



In Fascinating Chemistry, you will learn the four ways that atoms bond to each other to create molecules, and how each bond helps determine the properties of the resulting molecule. You will learn how these special molecular properties explain our everyday world from water freezing to nuclear energy to food to metals to weather, and more.

Lesson 1: Intramolecular Bonding

- The Periodic Table of Elements
- Bohr Model of the Atom
- Electrons, Protons, Neutrons, Nucleus
- The Strong Force
- Intramolecular Bond

Lesson 2: The Ionic Bond

- Law of Entropy
- How Ionic bonds form molecules
- Reaching a lower energy level
- Polarity
- Ionic bonds
- Pauling's Electronegativity Chart
- Atomic Numbers

Lesson 3: The Covalent Bond

- Covalent Bonds
- Gases
- van der Waals forces

Lesson 4: The Polar Covalent Bond

- Giving away electrons
- Polar covalent bonds
- Intramolecular bonds hold atoms together.
- Intermolecular bonds hold molecules together.
- Polarity of a molecule
- Dipoles

Lesson 5: The Metallic Bond, Part 1

- The Metallic Bond
- Metals in the Periodic Table
- Transition metals
- Electron shells
- Block groups of the Periodic Table
- Electron configuration

Lesson 6: The Metallic Bond, Part 2

- Molecular movement in a metal
- Metallic strength
- Hard or soft?
- Temperature and translational movement
- Heat Conduction
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Lesson 7: Heat

- Sensing cold
- Hypothermia
- Heat insulation
- The Leidenfrost Effect
- States of water
- Heat capacity
- Latent heat of fusion
- Vaporization
- Steam

Lesson 8: Air Pressure

- The boiling point
- Air pressure
- Barometer
- The strength of air pressure
- Measuring altitude
- Temperature and pressure

Lesson 9: Properties of Water

- Oil and water
- Micelles and soap
- Viscosity
- Surface tension
- Density
- Displacing water
- Salt water versus fresh water

Lesson 10: The Mole

- Comparing equal numbers of molecules
- Lower the freezing point
- Weighted average
- Converting grams to moles
- Converting moles to molecules
- Converting moles to grams
- Percentage weight
- Empirical formula vs. actual formula

Lesson 11: Gases

- Coulomb's Law
- Kinetic energy
- Ideal Gas Law
- Electrolysis
- Concentration vs. density
- Standard temperature and pressure (STP)
- Partial pressure of gas

Lesson 12: Solutions

- Molarity
- Molality
- Mixtures
- Freezing point depression
- Colligative property
- Phase diagram
- Boiling point elevation
- Acids and bases
- Types of acids
- Neutralization of acids and bases
- Calculating pH

Lesson 13: Chemical Reactions

- Activation energy
- Catalysts
- Balancing equations
- Stoichiometry
- Coefficients
- Equilibrium state
- LeChatelier's principle
- Phase diagram
- Equilibrium constant
- Solubility product constant

Lesson 14: Orbitals

- Subshells
- Slots within subshells
- Energy levels within slots
- Probability clouds
- Aufbau Principle
- Hund's Rule
- Pauli Exclusion Principle
- Ionization energy
- Lewis Diagrams
- Hybrid bonds
- VSEPR (Valence Shell Electron Pair Repulsion)
- Molecular shapes

Lesson 15: Molecular Geometry

- Lewis Dot Diagrams
- Lewis Dot Diagram Predictions
- Filling the Valence Shell
- Formal Charges
- Forming sp³ Hybrid Bonds
- Carbon sp² Hybrid Orbitals Current
- Sigma and Pi bonds
- Nitrogen sp³ Hybrid Orbitals
- Oxygen sp³ Hybrid Orbitals
- Beryllium difluoride
- Boron trifluoride
- VSEPR
- Molecular shapes

- Diamonds
- Isomers

Lesson 16: Electrochemistry

- Oxidation State
- Redox
- Voltage Cells
- Reduction Potential
- Calculating Potentials
- Voltage
- Current
- Car Battery
- Electroplating
- Aluminum Oxide
- Iron Rust
- Fuel Cells

Lesson 17: Polymers

- Formaldehyde, Phenol, and Bakelite
- Ethylene and Polyethylene
- Strengthening Polyethylene
- Natural Polymers
- Nylon
- Rubber

Lesson 18: The Nucleus

- Solar energy
- The Strong Force
- Neutrons
- Making helium
- Making heavy elements
- Binding energy
- The Sun's fuel

Final Problems