Bonding

Unit: Nomenclature & Formulas

NGSS Standards/MA Curriculum Frameworks (2016): HS-PS2-6

Mastery Objective(s): (Students will be able to…)

- Explain how atoms bond together to form compounds.
- Identify different types of chemical bonds.

Success Criteria:

- Explanations account for sharing or transfer of electrons.

Tier 2 Vocabulary: bond

Language Objectives:

- Explain what happens with electrons in order to form chemical bonds.

Notes:

bonding: any joining together of atoms or molecules

chemical bond or intramolecular bond: a strong bond between atoms or individual ions, resulting from the sharing or transfer of electrons

intermolecular bond: a weak bond between molecules or ions, which holds the molecules of a liquid or solid together. (We will study these in more detail later in the section on "Intermolecular Forces" on page 305.)

ion: an atom or group of atoms that has a charge, because it has either gained or lost electrons.

Use this space for summary and/or additional notes:

Types of Chemical Bonds

ionic bond: when a positive ion and a negative ion are held together by the electrical attraction of their charges.

- ionic bonds occur between ions, usually between a metal ion and a non-metal ion.
- the positive ion (cation) is always either the ion of a metal or a positive polyatomic ion.
- the negative ion (anion) is always either the ion of a nonmetal or a negative polyatomic ion.
- the difference between the electronegativity of the nonmetal and the electronegativity of the metal ($\Delta\chi$) is usually ≥ 1.7. (This will be addressed further in the section on "Intermolecular Forces" on page 305.)

covalent bond: when two atoms form a bond by sharing ("co-") their valence ("-valent") electrons.

- covalent bonds occur only between non-metals
- the electronegativity difference ($\Delta\chi$) between the two nonmetals is usually < 1.7

metallic bond: when atoms in a metal form a network of positive ions and loosely held electrons.

- metallic bonds, as the name suggests, occur only between metals
- metallic bonds are often described as a "sea of electrons" because the valence electrons can move easily from one atom to another. This is how metals conduct electricity—electricity is simply the flow of electrons.

Use this space for summary and/or additional notes: