Sedimentary, My Dear Watson

Oh no! There was an accident at the Bakerstreet Mine! Four minecarts, each filled with a different mineral, crashed into each other, hopelessly muddling their contents. (Luckily, no one was hurt.) However, now the miners are really in between a rock and a hard place. Help Sherlock Gnomes and his friend Dr. Watson, the noted geologist, sort out these mixed up minerals.

The Four Mixed-Up Minecarts

Salt

Salt has had a profound impact on the history of man. It has promoted exploration, warfare, conquest, and trade. Salt has been used as basis for government taxation and payment for services. Salt was also used to pay soldiers of the Roman Empire in a payment called "Salarium argemtum." The English word "salary" is derived from this Latin term. In addition to its historical importance, salt is an essential nutrient for the existence of life. Because you lose salt in sweat, tears, and other body functions, you need to eat salt to keep your hydration in check. In a year, you consume approximately 12 pounds of salt.

Gypsum

Gypsum is extensively mined in many parts of the world and consists of 79% calcium sulfate and 21% water. Gypsum is the raw material for making plaster of Paris, which, in the past, was often used to make the inside walls of houses. Plaster of Paris got its name from the gypsum deposit in the Paris Basin in France. Now a material called drywall is typically used in building, but it is still made of gypsum. Plaster of Paris is still used today to make casts for broken bones, though fiberglass casts are also very common.

Gold Ore

Man's quest for gold has been going on since ancient times. Gold has been prized as an ornament, a display of wealth, and as a bartering tool. The search for gold has also played a major role in exploration and discovery, because European explorers were often searching for gold when they first arrived in North and South America. Today gold is still very popular in jewelry-making.

Anthracite Coal

Anthracite coal, or hard coal, is the highest ranking coal. It is an ideal fuel because its high carbon content In the U.S., coal provides over half of the electricity nationwide, meaning that it provides almost as much energy as gas, oil, hydroelectric, and nuclear power provide combined. It is relatively cheap to use coal to produce electricity, so it helps keep costs down as we power the air conditioners, televisions, computers, and so many other things we need electricity to use, and allows it to burn slowly and cleanly (smoke free and odorless), maximizing heat output.

Physical Properties

Most rocks and minerals can be identified by examining their physical properties. Here are some that you can use to identify your samples.

Luster

Luster is determined by the way light is reflected from a rock or mineral. Luster describes how glossy, or shiny, the surface is. The general appearance of the surface, how it reflects light, the scattering of light by tiny, microscopic flaws (called inclusions), and how much light passes through the mineral—these and many other features are responsible for luster. Here are a few examples of luster:

Metallic—The surface is opaque, meaning light does not pass through. It reflects light and looks like a typical metal, such as gold, silver, lead, copper, or aluminum.

Vitreous—The surface reflects light like glass does; vitreous rocks and minerals, like the anthracite coal in your kit, are often called glassy.

Greasy—The surface looks as if it has been coated in grease, like the salt in your kit.

Other terms used to describe luster include silky, pearly, waxy, and dull.

Hardness

Hardness is one of the most useful properties for identifying a mineral. Hardness can be defined as a measure of the mineral's resistance to a force. There are several ways to apply force (scratching, indentation, and grinding), but testing resistance to scratching is a popular way of determining hardness because it requires no special equipment. Hardness based on scratch testing was given a precise definition in 1822 by the Austrian mineralogist Friedrich Mohs, who proposed the following scale:

Mohs Scale of Hardness

1. Talc (Softest)
2. Gypsum
3. Calcite
4. Fluorite
5. Apatite
6. Orthoclase
7. Quartz
8. Topaz
9. Corundum
10. Diamond (hardest)

Each of these minerals will scratch those minerals lower in the scale, and will in turn, be scratched by those higher in the scale. So, gypsum can scratch talc (or any mineral lower than a 2) and it will be scratched by calcite (or any mineral higher than a 2). To give a real-world example, minerals softer than 2 ½ will leave a mark when scratched across paper; here are some more hardness values for familiar objects:

2 ½ = Fingernail
3 = Copper coin
5 ½ = Knife blade, Window glass

Given those values, we can see that minerals under a hardness of 2 ½ can be scratched by your fingernail. Minerals under a hardness of 3 can be scratched by a copper coin.

When testing your samples for hardness, scratch the rock with your fingernail first, and then with the penny.

Color

The same mineral can come in a variety of colors, so we don't usually rely on color to recognize them. Some minerals are almost always found in the same color, such as sulfur (yellow), gold, and silver, but many minerals have minor impurities, or flaws, that can cause color change. For example, quartz occurs in almost every color imaginable.