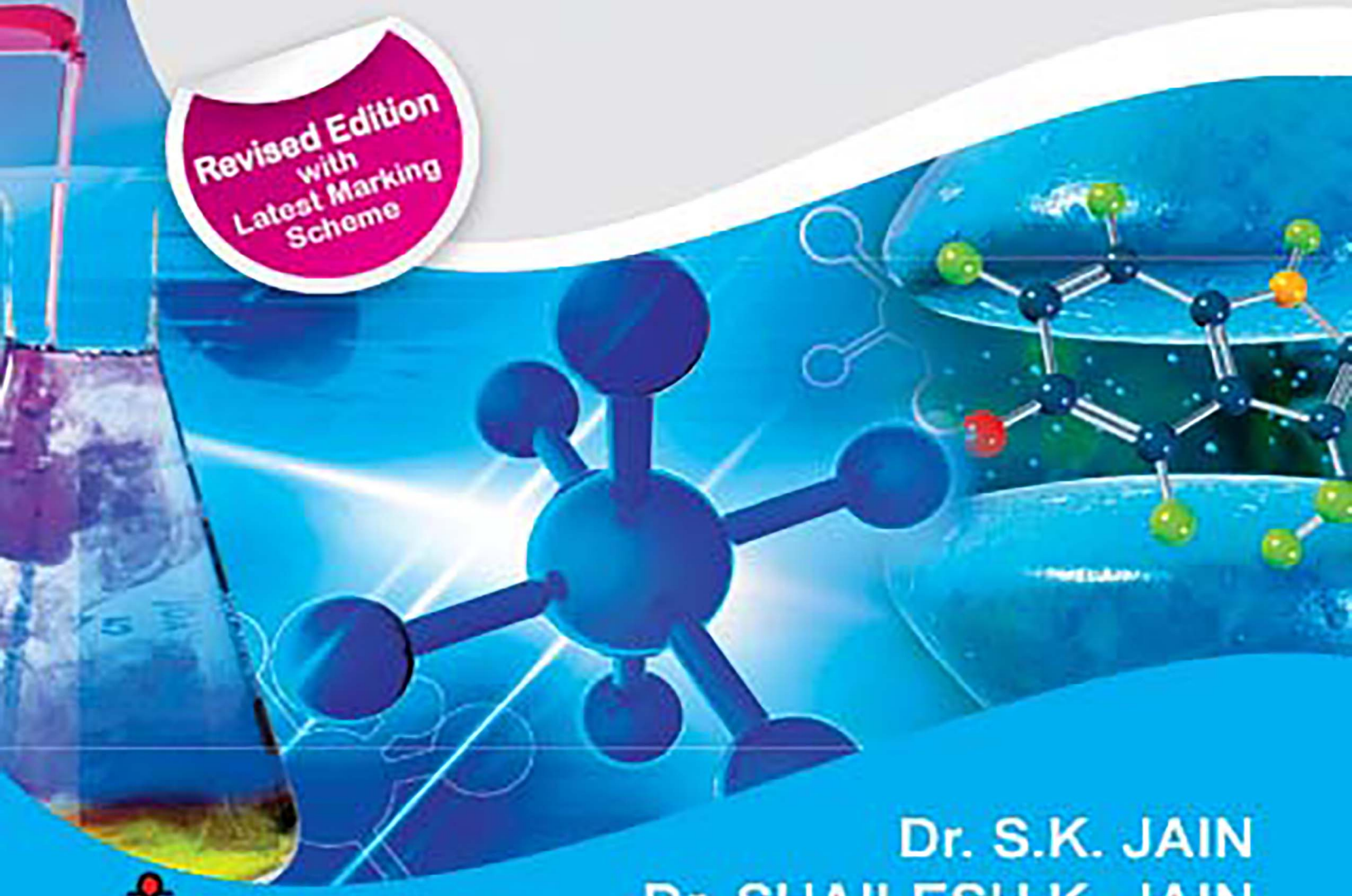
As per New NCERT/CBSE Syllabus

CONCEPTUAL CHEMISTRY

VOLUME - I

FOR CLASS XI

Revised Edition with Latest Marking Scheme



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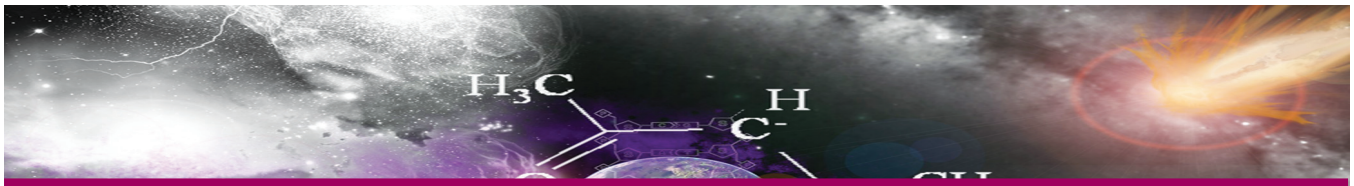

Strictly According to the Latest Syllabus Prescribed by the Central Board of Secondary Education, New Delhi

Conceptual CHEMISTRY

VOLUME – I

FOR CLASS XI

of

Senior Secondary Certificate Examinations of CBSE and Other State Boards of School Education, also for Medical (NEET) and Engineering Entrance Examinations.

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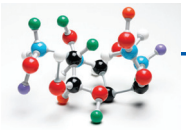
Preface to the Fifth Edition



With a sense of gratitude, we wish to thank all the students and teachers of Chemistry for accepting our books, **Conceptual Chemistry (XI and XII)** as among the **'most user-friendly'** books in Chemistry.

We also thankfully acknowledge the valuable suggestions received by us from time to time from a large number of students and teachers. This is just to let you know that we value and appreciate your contribution in making our efforts more meaningful.

Recent changes in policy for Admission to IIT's Regional and State Level Engineering Colleges/ Institutes, to give weightage to the marks secured at +2 level provided us with an opportunity to update the text to make Conceptual Chemistry (XI and XII) a more effective study material.

We feel happy in presenting to you a thoroughly revised and updated edition of Conceptual Chemistry Volume–I (for Class XI). While retaining all the earlier user-friendly features of the book, we have added several new features to this edition of the book. These new additions have been made primarily to help students to improve their performance in the Competitive Entrance Examinations as well as in their Final Examinations.

Salient Features of the New Edition

Coloured presentation with better readability.

- A large number of Solved Numerical Problems and Short and Long Answers Type Questions have been included.
- Conceptual Questions – The Brain Strain.
- Conceptual Corner for Competitive Examinations – Solved AIEEE and IIT questions (up to 2012).
- Objective Questions for Competitive Examinations.
- Question Bank in the form of Test Assignments for quick self-assessment.
- All symbols and notations as per the latest IUPAC guidelines.
- Nomenclature of organic compounds based on the IUPAC Recommendations (1993).
- Let us Say it Again – The Chapter Round Up (pointwise) for quick revision.

We hope the book in its present format will be received by all the users with more enthusiasm than before.

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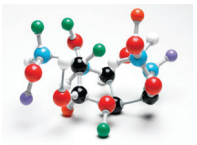
shailejain@gmail.com

Preface to the First Edition



The model curriculum developed by NCERT under the guidelines of the National Policy on Education for Secondary and Senior Secondary Classes has gained wide acceptability in many States and Union Territories of our country. This model curriculum lays emphasis towards making the youth of our country aware of the problems connected with Environment, Energy, Health and Food. As a result, the science subjects have become more interdisciplinary in nature. I have attempted to present such an interdisciplinary face of Chemistry through this book **Conceptual Chemistry** for Class XI in the light of newer developments in the methodology of teaching and in the pattern of examinations.

Who should use this book

This book will serve as a user–friendly Textbook and also as a Question Bank for all,

- Those who are appearing for class XI examination of CBSE New Delhi and the Boards of Education of many other states following the CBSE syllabus Core syllabus.
- Those who are planning to appear for the Competitive Entrance Examinations to the Engineering and Medical colleges.

What does this book contain

The book Conceptual Chemistry (for Class XI) has been prepared in accordance with the syllabus prescribed by the Central Board of Secondary Education, New Delhi. Since many States and Union Territories have also adopted the CBSE syllabus, this book should prove useful for the students of the Boards of Education of these states and Union Territories also.
The book Conceptual Chemistry (for Class XI) contains

- Well–illustrated text designed on the basis of the questions asked in the Board Papers of many past years. Typical questions from the examination papers of other Boards are also included.
- A Bank of Questions in the form of,
  - Test Assignments consisting of Very Short and Short Answer Questions and Numerical Problems, for practice and self-assessment.
  - A large number of Multiple choice questions, Fill in the blanks type questions, True or false type questions, and Matching type questions are included for the benefit of the students intending to appear for the Competitive Entrance Examinations.

- A large number of Solved Numerical Problems to illustrate the applications of the various concepts described in the text.

Before closing, I wish to express my personal thanks to everybody at the Publisher's end for their fullest cooperation throughout. Suggestions from the fellow teachers and the students to make this book a more effective study material shall be appreciated.

Dr. S.K. Jain

CBSE Syllabus 2014

Class–XI (Theory : Chemistry)

One Paper **Time : 3 Hours** **Total Periods : 180**

Unit No.	Title	Marks
Unit I	Some Basic Concepts of Chemistry	5
Unit II	Structure of Atom	6
Unit III	Classification of Elements and Periodicity in Properties	4
Unit IV	Chemical Bonding and Molecular Structure	5
Unit V	States of Matter: Gases and Liquids	4
Unit VI	Thermodynamics	6
Unit VII	Equilibrium	6
Unit VIII	Redox Reactions	3
Unit IX	Hydrogen	3
Unit X	The *s* – Block Elements	5
Unit XI	Some *p* – Block Elements	5
Unit XII	Organic Chemistry: Some Basic Principles and Techniques	7
Unit XIII	Hydrocarbons	8
Unit XIV	Environmental Chemistry	3
	Total	**70**

Unit I Some Basic Concepts of Chemistry (Periods 14)

General Introduction: Importance and scope of chemistry. Nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II Structure of Atom (Periods 16)

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals – Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half – filled and completely – filled orbitals.

Unit III Classification of Elements and Periodicity in Properties (Periods 8)

Significance of classification, brief history of the development of the periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii Ionization enthalpy, electron gain enthalpy, electronegativity, valency.Nomenclature of elements with atomic number greater than 100.

Unit IV Chemical Bonding and Molecular Structure (Periods 16)

Valence electrons, ionic bond, covalent bond; bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s,p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only), hydrogen bond.

Unit V States of Matter: Gases and Liquids (Periods 14)

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of molecule, Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation. Deviation from ideal behaviour, liquefaction of gases, critical temperature, kinetic energy and molecular speeds (elementary idea).

Liquid State – vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations)

Unit VI Chemical Thermodynamics (Periods 16)

Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions.

First law of thermodynamics – internal energy and enthalpy, heat capacity and specific heat, measurement of ΔU and ΔH, Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution.

Second saw of Thermodynamics (brief introduction) Introduction of entropy as a state function, Gibb's energy change for spontaneous and non – spontaneous processes, criteria for equilibrium.

Third law of thermodynamics (brief introduction).

Unit VII Equilibrium (Periods 16)

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium – Le Chatelier's principle, ionic equilibrium – ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of pH, Henderson Equation, hydrolysis of salts (elementary idea), buffer solution, solubility product, common ion effect (with illustrative examples).

Unit VIII Redox Reactions (Periods 6)

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions

Unit IX Hydrogen (Periods 8)

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen, hydrides – ionic, covalent and interstitial; physical and chemical properties of water, heavy water, hydrogen peroxide – preparation, reactions, structure and uses; hydrogen as a fuel.

