

## Section 1 Metals

A. Properties of metals

1. Conduct heat and electricity
2. Luster—reflect light well
3. Malleable—can be hammered or rolled into sheets
4. Ductile—can be drawn into wires
5. Ionic bonding—combine with nonmetals by losing electrons
6. Metallic bonding—positively charged metallic ions are surrounded by a cloud of electrons; ions are in sliding layers and electrons are weakly held; readily form ionic bonds with nonmetals

B. The Alkali Metals—softer and more reactive than other metals

1. Highly reactive with oxygen and water; don't occur naturally as elemental forms
2. Combine readily with other elements due to single electron in outer energy level
3. Multiple uses
  - a. Human health—sodium, potassium, and lithium compounds
  - b. Photocells—some depend on rubidium or cesium
  - c. Francium—a radioactive element which breaks down giving off particles and energy

C. The Alkaline Earth Metals—not found naturally in elemental form; two electrons in outer energy level

1. Applications—strontium and magnesium found in fireworks; magnesium in vehicles, ladders, and bats; calcium in statues and countertops
2. Human body—calcium in bones; barium in disease diagnoses; radium formerly used in cancer treatment



- D. **Transition Elements**—they often occur in nature as uncombined elements
1. Typically form colored compounds—chromium found in rubies and emeralds
  2. Iron triad—iron, cobalt, and nickel
    - a. Iron—most widely used of all metals and main ingredient in steel; abundant in Earth's crust
    - b. Cobalt and nickel—used in some steels
    - c. Nickel used to coat other metals
  3. Copper, silver, gold—coinage metals since once were commonly used in coins
    - a. copper—used in electric wiring because it is a superior electricity conductor
    - b. silver—used in photographic film and paper; jewelry
    - c. gold—used in jewelry
  4. Zinc, cadmium, mercury—group 12 on periodic table
    - a. Zinc and cadmium—often used to coat or plate other metals
    - b. Mercury—only room temperature liquid metal; used in thermometers and batteries
- E. The **Inner Transition Metals**—seem disconnected from the rest of periodic table
1. The Lanthanides—include lanthanum, cerium, praseodymium, americium, europium, gadolinium, and terbium
  2. The Actinides—all are radioactive and unstable; uranium is the best known.

**Discussion Question**

Why were copper, silver, and gold so frequently used in coins? They occur naturally in their elemental form and are malleable

END