
Syllabus in Chemistry – Level III

The gaseous state of matter and gas laws

- 1) Physical characteristics of gases
- 2) Ideal gas law
- 3) Boyle's law
- 4) Charle's law
- 5) Absolute scale of temperature
- 6) Combined gas law equation
- 7) Gay Lussac's law of combining volumes
- 8) Avogadro's law
- 9) Dalton's law of partial pressures
- 10) Graham's law of diffusion

Mole concept and stoichiometry

- 1) Concept of mole
- 2) Avogadro's hypothesis
- 3) Applications of Avogadro's law
- 4) Stoichiometry : limiting reagents
- 5) Composition of compounds: percentage by weight and problems based on it
- 6) Empirical formula and molecular formula
- 7) Calculations on stoichiometry

Electrolysis

- 1) Conduction of electricity
- 2) Types of conductors
- 3) Electrolytes and non-electrolytes
- 4) Electrolytic cell
- 5) Mechanism of electrolysis
- 6) Factors affecting preferential discharge of ions
- 7) Applications of electrolysis: *Electroplating, Anodizing technique, Electro-refining*

Chemical bonding

- 1) Formation of chemical bond: *Types of chemical bonds*
- 2) Formation of electrovalent bond
- 3) Formation of covalent bond
- 4) Co-ordinate bond:
- 5) Polar and non-polar covalent bonds

Metallurgy

- 1) Occurrence of metals: *Elemental and Combined*
- 2) Enrichment of ores: *Methods of concentration*
- 3) Extraction of metals: *Extracting metal - low in activity series, middle in the activity series, top in the activity series*
- 4) Metallurgy of Aluminium: *Serpek's process, Bayer's process, Electrolytic reduction, Hoop's process, Physical and Chemical properties, Alloys, Uses*
- 5) Metallurgy of Iron: *Extraction of Iron, Blast furnace, Pig iron, Wrought iron, Uses*
Steel - Manufacture of steel: Bessemer process, L.D. process, Alloys of iron, Uses

Strength of Solutions

- 1) Solutions : Definition
 - *Types of solutions: solid in gas, gas in liquid, gas in gas, liquid in liquid, solid in solid, liquid in gas, liquid in solid*
- 2) Molecular mass
- 3) Equivalent weight
- 4) Methods of expressing concentration of solution: *Normality: Deduction of normality equation, Problems related to strength of solutions, Molarity: Problems based on molarity, Molality: Definition and problems*

Study of hydrocarbons and some important functional groups

1) Hydrocarbons:

- a) Saturated and unsaturated carbon compounds (alkanes, alkenes and alkynes), reactions of hydrocarbons: addition and substitution
- b) Chains, Branches and Rings
- c) Homologous series
- d) Nomenclature of carbon compounds
- e) Structure, properties and uses

2) Study of some important functional groups:

Alcohols and Carboxylic acids: properties and reactions

Study of selected inorganic compounds

- 1) **Hydrogen chloride:** preparation, properties (physical and chemical) and uses
- 2) **Ammonia:** preparation, properties(physical and chemical) and uses
- 3) **Nitric acid:** preparation, properties(physical and chemical) and uses
- 4) **Compounds of sulphur:**
 - SO_2 : preparation, properties and uses
 - Sulphuric acid: preparation, properties and uses

H_2S : preparation, properties and us

Syllabus in Biology – Level III

Nervous system- Control and coordination

- a) Need for study, importance in humans,
- b) CNS, ANS, PNS, organs involved and functions of each organ, brain-structure, function, spinal cord- T.S., neurons-structure,
- c) Cranial and spinal nerves, types of controls their path and examples, impulse transmission- stimulus, synaptic complex, action potential

Endocrine system- Chemical control and coordination

- a) Importance in growth and development, what are hormones, their role;
- b) Pituitary, thyroid, parathyroid and adrenal gland- their structure, function; cell receptors, cell signaling;
- c) Imbalancement of hormones- excess and under secretion

Reproduction- Self duplication

- a) Importance in organisms, why to study;
- b) Plants and animals- types of reproduction and examples; human reproduction- organs structure and function, hormones,
- c) Gametogenesis, fertilization, development,
- d) Social and moral issues, birth control mechanism, sex linked diseases;
- e) Case study- twins

Sensory organs

- a) Role of senses, importance of response to senses,
- b) Sensory organs- skin, eye, ear, tongue, nose, their structure and function, related diseases and treatments

Genetics - Heredity and evolution

- a) Classical genetics: Mendel's experiments, laws of heredity, various crosses and their offsprings and ratios
- b) Evolution: origin of species, tree diagram of life, tabular form for Era, period, age on earth in relation to organisms and climate. Charles Darwin and his theory. contribution of Alfred Wallace,
- c) Modern genetics: mutations, their causes, effects, importance in evolution

Applied biology II

- a) Environmental issues - Natural resources, their pollution and conservation
- b) Demographic study - Population- overpopulation, drawbacks, controlling measures
- c) Role of Biotechnology- DNA as genetic material, structure, protein synthesis, replication
 - i. Application in industry, agriculture, medicine, research, bio-engineering, molecular biology, bioinformatics

Syllabus in Physics – Level III**Mechanics:**

- 1) Force of gravity,
- 2) Relation between G and g ,
- 3) Principle of balance,
- 4) Centre of gravity - stability,
- 5) Launching of satellite, Critical or orbital velocity, Radius, period and orbit of satellites, Communication satellite,
- 6) Kepler's laws ,
- 7) Hubble's law

Pressure:

- 1) Pascal's law,
- 2) Law of floatation,
- 3) Manometer,
- 4) Water seeks its own level, its application,
- 5) Here's apparatus,

Light:

- 1) Lenses,
- 2) Refraction of light,
- 3) Refractive index,
- 4) Dispersion of light,
- 5) Spectrum,
- 6) Simple microscope,
- 7) Compound microscope,
- 8) Telescope,
- 9) Total internal reflection and its effects,
- 10) Defects due to lenses,
- 11) Eye and defects of eye,

Electricity and Magnetism:

- 1) Magnetic field due to straight conductor,
- 2) Magnetic field due to current carrying circular coil,
- 3) Electromagnetic induction
- 4) Electricity and its heating, chemical and magnetic effects and their applications,
- 5) Alternating current and direct current, Generators, Dynamo etc.
- 6) Conductors, Insulators, Resistors,
- 7) Resistivity,
- 8) Electrical power, Electrical energy and relation between them,
- 9) Commercial unit - Watt and Joule

Heat:

- 1) Specific heat: Specific heat of gases,
- 2) Heat capacity of substance,
- 3) Water equivalent of substance,
- 4) Latent heat,
- 5) Change of state

Sound:

- 1) Ear: parts and function,
- 2) Characteristics of musical sound,
- 3) Mode of vibration in stretched string,
- 4) Resonance,
- 5) Tuning fork

Astrophysics:

- 1) The Universe
- 2) Origin of the solar system
- 3) Terms: Nebula, Galaxies, stars,
- 4) Big bang theory,
- 5) Black holes,
- 6) Cosmological observations

Modern Physics:

- 1) α , β & γ radiations,
- 2) Properties of α , β & γ radiations,
- 3) Mass Defect,
- 4) Energy mass relationship,
- 5) Binding Energy,
- 6) Fission,
- 7) Radioactive transformation,
- 8) Chain reaction,
- 9) Law of radioactive decay,
- 10) half life time,
- 11) Nuclear Fusion,
- 12) Radioisotopes and their uses.
- 13) Thermionic emission,
- 14) Cathode ray tube,
- 15) Cathode rays and their properties,
- 16) Deflection of cathode rays by electric and magnetic field,
- 17) X-rays, their properties and uses,
- 18) Radiation hazards.