

Unit 7 • How Do Atoms Stick Together?

STUDY LIST

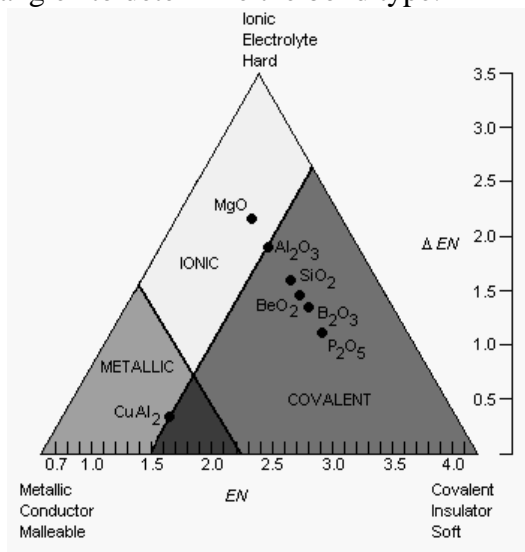
What Kinds of Bonds Are There?

I can...

- name the three kinds of bonds: ionic, covalent, and metallic
- describe each kind of bonding:
 - covalent—they share e⁻'s between two atoms
 - ionic—they trade e⁻'s (+ ion loses e⁻'s while – ion gains e⁻'s) and then they attract each other.
 - metallic—they share e⁻'s among multiple atoms
- state the kind of bond that will form between any two atoms

ionic	metallic	covalent
metal/nonmetal	metal/metal	nonmetal/nonmetal

- use the electronegativity values of any two atoms to determine the *average* electronegativity (\overline{EN}) and the *difference* in electronegativity (ΔEN) and place the bond correctly on the “bond type triangle” to determine the bond type.



What Substances Use These Bonds?

I can...

- give examples of the four kinds of substances:

molecular	CH ₄ , CO ₂ , H ₂ O, C ₂ H ₅ OH
metallic	Au, Ag, Ni, Zn, Cu, brass, bronze
ionic	NaCl, K ₂ SO ₄ , Al ₂ S ₃ , NaOH
network	C _(graphite) , C _(diamond) , SiO ₂ , SiC

- state that all solids have a “crystal lattice” and can state what makes up the points of the crystal lattice for each type of substance.

metallic bond	covalent bond	ionic bond
metals	molecules <u>or</u> network solids	ionic solids (salts)
+ ions in a “sea of e ⁻ 's”	nonmetal atoms	alternating + and – ions

- state the properties of a metal (malleable, ductile, shiny, good conductor of heat & electricity) and explain them in terms of metallic bonding.
- state the properties of an ionic solid [brittle, cubic, good conductor of electricity as (l) or (aq)] and explain them in terms of ionic bonding.
- state the properties of a network solid (very hard, high MP & BP, good insulator except graphite which conducts electricity) and explain them in terms of covalent bonding.

How Do We Symbolize These Bonds?

I can...

- write the Lewis symbol for any element or ion.
- show a covalent bond as a pair of electrons being shared between two atoms. (H:H)
- draw the Lewis structure for a simple molecule with a single, double, or triple bond.
- recognize a Lewis structure that has the correct number of valence electrons and follows the “octet rule”.

Why Don't Oil and Water Mix?

I can...

- use the operational definition of “attraction to a charged balloon” to determine whether a substance is polar or non-polar.
- explain why water is polar (has a positive and a negative end) using the ideas of “bond dipole,” bent shape, and VSEPR.
- draw water molecules to show how they attract each other with “hydrogen bonding”.