Article

Identify Your Mineral Treasures

Part Three: Physical Mineralogy

Picking up where we left off last issue, determining as best as possible the physical characteristics of your recently collected or acquired specimen will help to narrow the field of likely candidates. If you collected the specimen yourself, and did your research beforehand, then you know the location, geologic environment, and mineral suite known from that locale. Not that other species won't be present, but at least you have a solid start. Once you have a list of contenders, the process that follows will help you make a final determination by either eliminating from the list, or confirming identification.

Luster, Diaphaneity, Streak

In this issue the focus will be on the next most conspicuous and closely related characteristics of minerals…*luster, diaphaneity, a*nd *streak.* Together, these three traits reveal valuable clues to the identity of an unknown specimen without resorting to laborious and damaging testing procedures. Naturally, it is counterproductive to mar or potentially destroy a prize in the pursuit of identifying it!

Luster describes the general appearance of a specimen when light is reflected off its surface, and can be divided into two basic types, *metallic* and *non-metallic*. Minerals with a metallic luster, as the word implies, look like…well…metals. Even a young child can comprehend a metallic luster—just hand him a shiny new penny or nickel! Indeed, all native elements that fall under the description of a metal on the periodic table do have a metallic luster. However they also share that quality with other native elements called metalloids, plus such compounds as most sulfides, sulfasalts, some oxides, and even micas under certain circumstances, which may be regarded as having a *submetallic* luster, though there is no sharp line deliniating such.

Common examples of minerals having a metallic luster include such metals as gold, silver, and copper; metalloids as aluminum and silicon; non-metals such as the sulfides galena, pyrite, and chalcopyrite; and some oxides, most notably specular hematite and magnetite. Except for those pesky micas, minerals with a genuine metallic luster are completely opaque to light; no light *at all* passes through the specimen.

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Greenwater Range (center) and Funeral Mtns (background) from Boraxo Mine looking E.

All minerals without a metallic luster have, as the term implies, a non-metallic luster, of which there are numerous descriptions with obvious meanings. In general, the minerals are usually pale colored and transmit light through the specimen (referred to as *diaphanity*) either completely (transparent), only through the thinnest of edges, or any degree in between (translucent).

Those that have an appearance reminiscent of glass are said to have a *vitreous* luster (e.g. quartz, creedite, barite).

XX II 02 D
Quartz

If that glassy luster is also particularly brilliant (to the point of appearing almost metallic due to a high refractive index) and at times somewhat greasy, it is called *adamantine*, typical of diamond and anglesite, respectively.

X 67 D
Anglesite

A distinctly *greasy* (oily) luster can be seen in nepheline, as well as massive "bull" quartz and some sphalerites, though most sphalerite specimens have what is referred to as a *resinous* luster, described from resin (i.e. tree sap).

X 77 D
Nepheline

XXI 56 D
Apophyllite

Similar to greasy, but with an iridescent play of colors, a *pearly* luster is usually observed in minerals with surfaces that are parallel to the cleavage planes, such as the basal plane observed on apophyllite.

Other self-explanitory lusters include *waxy* (common opal, chlorargyrite, gummite), *earthy* (red ocher variety of hematite, limonite), *dull* (priceite, variscite), and *silky,* typical of halotrichite, the fibrous habit of malachite, and minerals that can occur in fine parallel aggregates, such as "satin spar" gypsum, ulexite, and the asbestos variety of serpentine known as chrysotile.

XXII 23 C
Common Opal

IV 19 D
Hematite

IX 35 C
Priceite

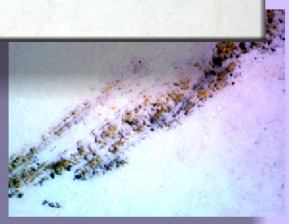
VII 143 D
Malachite

Luster and diaphaneity are immediately obvious characteristics determined either with the naked eye or under a typical 10x hand lens one should always carry into the field. If a small square of plaster is included in the field kit, then the mineral's streak can also be easily determined on the spot.

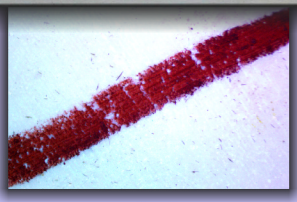
Streak is the color obtained when a sample of a mineral is crushed to a powder; it is important to note that the color of the powder can be distinctly different than the mineral's bulk color. A good example is the sulfide pyrite, which has a golden color, but a black streak! In fact, metallic sulfides in general have a black or dark streak, which distinguishes them from native metallic minerals. By comparison, the streak of non-metallic minerals is either colorless or very light in color.

Streak is particularly useful, for, although a mineral's color can vary considerably, its streak is usually constant. It is best observed when the sample is rubbed across a white, unglazed procelain tile. Since such a tile has a hardness of about 7, minerals of greater hardness will simply scratch the tile and not leave a streak. However, for these minerals, particularly the black ones, it is still possible to observe the streak color by crushing a sample to a fine powder. It will be found that lighter hues show in the powder of many black minerals (those that are not truly black and opaque, but only look that way due to their grain size, impurities, or internal imperfections).

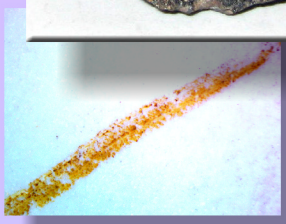
In the field, the quick and reliable streak test can easily differentiate massive specimens that otherwise may look alike, such as hematite (red streak), goethite (brownish yellow streak), pyrolusite (black streak), ilmenite (grayish black streak), and heterogenite (brown streak), thus saving the collector the time and back strain of lugging home mundane and unwanted specimens. While heterogenite would be worth the trouble, goethite likely would not.



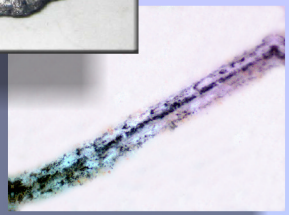
IV 10 D Heterogenite



IV 36 D
Hematite

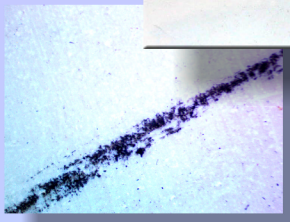


IV 05 D Goethite



IV 77 D
Ilmenite

all specimens from the
G. Miles Lehman Collection



IV 13 C
Pyrolucite

Armed with knowledge and experience, the collector can employ simple techniques and intuition to either recognize mineral specimens directly, or at least eliminate a host of likely contenders. Color, luster, diaphaneity, and streak are useful traits that all minerals present, and are features that do not necessitate destructive techniques to ascertain. A practiced eye can reduce or eliminate entirely the time and often tedious labor required to determine a mineral's identity using more complex chemical and physical methods, providing more time to enjoy rummaging around in the field.