

Chapter 18: Elements and Their Properties

Section 2: Types of Bonds

Atoms: smallest particle of an element that retains the element's properties

- Protons = electrons
- Atoms can gain or lose its electrons to gain stability
- Once an atom loses or gains an electron it becomes an ion

Ion: a charged particle that has either more or less electrons than protons

- When an atom loses electrons = it becomes positively charged
 - called a *cation*
 - Draw Sodium atom vs. Sodium ion

- When an atom gains electrons = it becomes negatively charged
 - called an *anion*
 - Draw Chlorine atom vs. Chlorine ion

- The oppositely charged ions are attracted to each other and are held together like a magnet sticks to a fridge.
- The charges of the ions are written as superscripts on the element's symbol.
 - Neutral atoms don't have a superscript
 - Ions have a superscript with its charge

Ionic bond: the force of attraction between the opposite charges of the ions in an ionic compound

- The number of positive charges must equal the number of negative charges in order to form a compound with a neutral charge
- Formed between metals and nonmetals
- Another example: MgCl_2

- CaO

Covalent bond: the attraction the forms between atoms when they share electrons

- Formed between 2 nonmetals

- **Molecule:** the neutral substance that forms because of electron sharing
- One shared electron comes from each atom in the bond
 - Single bond has 2 shared electrons
 - Double bond has 4 shared electrons
 - Triple bond has 6 shared electrons
- The magic number 8 ve (or 2 ve for smaller atoms) is still an important rule
- Draw Water (H₂O) and Methane (CH₄)

- Equal and unequal sharing of electrons
 - **nonpolar bond:** a covalent bond in which electrons are shared equally by both atoms
 - **polar bond:** a covalent bond in which electrons are shared unequally
 - The atoms have partially positive and negative symbols
 - One atom tends to have a stronger attraction for the electrons
 - Think of a tug-of-war
 - Molecular geometry helps determine whether the molecule is polar or nonpolar