Unit X s –Block Elements (Alkali and Alkaline Earth Metals) (Periods 12)

Group 1 and Group 2 Elements

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens, uses.

Preparation and Properties of Some Important Compounds:

Sodium carbonate, sodium chloride, sodium hydroxide and Sodium hydrogencarbonate, biological importance of sodium and potassium.

Calcium oxide and Calcium carbonate and their industrial uses, biological importance of Magnesium and Calcium.

Unit XI Some p –Block Elements (Periods 14)

General Introduction to p –Block Elements

Group 13 Elements : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group, Boron - physical and chemical properties, some important compounds, borax, boric acid, boron hydrides, Aluminium: Reactions with acids and alkalies, uses.

Group 14 Elements : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of the first elements.

Carbon -catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides.

Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and Zeolites, their uses.

Unit XII Organic Chemistry – Some Basic Principles and Techniques (Periods 16)

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds.

Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyperconjugation.

Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

Unit XIII Hydrocarbons (Periods 16)

Classification of Hydrocarbons

Aliphatic Hydrocarbons:

Alkanes – Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.

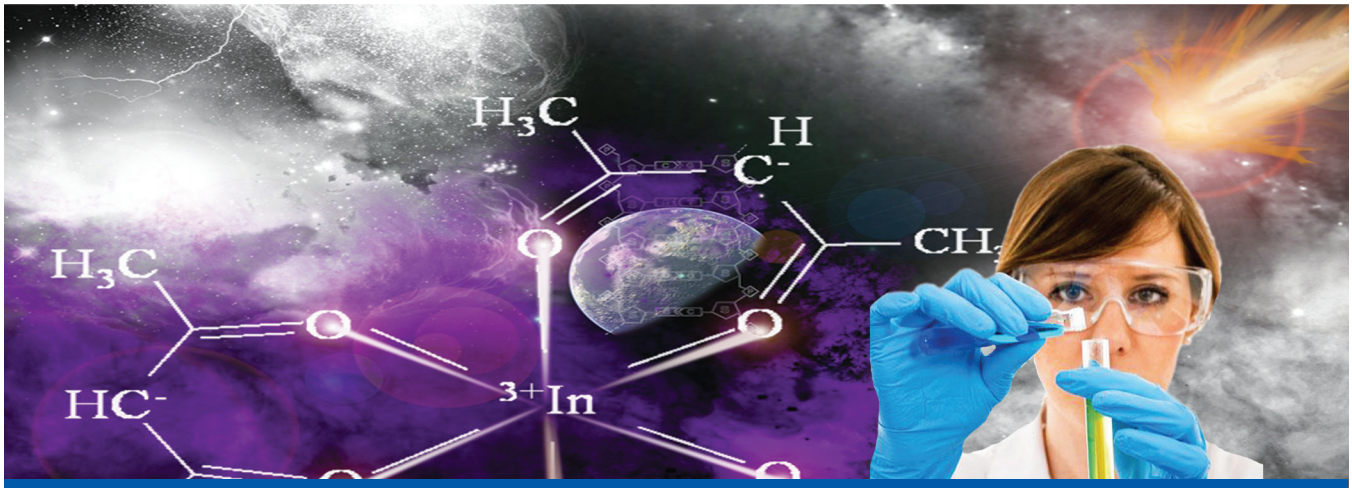
Alkenes – Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markownikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes – Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic Hydrocarbons: Introduction, IUPAC nomenclature, benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution. nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

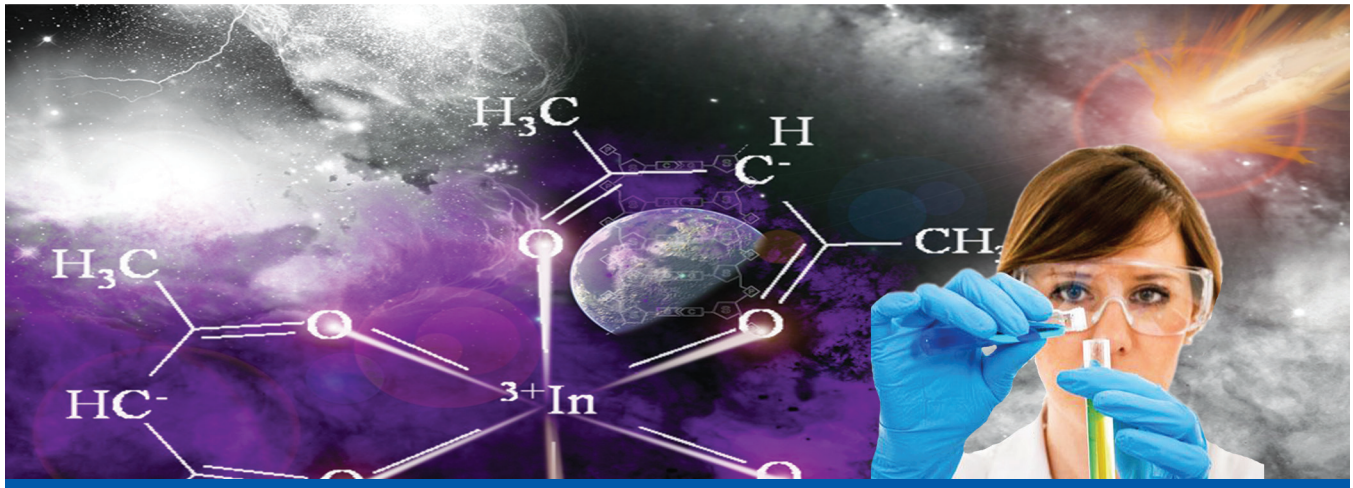
Unit XIV Environmental Chemistry (Periods 8)

Environmental pollution – air, water and soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants, acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming – pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategies for control of environment pollution.



Brief Contents

VOLUME–I



Brief Contents

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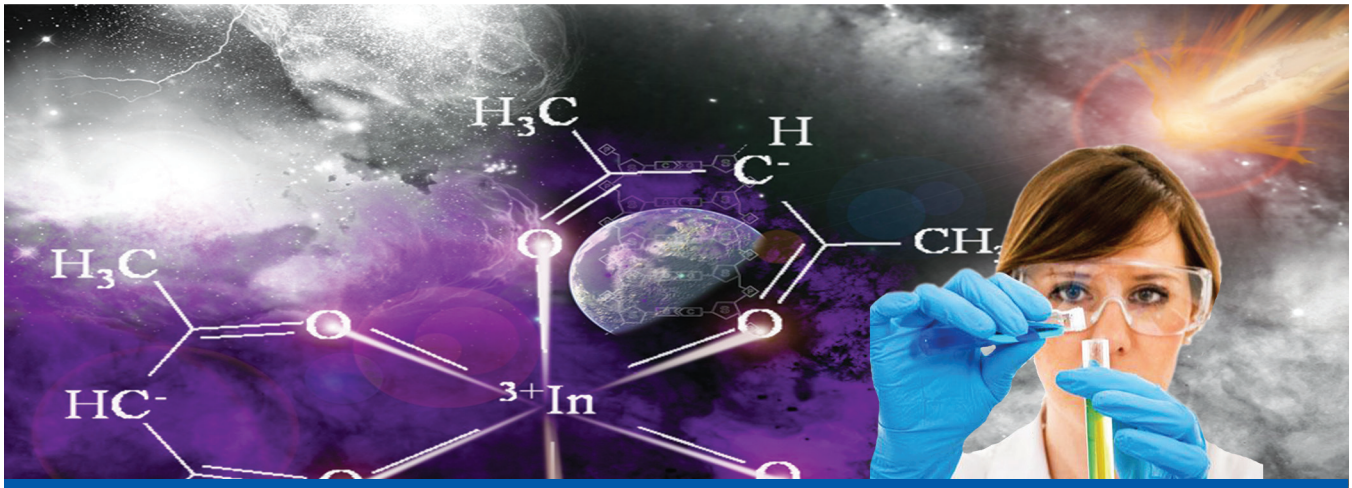

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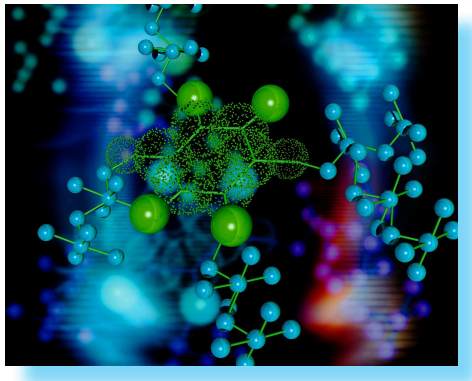
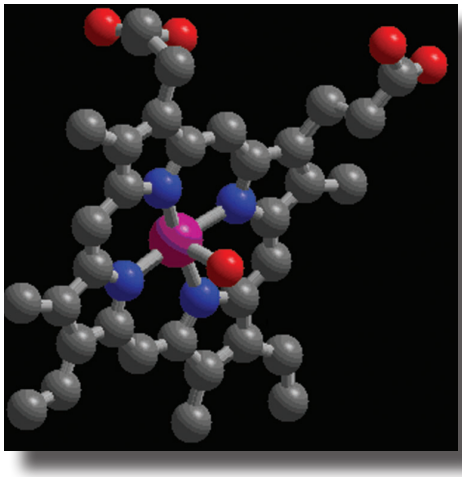
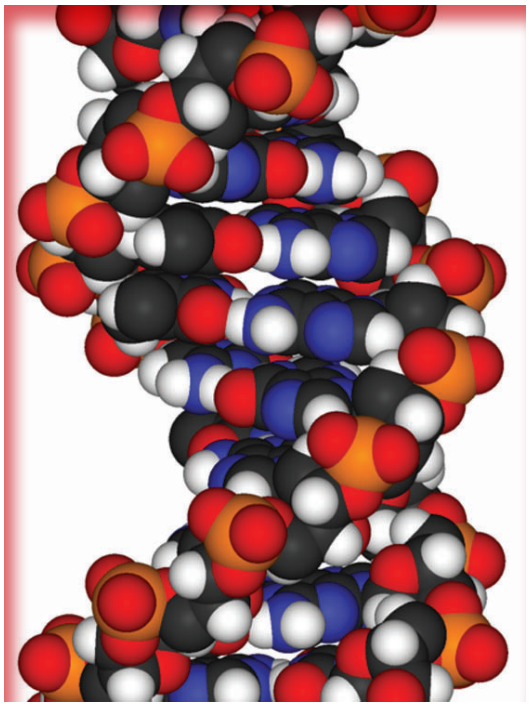
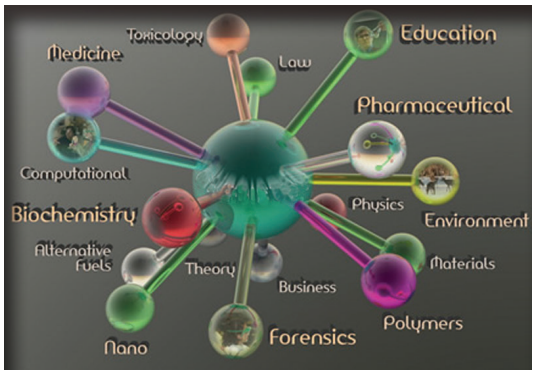
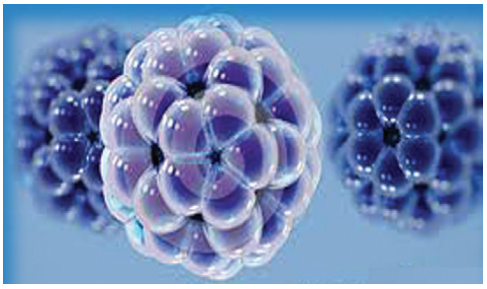
VOLUME–I











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