

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Chemistry and Biochemistry - NOC: Concepts of Chemistry for Engineering

Subject Co-ordinator - Prof. Anindya Datta

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to quantum theory  
Lecture 2 - Schrodinger's theory  
Lecture 3 - Laws of quantum mechanics  
Lecture 4 - Wave functions  
Lecture 5 - Quantum mechanics of a free particle  
Lecture 6 - Particle in 1D box  
Lecture 7 - Particle in 2D box  
Lecture 8 - Spherical polar coordinates and angular momentum  
Lecture 9 - Developing Hydrogen atom orbitals - 1  
Lecture 10 - Developing Hydrogen atom orbitals - 2  
Lecture 11 - Developing Hydrogen atom orbitals - 3  
Lecture 12 - Visualizing molecular orbitals  
Lecture 13 - Molecular orbital theory 1: Introduction  
Lecture 14 - Molecular orbital theory 2: Diatomic molecules  
Lecture 15 - Molecular orbital theory 3: Homo-diatomic molecules - I  
Lecture 16 - Molecular orbital theory 4: Homo-diatomic molecules - II  
Lecture 17 - Molecular orbital theory 5: Hetero-diatomic molecules  
Lecture 18 - Molecular orbital theory 6: Polyatomic molecules  
Lecture 19 - Molecular orbital theory 7: Ethylene (Introduction to Huckel's theory) - I  
Lecture 20 - Molecular orbital theory 8: Ethylene (Introduction to Huckel's theory) - II  
Lecture 21 - Molecular orbital theory 9: Butadiene - I  
Lecture 22 - Molecular orbital theory 9: Butadiene - II  
Lecture 23 - Concept of effective nuclear charge  
Lecture 24 - Electronic configuration of elements  
Lecture 25 - Properties of Elements (Size, IE, EA and EN)  
Lecture 26 - Polarizability  
Lecture 27 - Hard soft acid base  
Lecture 28 - Predicting molecular structures: VSEPR theory  
Lecture 29 - Coordination Chemistry: 18 electron rule and VBT

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- Lecture 30 - Crystal Field Theory: Octahedral Complex
- Lecture 31 - Crystal Field Theory: Tetrahedral Complex
- Lecture 32 - Crystal Field Theory: Octahedral vs. Tetrahedral Complex
- Lecture 33 - Application of CFSE: Spinel and J-T Distortion
- Lecture 34 - Introduction to Molecular Magnetism
- Lecture 35 - Problem Solving Approach
- Lecture 36 - Magnetism
- Lecture 37 - Spectroscopic Term Symbol
- Lecture 38 - Magnetic States of Matter: Paramagnetic, Ferro and Antiferromagnetic
- Lecture 39 - Band structures of solid materials
- Lecture 40 - Density of states and doping in semiconductors
- Lecture 41 - Introduction to molecular spectroscopy
- Lecture 42 - Rotational spectroscopy
- Lecture 43 - Vibrational spectroscopy
- Lecture 44 - Electronic Spectroscopy - I
- Lecture 45 - Electronic Spectroscopy - II
- Lecture 46 - Electronic Spectroscopy - III
- Lecture 47 - Fluorescence Spectroscopy
- Lecture 48 - Fundamentals of NMR spectroscopy and MRI
- Lecture 49 - Surface characterization techniques
- Lecture 50 - Introduction to thermodynamics: Work, heat and energy
- Lecture 51 - First law of thermodynamics: Diathermic and adiabatic systems, exothermic and endothermic processes
- Lecture 52 - Enthalpy, Hess's law
- Lecture 53 - Second law of thermodynamics: Entropy and third law of thermodynamics
- Lecture 54 - Helmholtz and Gibbs free energies, Concept of spontaneity
- Lecture 55 - Electrochemical equilibrium, Nernst equation
- Lecture 56 - Acid base and solubility equilibria
- Lecture 57 - Corrosion
- Lecture 58 - Extraction of metals
- Lecture 59 - Ellingham Diagram
- Lecture 60 - Problems From Thermodynamics
- Lecture 61 - Intermolecular forces: Electrostatic and Ion-Dipole Interaction
- Lecture 62 - Intermolecular forces: Dipole-dipole, hydrogen bonding
- Lecture 63 - Real gases - Part 1
- Lecture 64 - Real gases - Part 2
- Lecture 65 - Introduction to Potential Energy Surfaces
- Lecture 66 - Potential energy surface of H<sub>3</sub> system
- Lecture 67 - Salient features of H<sub>3</sub> potential energy surface
- Lecture 68 - Potential Energy Surfaces of HCN and H<sub>2</sub>F system

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- Lecture 69 - Representation of three dimensional structures
- Lecture 70 - Structural isomers and stereoisomers
- Lecture 71 - Configurations, Symmetry and Chirality
- Lecture 72 - Enantiomers and Diastereomers
- Lecture 73 - Optical activity, Conformational analysis, and absolute configuration
- Lecture 74 - Substitution reactions
- Lecture 75 - Elimination reactions
- Lecture 76 - Addition, Oxidation and Reduction reactions
- Lecture 77 - Synthesis of a drug molecule