Topic : Chemical Bonding

Date:

Cue words	Notes
What is a chemical bond?	• An electrostatic force holding atoms together in molecules or solids. • Forms to lower overall potential energy
What are the major types of bonding?	**Ionic** - Transfer of electrons (metal → nonmetal) - Creates cations/anions; attracted by opposite charges **Covalent** - Sharing of electron pairs (nonmetal–nonmetal) - Can be single, double, triple bonds **Metallic** - “Sea” of delocalized electrons around metal cations - Explains conductivity, malleability

Summary

Cornell notes

Topic : Chemical Bonding

Date:

Cue words	Notes
How does electronegativity influence bonds?	**Coordinate (dative) covalent** - One atom donates both electrons in a bond **Electronegativity** (EN): ability to attract bonding electrons • $\Delta EN < 0.5 \rightarrow$ nonpolar covalent • $0.5 \leq \Delta EN \leq 1.7 \rightarrow$ polar covalent • $\Delta EN > 1.7 \rightarrow$ ionic |
How are Lewis structures drawn?	1. Count total valence electrons of all atoms 2. Write skeletal structure (single bonds) 3. Distribute remaining electrons to satisfy octets 4. If needed, form double/triple bonds to eliminate formal charges
How is molecular geometry predicted?	VSEPR theory (Valence Shell Electron Pair Repulsion) • Electron domains (bonding & lone pairs) repel to minimize energy • Geometries: linear, trigonal planar, tetrahedral, trigonal bipyramidal, octahedral, etc. |

Summary

Cornell notes

Topic : Chemical Bonding

Date:

Cue words	Notes
What are bond energy & bond length?	• **Bond energy:** energy required to break 1 mol of bonds (kJ/mol) • **Bond length:** distance between nuclei at minimum potential energy (pm or Å) • Stronger bonds = higher energy, shorter length
How do bonding types affect properties?	• Ionic compounds: high melting/boiling, brittle, conduct when molten/aqueous • Covalent compounds: low–moderate melting/boiling, poor conductors • Metals: good electrical/thermal conductivity, malleable, ductile

Summary

Chemical bonds arise from interactions between electrons and nuclei to achieve lower energy states. The three primary bond types (ionic, covalent, and metallic) differ in electron distribution, leading to distinct physical and chemical properties. Key concepts—electronegativity, Lewis structures, VSEPR theory, bond energies, and bond lengths—provide a framework for predicting molecular shapes, bond strengths, and material behaviors.