2.1

Elements combine to form compounds

* Compounds have different properties from the elements that make them
  + Atoms of different elements are held together in compounds by chemical bonds
  + Bonds help determine the properties of a compound
  + Properties of a compound depend on which atoms are in the compound and how those atoms are arranged
* Atoms combine in predictable numbers
  + A given compound always contains atoms of elements in a specific ratio
  + **Chemical formula –** uses chemical symbols to represent the atoms of the elements and their ratios in a chemical compound
  + **Subscript –** a number written to the right of a chemical symbol and slightly below it
  + Different compounds could be composed of atoms of the same elements

2.2

Chemical bonds hold compounds together

* Chemical bonds between atoms involve electrons
  + Chemical bonds are the glue that hold atoms of elements together in a compound
  + Chemical bonds form when the electrons in the electron clouds around two atoms interact
  + How electron clouds interact determine the kind of chemical bond that is formed
* Atoms can transfer electrons
  + Ions typically form in pairs when one atom transfers one or more electrons to another atom
  + **Ionic bonds** – force of attraction between positive and negative ions
    - Electrical forces act in all directions
    - Each ion attracts all other nearby ions with the opposite charge
    - These interactions make ionic compounds very stable and form strong crystals
* Atoms can share electrons
  + **Covalent bond** – a pair of shared electrons between two atoms, neither atom gains or loses an electron, no ions are formed
    - Represented as a line between the two atoms
    - Number of covalent bonds depends on the number of electrons that an atom has available to share
  + **Molecule** – group of atoms held together by covalent bonds
  + **Polar Covalent Bonds** – covalent bond in which the electrons are shared unequally, has two extremes
* Chemical bonds give all materials their structures
  + **Ionic compounds** – have regular crystal structure, shatters with force
  + **Covalent compounds** – exist as individual molecules, have a three dimensional shape called molecular structure
    - **Molecular structure** – influence texture, and interactions between other substances

2.3

Substances’ properties depend on their bonds

* Metals have unique bonds
  + Metal atoms bond by sharing electrons with one another
  + **Metallic bond** – equal sharing of electrons between atoms, allows electrons to move easily among the atoms of the metal
* Ionic and covalent bonds give compounds certain properties
  + Depending on the bonds, it determines how the atoms will interact and behave when combined with other substances
* Bonds can make the same element look different
  + Properties of each form of the element depend on how the atoms are bonded to each other
    - Diamond, graphite, fullerene – all carbon atoms!