

**Note-taking  
Worksheet****Elements and Their Properties****Section 1 Metals****A. Properties of \_\_\_\_\_**

1. \_\_\_\_\_ heat and electricity
2. \_\_\_\_\_—reflect light well
3. \_\_\_\_\_—can be hammered or rolled into sheets
4. \_\_\_\_\_—can be drawn into wires
5. \_\_\_\_\_—combine with nonmetals by losing electrons
6. \_\_\_\_\_—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 \_\_\_\_\_ Metals—softer and more reactive than other metals**

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

**C. The \_\_\_\_\_ Metals—not found naturally in elemental form; \_\_\_\_\_ electrons in outer energy level**

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

**D. \_\_\_\_\_ Elements—they often occur in nature as uncombined elements**

1. Typically form colored compounds—\_\_\_\_\_ found in rubies and emeralds

**Note-taking Worksheet** (continued)

2. Iron \_\_\_\_\_—iron, cobalt, and nickel
  - a. \_\_\_\_\_—most widely used of all metals and main ingredient in \_\_\_\_\_; abundant in Earth's crust
  - b. \_\_\_\_\_ and nickel—used in some steels
  - c. \_\_\_\_\_ used to coat other metals
3. Copper, silver, gold—\_\_\_\_\_ metals since once were commonly used in coins
  - a. \_\_\_\_\_—used in electric wiring because it is a superior electricity conductor
  - b. \_\_\_\_\_—used in photographic film and paper; jewelry
  - c. \_\_\_\_\_—used in jewelry
4. Zinc, cadmium, mercury—group \_\_\_\_\_ on periodic table
  - a. Zinc and \_\_\_\_\_—often used to coat or plate other metals
  - b. \_\_\_\_\_—only room temperature liquid metal; used in thermometers and batteries
- E. The \_\_\_\_\_ Metals—seem disconnected from the rest of periodic tables
  1. The \_\_\_\_\_—include \_\_\_\_\_, cerium, praseodymium, americium, europium, gadolinium, and terbium
  2. The \_\_\_\_\_—all are radioactive and \_\_\_\_\_; \_\_\_\_\_ is the best known.

**Section 2 Nonmetals**

- A. Properties of \_\_\_\_\_—usually gases or \_\_\_\_\_ solids at room temperature; are not malleable or \_\_\_\_\_; usually poor \_\_\_\_\_ of heat and electricity; usually not lustrous
  1. \_\_\_\_\_ compounds—form when nonmetals gain \_\_\_\_\_ from metals and become \_\_\_\_\_ ions
  2. \_\_\_\_\_ compounds—form when nonmetals share electrons with other \_\_\_\_\_
- B. \_\_\_\_\_—most common element in universe
  1. A \_\_\_\_\_—two atoms of the same element in \_\_\_\_\_ bond
  2. Highly \_\_\_\_\_ element found mostly on Earth as part of water compound
- C. The \_\_\_\_\_—include bromine, iodine, \_\_\_\_\_, \_\_\_\_\_, and astatine
  1. A \_\_\_\_\_ forms when a halogen gains one electron from a metal.

**Note-taking Worksheet (continued)**

2. Use of halogens
  - a. \_\_\_\_\_—disinfectant and bleach
  - b. \_\_\_\_\_—dyes in cosmetics
  - c. \_\_\_\_\_—hormone regulation
3. \_\_\_\_\_—a solid changes directly into a gas without first becoming a liquid
- D. The \_\_\_\_\_—exist as isolated, stable atoms
  1. \_\_\_\_\_—used in blimps and balloons
  2. Neon, \_\_\_\_\_, and \_\_\_\_\_—used in lights

**Section 3 Mixed Groups**

- A. Properties of \_\_\_\_\_—form ionic and covalent bonds; have some metallic and some nonmetallic properties; partial conduction gives them \_\_\_\_\_ characteristics.
- B. The \_\_\_\_\_—named for the first element in Group 13
  1. \_\_\_\_\_—used in water softening products, antiseptics, and fuels
  2. \_\_\_\_\_—abundant in Earth's crust; used in cans, foil wrap, pans, building materials, and aircraft
- C. The \_\_\_\_\_ Group—four electrons in outer energy level
  1. \_\_\_\_\_—found in coal, oil, natural gas, and foods
  2. Silicon occurs as an **allotrope**—same element with different molecular structures
    - a. \_\_\_\_\_ found in sand, rocks, and soil
    - b. The main component in \_\_\_\_\_, which conduct electricity under certain conditions
  3. \_\_\_\_\_—also used in semiconductors
  4. \_\_\_\_\_—used to coat other metals
  5. \_\_\_\_\_—toxic, so no longer used in paint
  6. Diamonds, graphite, and buckminsterfullerene are all \_\_\_\_\_ of carbon.
- D. The \_\_\_\_\_ Group—five electrons in outer energy level; tend to form covalent bonds
  1. \_\_\_\_\_—used to make nitrates and ammonia
  2. \_\_\_\_\_—used in water softeners, fertilizers, match heads, fine china
  3. \_\_\_\_\_ and \_\_\_\_\_ used with other metals to lower their melting points

**Note-taking Worksheet** (continued)

- E. The \_\_\_\_\_ Group or Group 16
1. \_\_\_\_\_—makes up 20% of air, is used by living things in respiration, and provides protection from Sun's radiation
  2. \_\_\_\_\_—used to form sulfides for pigment in paint
  3. \_\_\_\_\_—used in photocopiers and multivitamins
  4. \_\_\_\_\_ and \_\_\_\_\_ are also oxygen group elements.
- F. \_\_\_\_\_ Elements—scientists create elements not usually found on \_\_\_\_\_; synthetic elements usually disintegrate quickly.
1. Uranium can be made into \_\_\_\_\_ which forms plutonium when it disintegrates.
  2. Plutonium can be changed into \_\_\_\_\_, which is used in \_\_\_\_\_ detectors.
  3. \_\_\_\_\_ **elements** have more than \_\_\_\_\_ protons and are synthetic and unstable.
    - a. The study of synthesized elements helps scientists to understand the \_\_\_\_\_ holding the \_\_\_\_\_ together.
    - b. Element 114 lasted for \_\_\_\_\_ seconds.
    - c. It combined 114 protons with \_\_\_\_\_ neutrons.
    - d. It broke apart due to enormous \_\_\_\_\_ between the protons.