

CLASS X – PHYSICAL SCIENCE 2014-15

1. Heat

- 1.1 Temperature (based on thermal equilibrium), heat
- 1.2 Specific heat capacity
- 1.3 Thermal expansion [solids and liquids only]
- 1.4 Methods of mixtures
- 1.5 Evaporation, condensation, humidity, Boiling, Melting, Freezing

2. Chemical Equations and Reactions:

- 2.1 Introduction to Language of Chemistry
- 2.2 Atoms, molecules, Elements, Compounds, Mixtures, Atomic mass, Molecular mass, Gram Atomic mass, Gram molecular mass, Molar & Mole concept.
- 2.3 Some daily life examples of chemical reactions.
- 2.4 Chemical equations – writing chemical equations, skeletal chemical equations, balancing chemical equations, writing symbols of physical states.
- 2.5 Types of Chemical Reactions:
 - 2.5.1 Combination reactions: (Exothermic chemical reactions, Endothermic reactions)
 - 2.5.2 Decomposition reactions: (Thermal, Electrolytic, Photo-chemical reactions- examples only without mentioning names)
 - 2.5.3 Displacement reactions:
 - 2.5.4 Double displacement reactions:
- 2.6 Oxidation and Reduction:
- 2.7 Corrosion and prevention of corrosion
- 2.8 Rancidity

3. Reflection of Light

- 3.1 Theories of light
 - 3.1.1 Fermat principle
- 3.2 Reflection – its laws
- 3.3 Mirrors
 - 3.3.1 Plane mirrors – image formation
 - 3.3.2 Spherical mirrors, convex, concave mirrors
- 3.4 Rules for Ray diagrams by sign laws of reflection
 - 3.4.1 Images formed by spherical mirrors
 - 3.4.2 Formula for spherical mirrors – focal length and sign convention
 - 3.4.3 Application of reflection

4. Acids, Bases and Salts:

- 4.1 Introduction (for Recalling only) to Acids & Bases
- 4.2 Chemical properties of acids & bases
 - 4.2.1 Acids & Bases in laboratory – Indicators
 - 4.2.2 Reaction of Acids & Bases with Metals
 - 4.2.3 Reaction of Acids & Bases with each other (Neutralization)
 - 4.2.4 Reaction of Acids & Bases with Metal Carbonates and Metal hydrogen carbonates
 - 4.2.5 Reaction of Acids & Bases with Metallic oxides with acids
 - 4.2.6 Reaction of Acids & Bases with Non-Metallic oxides with bases
- 4.3 What do acids have in common? What do bases have in common?
- 4.4 Importance of p^H in everyday life
 - 4.4.1 Sensitive of plants and animals to p^H
 - 4.4.2 p^H of soils, p^H in digestive system, p^H tooth decay
- 4.5 Self defense by animals and plants through chemical warfare
- 4.6 Some naturally occurring acids
- 4.7 Salts
 - 4.7.1 Nature of salts
 - 4.7.2 p^H Of salts
 - 4.7.3 Sources of common salt
 - 4.7.4 Common salt – a raw material for other chemicals (NaOH, Bleaching powder, baking soda, washing soda, and their uses)
 - 4.7.5 NaOH, Bleaching powder, Baking soda, $NaHCO_3$ uses washing soda and its uses
 - 4.7.6 Salt crystals – water of crystallization eg: $CuSO_4 \cdot 5H_2O$, Plaster of Paris
 - 4.7.7 Plaster of Paris

5. Refraction of light at plane surface

- 5.1 Refraction and its laws
- 5.2 Refractive index
- 5.3 Relative refractive index
 - 5.3.1 Snells law
- 5.4 Total internal reflection and its applications (Mirages)
- 5.5 Application of total internal reflection
- 5.6 Reflection through a glass slab
 - 5.6.1 Refraction through a thin slab

6. Refraction of light at curved surface

- 6.1 Refraction of light through lenses and prisms by using Fermat principle
 - 6.1.1 Image formation

- 6.2 Lenses
- 6.3 Rules for Ray diagram
- 6.4 Images formed by the lenses
- 6.5 Formula for derived for thin lenses
- 6.5.1 Applications

7. Human eye and colourful world

- 7.1 Least distance of distinct vision
- 7.2 Structure of human Eye
- 7.3 Common defects of vision - Myopia, Hypermetropia, presbyopia
- 7.4 Prism
- 7.5 Dispersion
- 7.5.1 Rainbow
- 7.6 Scattering of light

8. Structure of atom

- 8.1 Electro magnetic spectrum
- 8.2 Atomic spectrum
- 8.3 Planck's theory/ Einstein's theory
- 8.3.2 Bohr's theory
- 8.4 Hiesenberg Uncertainty Principle – functions
- 8.4.1 Probability functions – probability diagrams - orbitals
- 8.5 Quantum numbers: (no mathematical derivations)
- 8.6 Main shells, Sub-shells and orbitals in different sub-shells
- 8.7 Electronic Configuration of elements in their atoms
- 8.8 „ l^x rule, Energies of electronic energy levels (n+l) rule ; Aufbau Principal, Paulis principal, Hund's Rule of maximum multiplicity, Stable configurations.

