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5. Kinetic theory of gases:

assumptions of kinetic theory of gasses, Derivation of the pressure of an ideal gas, Deduce Boyle's law, Charles's law and Avogadro's law from kinetic theory, Maxwell's velocity & speed distribution (Graph & interpretation without derivation), Definition & expressions for rms, mean & most-probable velocity. Degrees of freedom-Ideal gas. Principle of equipartition of energy, ratio of specific heat capacity for mono-atomic, di-atomic and polyatomic gas. Mean free path (Derivation).

Transport phenomenon – derivation of coefficient of viscosity & thermal conductivity.

(9 hrs)

6. Thermodynamics:

Zeroth law, Concept of internal energy, First law of thermodynamics, Different types of thermodynamic processes – isothermal, adiabatic, isobaric and isochoric. Derivation of $PV^\gamma = \text{constant}$. Work done during isothermal, adiabatic, isobaric and isochoric. Carnot cycle, Carnot engine – efficiency. Clausius – Clayperon's equation, Carnot's theorem (No proof, only statement and explanation). Concept of absolute zero, Entropy & second law of thermodynamics. Principle of entropy in solving problems (No derivations), Statement of Clausius inequality, Third law of thermodynamics, T-S diagram.

(8 hrs)

Self Study: Reversibility – refrigerator, coefficient of performance. Use of T-S diagram to find the efficiency of Carnot cycle.

(2 hrs)

7. Thermodynamic potentials:

Internal energy, enthalpy, Helmholtz free energy, Gibbs free energy & their significance, Maxwell's thermodynamic relations from thermodynamic potentials & their significance. Application of Maxwell's thermodynamic relation – nature of variation of internal energy with volume, difference between the specific heat capacities for ideal gases & real gases.

(5 hrs)

8. Real gasses & Liquefaction of gases:

Andrew's isothermal curves for real gases, Vander Waals' equation critical constants (Definition and derivation). Detail study of Joule Thomson effect.

(4 hrs)

Self Study: Difference between Joule Thomson expansion & adiabatic expansion, adiabatic de-magnetization.

(2 hrs)

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