

CHAPTER HIGHLIGHTS

Introduction to Chemical Bonding

Vocabulary

chemical bond
ionic bonding
covalent bonding
nonpolar-covalent bond
polar
polar-covalent bond

- Most atoms are chemically bonded to other atoms. The three major types of chemical bonding are ionic, covalent, and metallic.
- In general, atoms of metals bond ionically with atoms of nonmetals, atoms of metals bond metallically with each other, and atoms of nonmetals bond covalently with each other.

Covalent Bonding and Molecular Compounds

Vocabulary

molecule	Lewis structure
molecular compound	structural formula
chemical formula	single bond
molecular formula	multiple bond
bond energy	resonance
electron-dot notation	

- Atoms in molecules are joined by covalent bonds. In a covalent bond, two atoms share one or more pairs of electrons.
- The octet rule states that many chemical compounds tend to form bonds so that each atom shares or has eight electrons in its highest occupied energy level.
- Bonding within many molecules and ions can be indicated by a Lewis structure. Molecules or ions that cannot be correctly represented by a single Lewis structure are represented by resonance structures.

Ionic Bonding and Ionic Compounds

Vocabulary

ionic compound
formula unit
lattice energy
polyatomic ion

- An ionic compound is a three-dimensional network of positive and negative ions mutually attracted to one another.
- Ionic compounds tend to be harder and more brittle and to have higher boiling points than materials containing only covalently bonded atoms.

Metallic Bonding

Vocabulary

metallic bonding
malleability
ductility

- The “electron sea” formed in metallic bonding gives metals their properties of high electrical and thermal conductivity, malleability, ductility, and luster.

Molecular Geometry

Vocabulary

VSEPR theory
hybridization
hybrid orbitals
dipole
hydrogen bonding
London dispersion forces

- VSEPR theory is used to predict the shapes of molecules based on the fact that electron pairs strongly repel each other.
- Hybridization theory is used to predict the shapes of molecules based on the fact that orbitals within an atom can mix to form orbitals of equal energy.
- Intermolecular forces include dipole-dipole forces and London dispersion forces. Hydrogen bonding is a special case of dipole-dipole forces.