

The Treacherous Mineral

Mineral names are often given to commemorate a famous scientist or locality. Sphalerite (ZnS) however, has a name based on the Greek word for "treacherous." Blende, a German synonym for sphalerite, means "blind" or "deceiving." What is it about this common mineral (which forms very attractive collector specimens) which led its namers to be so negative about it?

The name comes from the tendency of people to misidentify it. It was often mistaken for galena, which was mined for its lead, and sometimes silver, content. Sphalerite yielded neither at the smelter, and, until the nineteenth century, there were few if any uses for the zinc that was present. So, to the old-time miners, the mistaken identity was a costly error. Things changed for sphalerite in the 1850's with the advent of galvanizing. In Wisconsin, many deposits worked for lead suddenly became zinc mines as well, with hundreds of thousands of tons of metal produced. This was also true for deposits elsewhere, notably in the Tristate district and other mid-western deposits, now prized for the beautiful sphalerite crystals found during mining.

So this is a bum rap for poor sphalerite. It is actually a relatively easy mineral to identify, and has a number of very distinctive properties that can be tested with little equipment. Yet, true to form, I find many students misidentifying it with depressing regularity.

First, when well crystallized, its form is distinctive. Sphalerite forms complex crystals that have a generally tetrahedral habit, although many modifying forms commonly occur. A tetrahedron has 4 faces, each one an equilateral triangle. Even with the complex modifications frequently present on sphalerite crystals, the generally triangular outline is usually visible. Few minerals have this crystal habit.

The color of sphalerite is extremely variable, and this is probably part of the identification problem. Though usually some shade of brown to nearly black, red, yellow, green, blue and clear sphalerite is known. The colors represent the effects of chemical impurities, generally iron. The percentage of iron controls how dark the brownish hue is. Chemically pure sphalerite is clear (a variety called cleiophane). Translucent red sphalerite is sometimes called ruby jack.

The streak plate helps even out the color problems. Sphalerite will generally give a pale yellow streak. The hardness of 3-4 on the Mohs' scale,

distinguishes sphalerite from quartz or feldspar. You can scratch sphalerite with a steel nail, but not with a copper penny.

Sphalerite breaks readily along a number of regular cleavage planes. Ideally, there are 6 preferred directions of break (the so-called dodecahedral cleavage). While it is not usually possible to count all 6 directions on any particular specimen, an observer will clearly see this is a mineral with at least 4 cleavages. Few minerals have more than three.

A chemical test is also helpful. When powdered and moistened with weak HCL (muriatic or brick-cleaning acid), sphalerite emits a potent rotten egg odor of sulfur compounds. Kids generally love to do this test. So sphalerite gives many cues to its identity, yet is still viewed as "treacherous." Many minerals for which sphalerite is mistaken, such as calcite, fluorite, siderite or goethite, will never emit sulfurous fumes. Among the sulfur-bearing minerals, few have the color, luster, streak and cleavage of sphalerite. Galena, for which it is most frequently mistaken, is always metallic; always some shade of gray, breaks along 3 sets of cleavages as cubes, and never crystallizes as tetrahedrons. Who could honestly mistake it for sphalerite? Poor sphalerite. Sometimes life ain't fair.

Last fall, I took my mineralogy students to visit the core labs of the proposed Crandon copper-zinc mine in Wisconsin. While viewing a length of core, I pointed out to my students what I thought was an interesting zone of coarse siderite in one of the cores. The mine-site geologist looked at me and said, "Oh, no, that's one of our main ore minerals up here – its sphalerite." Boy was my face red. The treacherous mineral had struck again!

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