



4. Chalcopyrite (copper iron sulfide or CuFeS_2)



Chalcopyrite is the most important ore mineral of copper. It loses its metallic luster and tarnishes from a brassy yellow color upon weathering to a dull gray-green color. The streak on an unglazed ceramic plate is greenish black. Copper is used in many industries (read more at [2. Copper](#)). The electrical power industry relies on copper wires to conduct electricity. Copper was formerly used for the US penny coin, but now is only a coating on the penny.

It is often alloyed with other metals to produce harder composites such as brass and bronze. Copper is also widely used in analytical chemistry.

Chalcopyrite is often associated with bornite (Cu_5FeS_4), which is also a mixture of copper, iron, and sulfur. Bornite has a copper-red color on fresh broken surfaces but tarnishes to multiple iridescent colors, earning it the nickname peacock ore.

Activities:

K-1: Do you have any doorknobs or lamps in your home that have a bright, shiny gold-colored finish? This is brass, which is an alloy (mixture) of copper and zinc. Write or draw what you found that is made of brass: _____

1-4: Chalcopyrite crystals are in the tetragonal crystal system, which means that the crystal looks like a square if you look at it from the top and like a rectangle from the side. Draw what is called an “exploded view” of the crystal as a square and a rectangle that share one short side of the rectangle:

5-8: Draw a 3D rectangular prism to represent the chalcopyrite crystal in the tetragonal crystal system. Put the square on top and size the rectangular sides as 1.5 cm wide, 1.5 cm deep, and 5 cm in height.



4. Chalcopyrite continued

9+: The composition of chalcopyrite is CuFeS_2 , bornite is Cu_5FeS_4 , and pyrite, which is often confused with chalcopyrite, is FeS_2 . These minerals are often found associated with each other. Copper is the most valuable element of the three that make up these minerals. Iron and sulfur are typically waste byproducts of mining copper minerals. Answer which of the three minerals would produce the most copper if you mined 100 kg of each and explain how you determined the answer:
