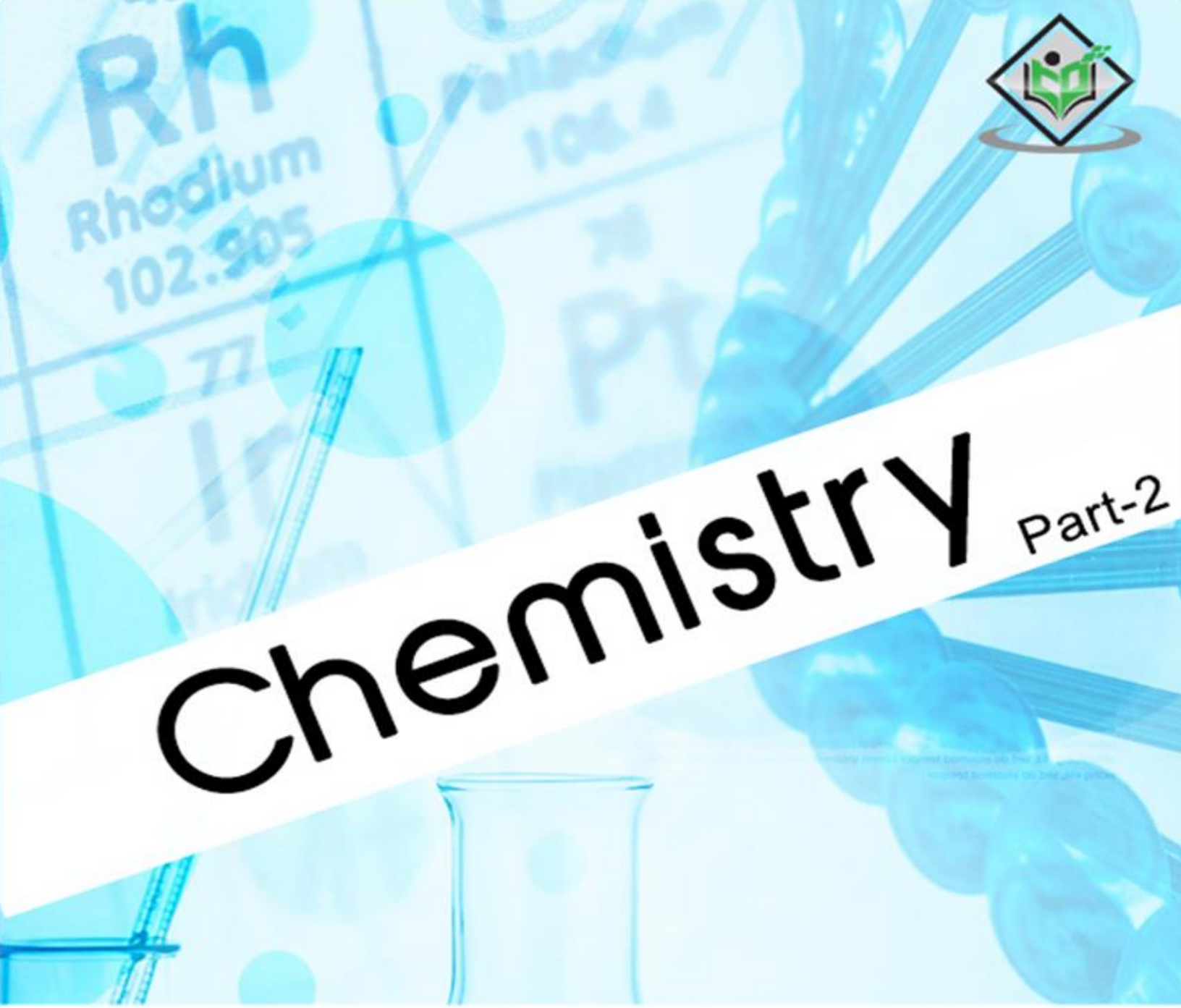

Chemistry Part-2

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About the Tutorial

Chemistry is one of the disciplines of science under which, we study about the various aspects of the matters i.e. composition, properties, their reactions, and the use of such reactions to form new substances. In its given premises, Chemistry includes a wide range of topics such as organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry, biochemistry, etc.

Because of having wide range of topics, this tutorial is divided into two parts namely Chemistry Part 1 and Chemistry Part 2. Further, these two parts are divided into different chapters for an easy understanding.

Audience

This tutorial is designed exclusively for the students preparing for the different competitive exams including **civil services, banking**, **railway**, **eligibility test**, and all other competitive exams of such kind.