9. Classification of Elements:

- 9.1 Need for arrangement of elements in an organized manner
- 9.1.1 Historical background of classification of elements
- 9.2 Doberieners Triads
- 9.3 Newland's law of Octaves
- 9.4 Mendeleev's Periodic Table (Achievements & Limitations)
- 9.5 Modern Periodic Table.
- 9.5.1 Position of Elements in Modern Periodic Table
- 9.5.2 Trends in Modern Periodic Table (Valency, Atomic size, Ionization Energy, Electro-negativity, Metallic & Non-metallic properties)

10. Chemical Bonding:

- 10.1 Chemical bond definition (brief explanation)
- 10.2 Electronic theory of Valence by Lewis and Kossel
 - 10.2.1 Octet Rule
- 10.3 Ionic and Covalent bonds: examples with Lewis Dot formulae
- 10.4 Shapes and bond lengths in molecules
- 10.5 Valence bond theory – examples like H_2 , Cl_2 , H_2O , BF_3 , CH_4 , NH_3 , C_2H_6 , C_2H_4 , C_2H_2 etc
- 10.6 Hybridisation and explanation of H_2O , BF_3 , CH_4 , NH_3 etc., molecules
- 10.7 Properties of Ionic and Covalent Compounds

11. Electricity

- 11.1 Electric charge
 - 11.1.1 Electric force
 - 11.1.2 Electric field
 - 11.1.3 Electric potential, potential difference
- 11.2 EMF
- 11.3 Electric current
- 11.4 Ohm's law, resistance, specific resistance, factors influencing resistance, electric shock
 - 11.4.1 Kirchoff's Laws
- 11.5 Series and parallel connection of resistances
- 11.6 Heating effect of electric current, safety fuses
- 11.7 Electric power

12. Magnetic effects of electric current

- 12.1 Magnetic field – field lines
- 12.2 Magnetic field due to currents
 - 12.2.1 Due to current carrying wire
 - 12.2.2 Due to circular loop
- 12.3 Solenoid
- 12.4 Magnetic force on moving charged particle and long straight conductors
 - 12.4.1 Fleming's left hand rule
- 12.5 Electric motor
- 12.6 Electromagnetic induction – Faraday's law (including magnetic flux)
- 12.7 Generators and Alternating Currents
- 12.8 Latent heat; changes of phases, condensation, fog and cloud, boiling, melting

13. Metallurgy:

- 13.1 Occurance of Metals
- 13.2 Extractions of metals – activity series and related metallurgy, flow chart of steps involved in the extraction of metals from ore.
- 13.3 Enrichment of ores
- 13.4 Extracting metals low in the activity series
- 13.5 Extracting metal in the middle of the activity series
- 13.6 Extracting metal in the top of the activity series
- 13.7 Refining metals
- 13.7.1 Electrolytic refining
- 13.8 Corrosion – Prevention of Corrosion

14. Carbon and its compounds:

- 14.1 Introduction
- 14.2 Bonding in Carbon including Hybridization
- 14.3 Allotropes of Carbon (Diamond, Graphite and C₆₀)
- 14.4 Versatile nature of carbon
 - 14.4.1 Catenation and tetravalency
 - 14.4.2 Chains, branches and rings
- 14.5 Saturated and Unsaturated carbon compounds
 - 14.5.1 Bonding of carbon with other elements
- 14.6 Functional groups in carbon compounds (alcohols, ketones, aldehydes, halo and esters)
- 14.7 Homologous series (Alkanes, Alkenes and Alkynes)
- 14.8 Nomenclature of Carbon compounds
- 14.9 Chemical properties of carbon compounds
 - 14.9.1 Combustion (Blue and Sooty flame observed in carbon compounds, exothermic)
 - 14.9.2 Oxidation (Alcohol to Acids)
 - 14.9.3 Addition reaction
 - 14.9.4 Substitution reaction
- 14.10 Important carbon compounds
 - 14.10.1 Ethanol
 - 14.10.2 Ethanoic acid
 - 14.10.3 Properties of Ethanol – General properties, reaction of ethanol with sodium, reaction with hot concentrated sulphuric acid.
 - 14.10.4 Properties of Ethanoic acid – General properties, Esterification reaction, Reaction with a base, sodium hydroxide, sodium carbonate and sodium hydrogen carbonate
- 14.11 Soaps – Saponification, Micelles.