

Chapter 17: Elements and Their Properties

Section 1: Metals

Metals: elements that are shiny, malleable, ductile, and good conductors of heat and electricity

- Solids at room temperature
 - Except Mercury (Hg)
- Metallic luster is the shiny property (way light reflects)
- **Malleable:** metal can be hammered or rolled into sheets
- **Ductile:** metal can be drawn into wires
- Suitable for computers, buildings, wiring in homes, and glasses frames
- Found on the left of the stair-step line
- Tend to have 1-3 electrons available for bonding
- Mostly bond with nonmetals
 - Tend to lose those electrons to the nonmetals
 - This causes 1-3 electrons “lost” making the atom now have a charge (called an ion – Chapter 18)
 - This will make the metal have a positive charge because it “lost” a negative electron
- **Metallic bonding:** the positively charged nucleus are surrounded by a sea of electrons
 - This occurs when a metal is “bonded” to itself or to another metal atom

Groups of Metals (label on periodic table)

- **Alkali metals:** Group 1 metals (exclude Hydrogen)
 - Most reactive metals on the periodic table
 - React violently with oxygen and water
 - DO NOT occur naturally in its elemental form

- Softer than most metals
- 1 valence electron in its outer energy level
- Sodium and Potassium are found in many foods and sport drinks. Keep you healthy
- Lithium supports chemical regulations in the brain
- Rb, Cs, Fr are all radioactive

- **Alkaline earth metals:** Group 2 metals
 - Not as reactive as group 1 metals but will react violently with water
 - Not found as free elements in nature
 - 2 valence electrons in its outer energy level
 - Magnesium is good for cars, planes, ladders, and bats
 - Calcium is essential for bone health and used in countertops
 - Barium is used in medical diagnosis in the digestive system
 - Radium is radioactive

- **Transition metals (elements):** Groups 3-12
 - They are called transition because they land between the main group elements (Groups 1-2 and 13-18)
 - Not as reactive as groups 1 and 2
 - Can be found as free elements in nature
 - Many of the known metals = Iron, Nickel, Gold
 - Iron, Cobalt, Nickel are known as the “Iron Triad” as they are the most common magnetic elements and are used in steel
 - Copper, Silver, and Gold were once called the coinage metals
 - US stopped using Gold for coins in 1933

- US stopped using Silver for coins in 1964
- US now uses a mixture of Ni, Zn, and Cu

- Inner Transition metals (elements): bottom two rows
 - located between groups 3 and 4 and in periods 6 and 7
 - located here to save space on the periodic table
 - Lanthanides – first row
 - Atomic numbers 58-71
 - Follow the element Lanthanum
 - Actinides – second row
 - Atomic numbers 90-103
 - Follow the element Actinium
 - All radioactive and unstable
 - Thorium and Uranium are the only 2 metals that are naturally occurring