Matter, Atoms, Compounds

- Have properties between those of metals and nonmetals
  - Elements in a group have similar chemical properties
  - Elements in a period have different chemical properties
  - There is a gradation in properties from left to right and top to bottom
- Family Names
  - Group 1A - Alkali Metals
  - Group 2A - Alkaline Earth Metals
  - Group 7A - Halogens
  - Group 8A - Noble Gases
  - Group 3A - 6A - are often named for the first element in the group

Compounds: Introduction to Bonding

- Transferring electrons from one element to another to form ionic compounds
- Sharing electrons between atoms of different elements to form covalent compounds
  - These processes generate chemical bonds, the forces that hold the atoms together in a compound
- The Formation of Ionic Compounds
  - Ionic compounds are composed of ions
    - Ions - charged particles that form when an atom gains or loses one or more electrons
    - The simplest type of ionic compound is a binary ion compound
      - Binary ion compound - one composed of two elements
        - Typically forms when a metal reacts with a nonmetal
        - Each metal loses one or more electrons and becomes a cation, a positively charged ion
        - Each nonmetal atom gains one or more of the electrons lost by the metal atom and becomes an anion, a negatively charged ion.
  - A cation or anion derived from a single atom is called a monatomic ion
- The Case of Sodium Chloride
  - All binary ionic compounds are solid arrays of oppositely charged ions
  - The oppositely charged ions attract each other, and the similarly charged ions repel each other
- Coulomb’s Law
  - The strength of the ionic bonding depends to a great extent on the net strength of these attractions and repulsions
  - The energy of attraction (or repulsion) between two particles is directly proportional to the product of the charges and inversely proportional to the distance between them