Prerequisites

This tutorial is partly based on **NCERT Chemistry** (class 8^{th} to 10^{th}) i.e. Part I and Part 2 is prepared from the different reliable sources and represents largely the significant facts and figures vital for the competitive exams.

This tutorial starts with the basic concepts of Chemistry; however, prior experience of reading the NCERT science (Chemistry) books is recommended for the easy understanding.

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Table of Content

1. CHEMISTRY – INTRODUCTION

Introduction

- Chemistry is a branch of Natural Science that studies about the structure, composition, and changing properties of matters.

- Chemistry studies the smallest part of a matter i.e. atom (along with its all properties) to the large materials (e.g. gold, silver, iron, etc.) and their properties.

- Chemistry also studies the intermolecular forces (that provide matter the general properties) and the interactions between substances through the chemical reactions.

- In 1998, Professor Raymond Chang defined Chemistry as –

  "Chemistry" to mean the study of matter and the changes it undergoes.

- It is believed that the study of chemistry started with the theory of four elements propounded by Aristotle.

- The four theory of elements states that "*fire, air, earth, and water were the fundamental elements from which everything is formed as combination*."

- Because of his classical work namely "***The Sceptical Chymist,***" Robert Boyle, is known as the founding father of chemistry.

- Boyle formulated a law, became popular as 'Boyle's Law.'

- Boyle's law is an experimental gas law that analyzes the relationship between the pressure of a gas and volume of the respective container.

- By advocating his law, Boyle rejected the classical 'four elements' theory.

- The American scientists Linus Pauling and Gilbert N. Lewis collectively propounded the electronic theory of chemical bonds and molecular orbitals.

- The United Nations declared 2011 as the 'International Year of Chemistry.'

- The matter is defined in chemistry as anything that has rest mass and volume and also takes space.

- The **matter** is made up of particles.

- The **atom** is the fundamental unit of chemistry.

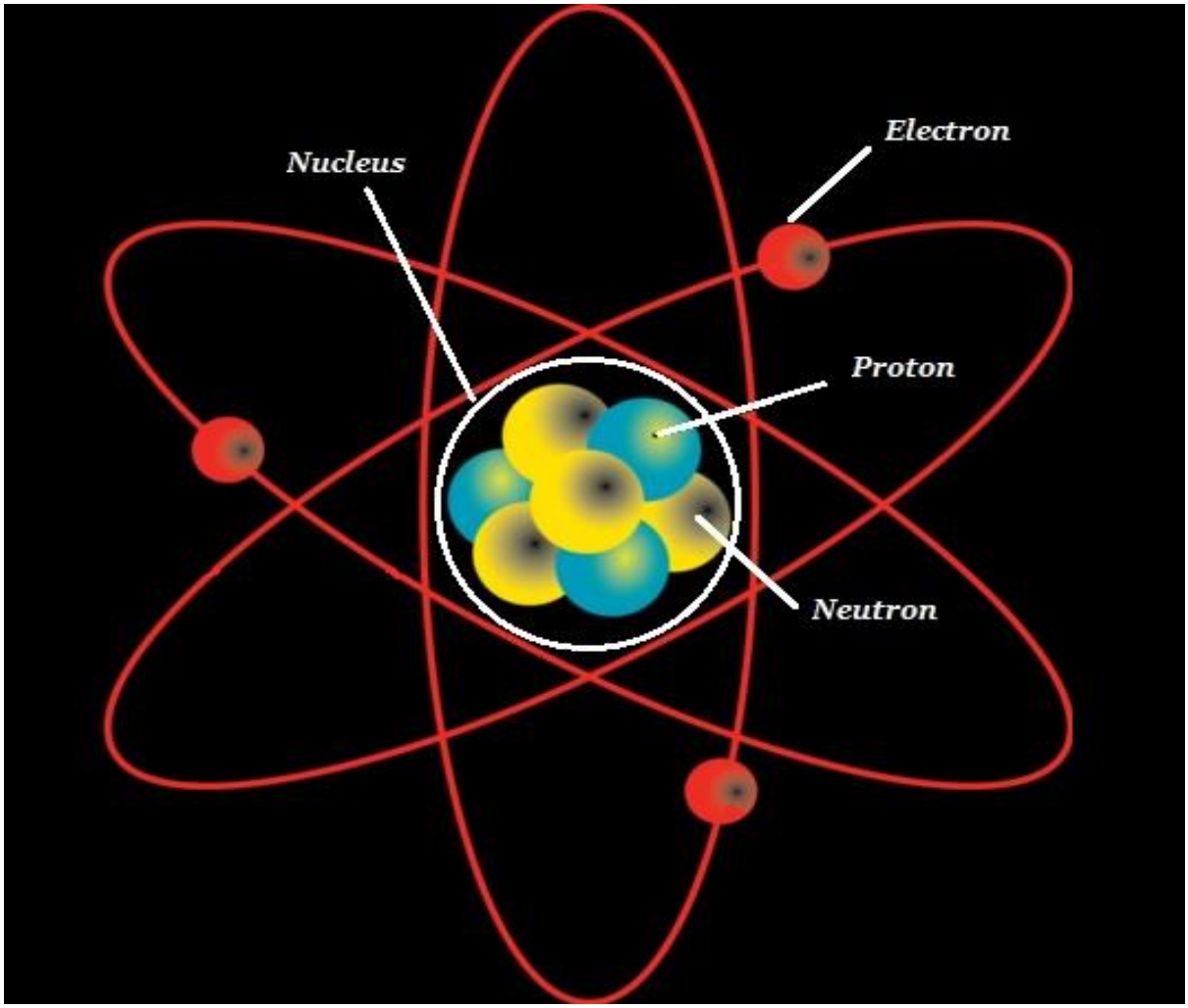
- The atom consists of a dense core known as the **atomic nucleus** and it is surrounded by a space known as the **electron cloud**.

