

FIGURE 14 Various nonmetallic elements: (a) carbon, (b) sulfur, (c) phosphorus, and (d) iodine

Copper: A Typical Metal

Copper has a characteristic reddish color and a metallic luster. It is found naturally in minerals such as chalcopyrite and malachite. Pure copper melts at 1083°C and boils at 2567°C . It can be readily drawn into fine wire, pressed into thin sheets, and formed into tubing. Copper conducts electricity with little loss of energy.

Copper remains unchanged in pure, dry air at room temperature. When heated, it reacts with oxygen in air. It also reacts with sulfur and the elements in Group 17 of the periodic table. The green coating on a piece of weathered copper comes from the reaction of copper with oxygen, carbon dioxide, and sulfur compounds. Copper is an essential mineral in the human diet.

Nonmetals

Many nonmetals are gases at room temperature. These include nitrogen, oxygen, fluorine, and chlorine. One nonmetal, bromine, is a liquid. The solid nonmetals include carbon, phosphorus, selenium, sulfur, and iodine. These solids tend to be brittle rather than malleable and ductile. Some nonmetals are illustrated in **Figure 14**.

Low conductivity can be used to define nonmetals. A **nonmetal** is an element that is a poor conductor of heat and electricity. If you look at **Figure 12**, you will see that there are fewer nonmetals than metals.

Phosphorus: A Typical Nonmetal

Phosphorus is one of five solid nonmetals. Pure phosphorus is known in two common forms. Red phosphorus is a dark red powder that melts at 597°C . White phosphorus is a waxy solid that melts at 44°C . Because it ignites in air at room temperature, white phosphorus is stored under water.

Phosphorus is too reactive to exist in pure form in nature. It is present in huge quantities in phosphate rock, where it is combined with oxygen and calcium. All living things contain phosphorus.

Metalloids

As you look from left to right on the periodic table, you can see that the metalloids are found between the metals and the nonmetals. A **metalloid**

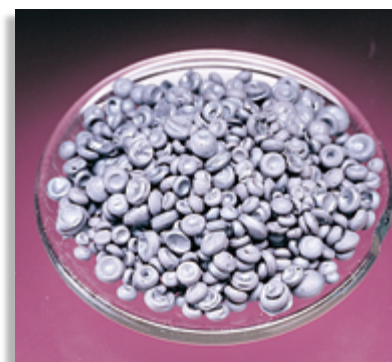


FIGURE 15 Selenium is a non-metal, though it looks metallic.