

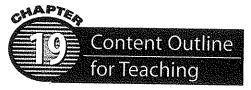
## Elements and Their **Properties**

Underlined words and phrases are to be filled in by students on the Note-taking Worksheet

## **Mixed Groups Section 3**

- A. Properties of metalloids—form ionic and covalent bonds; have some metallic and some nonmetallic properties; partial conduction gives them semiconductor characteristics.
- **B.** The Boron Group—named for the first element in Group 13
  - 1. <u>Boron</u>—used in water softening products, antiseptics, and fuels
  - 2. Aluminum—abundant in Earth's crust; used in cans, foil wrap, pans, building materials, and aircraft
- **C.** The <u>Carbon</u> Group—four electrons in outer energy level
  - 1. <u>Carbon</u>—found in coal, oil, natural gas, and foods
  - 2. Silicon occurs as an allotrope—same element with different molecular structures
    - a. Silicon found in sand, rocks, and soil
    - **b.** The main component in <u>semiconductors</u>, which conduct electricity under certain conditions
  - 3. <u>Germanium</u>—also used in semiconductors
  - **4.** Tin—used to coat other metals
  - 5. <u>Lead</u>—toxic, so no longer used in paint
  - **6.** Diamonds, graphite, and buckminsterfullerene are all <u>allotropes</u> of carbon.
- D. The Nitrogen Group—five electrons in outer energy level; tend to form covalent bonds
  - 1. Nitrogen—used to make nitrates and ammonia
  - 2. Phosphorus—used in water softeners, fertilizers, match heads, fine china
  - 3. Antimony and bismuth used with other metals to lower their melting points
- E. The Oxygen Group or Group 16
  - 1. Oxygen—makes up 20% of air, is used by living things in respiration, and provides protection from the Sun's radiation
  - 2. Sulfur—used to form sulfides for pigment in paint
  - 3. Selenium—used in photocopiers and multivitamins
  - **4.** <u>Tellurium</u> and <u>polonium</u> are also oxygen group elements.





## **Elements and Their Properties (continued)**

- F. <u>Synthetic</u> Elements—scientists create elements not usually found on <u>Earth</u>; synthetic elements usually disintegrate quickly.
  - 1. Uranium can be made into <u>neptunium</u> which forms plutonium when it disintegrates.
  - 2. Plutonium can be changed into americium, which is used in smoke detectors.
  - 3. <u>Transuranium</u> elements have more than <u>92</u> protons and are synthetic and unstable
    - **a.** The study of synthesized elements helps scientists to understand the <u>forces</u> holding the <u>nucleus</u> together.
    - **b.** Element 114 lasted for <u>30</u> seconds.
    - c. It combined 114 protons with 175 neutrons.
    - d. It broke apart due to enormous repulsion between the protons.

## Discussion Question.

Why do scientists create new elements? To understand atomic forces and attempt to find a useful application for them