- The nucleus (of an atom) is composed of **protons** (**+ve charged particles**) and **neutrons** (**neutral or uncharged particles**); collectively, these two are known as **nucleons** (as shown in the image given below).

- A chemical element is a pure form of a substance; it consists of single type of atom.

- The periodic table is the standardized representation of all the available chemical elements.

- A compound is a pure form of a substance; it composed of more than one elements.



A molecule is the smallest indivisible part of a pure chemical substance; molecule has distinctive set of chemical properties (see the image given below).

Molecule

2. BRANCHES OF CHEMISTRY

- The following table illustrates the branches of chemistry:

Branch	Sub-branch	Definition
Physical Chemistry	Physical Chemistry	Study of the physical properties of molecules
	Chemical Kinetics	Study of the rates of chemical reactions
	Electrochemistry	Study of the interaction of atoms, molecules, ions, and electric current (i.e. electron transfer between the electrode and the electrolyte or species)
	Surface chemistry	study of chemical reactions at surfaces (of substances)
	Thermochemistry	Study the relation between the chemical action and the amount of heat absorbed
	Quantum Chemistry	Study of application of quantum mechanics in physical models
	Spectroscopy	Study of spectra of light or radiation
	Photochemistry	study of the chemical effects caused by light
Organic Chemistry	Organic Chemistry	Study of structure, properties, and preparation of the chemical (carbon) compounds (e.g. fuels, plastics, food additives, and drugs)
	Stereochemistry	Study of the relative spatial arrangement of atoms (in molecules)
	Physical organic chemistry	study of structure and reactivity (interrelationship) in organic molecules

	Polymer Chemistry	Study of polymer molecules (composition and creation)
	Organometallic Chemistry	Study of chemicals that contain bonds (especially between a carbon and a metal)
	Medicinal chemistry	Study of designing, developing, and synthesizing the drugs & medicines
Inorganic chemistry	Inorganic chemistry	Study of all materials that are not organic (such as minerals, metals, catalysts, crystal structures, etc.)
	Organometallic Chemistry	Study of chemical compounds containing bonds (especially between carbon and metal)
	Solid-state Chemistry	Study of chemical compounds that contains bonds between carbon and metal
	Nuclear Chemistry	Study of radioactive substances
	Geochemistry	Study of chemical composition the earth (e.g. rocks, minerals & atmosphere)
	Bioinorganic Chemistry	Study of interactions between metal ions and living tissue
	Coordination Chemistry	
Biochemistry	Biochemistry	Study of chemical reaction (and changes) in living beings
	Molecular Biochemistry	Study of Biomolecules along with their functions
	Clinical Biochemistry	Study of chemical changes in living beings, caused by caused by different diseases
	Molecular Biology	Study of the different types of DNA, RNA, and protein biosynthesis (and their relationships)

	Agricultural biochemistry	Study of chemistry of fauna (i.e. plants)
Analytical Chemistry		Study of standardized experimental methods in chemistry (i.e. quantitative determination of chemical properties of a substance)
Astrochemistry		Study of the reactions of chemical elements and molecules found in the universe
Cosmochemistry		Study of the chemical composition of the matters found in the universe
Environmental chemistry		Study of chemical and biochemical phenomena that occur in the environment