

Congratulations! You are now the proud owner of a showcase of some important Midwestern rocks and minerals that we rely on for the things we use every day. Here is a brief introduction to the minerals and products in your kit. For more information on rocks and minerals, how they are formed, how they are mined, or how they are used every day, please visit the Minerals Education Coalition (www.mineralseducationcoalition.org) or contact the local St. Louis Section of SME (www.smenet.org or email us at sme.stl.section@gmail.com).

Limestone – one of the most common rocks in Missouri and Illinois. It is a source of aggregates which are used to make concrete and asphalt in building everything from roads to schools to airports to parking lots and everything in between. The cement used in concrete is also made from limestone that is heated in a kiln. Limestone is predominately Calcium Carbonate (CaCO_3). Very pure limestone is used in specialty chemical products that are used in animal feed, Calcium food supplements, and to clean water and air emissions in industrial settings. This particular sample is from a quarry in Eastern Missouri.

Trap Rock (Rhyolite) – locally this rock is found in areas of southeastern Missouri. It is often mined for aggregates as well, but is much harder than limestone and tends to break in sharp edges. It is used as railroad ballast, for wear-resistant pavements, and as an ice control chip. This specimen came from Iron Mountain Trap Rock in Iron Mountain, Missouri.

Roofing Granules – another use of **rhyolite** is as a roofing granule, which is put on roofing shingles. The rock is ground to a very small size and dyed to appealing colors. This particular sample is green. This specimen came from Specialty Granules, Inc. in Annapolis, Missouri.

Sandstone – sandstone, like limestone, is common throughout the Midwest. It is formed from grains of prehistoric sand sediments that became cemented together over millions of years. This particular specimen of sandstone is from the St. Peters Sandstone formation. Note the very pure white color and sugar-like texture. Other sandstones can be brown or tan or reddish in color, depending on other elements or impurities. This sample came from US Silica's mine near Pacific, Missouri.

Frac Sand – “Frac-ing” or has become widely used in natural gas and oil extraction to extend the life of an oil or gas deposit by “propping open” the voids in the rock where fluids have already been removed. In order to perform this operation, a very specialized particle is required. It has to be very pure, very hard, and very round. The Midwestern states have the perfect **sandstone** to make this type of sand, the St. Peters Sandstone. This nearly pure silica (SiO_2) sandstone is crushed so that the individual grains of sand are separated. This sample came from Mississippi Sand in Festus, Missouri.

Coal – This black rock provides about 40% of the electrical energy in the US. It is the primary source of low-cost energy throughout the world. Coal is primarily made of carbon. Coals with low ash, low moisture, and few other impurities are used to make “coke,” which is a key ingredient in making steel from iron ore and refining other metals. Notice how light this sample is compared to some other rock samples. Coal is about half the density of limestone. This particular sample came from a local Ameren power plant, and is likely from the Powder River Basin in Wyoming. Coal is also mined for power in Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Virginia, West Virginia, Alabama, Montana, Colorado, Texas, New Mexico, and Arizona. Coking coals are

mined in select areas of these same states, particularly Alabama, Pennsylvania, Virginia, and West Virginia, with new resources being developed in Arkansas and Oklahoma.

Halite – Halite is the mineral from which we get salt, also known as sodium chloride (NaCl). Rock salt has to be very pure to qualify for food grade, or table salt. Salt is used to preserve and flavor many foods. Less pure forms are used to melt ice on roads in winter, to provide mineral blocks for animals, to make pellets for water softener systems, and to a limited extent in agriculture. This particular specimen is from a Compass Minerals mine located on the Gulf of Mexico in Cote Blanche, Louisiana.

Gypsum – This white powdery rock is very soft. You can scratch it with a fingernail. Its chemical composition is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Some common uses of gypsum are in fertilizers, plaster, and, most importantly, drywall. Most modern houses use drywall on the interior walls. This specimen came from a US Gypsum mine in Sperry, Iowa.

Chalcopyrite – This shiny mineral is a copper-iron-sulfide (CuFeS_2). This is an ore mineral from which Copper can be obtained. Copper is a great conductor and is often used in electrical applications. It resists corrosion, so it can also be used for water pipes (tubing). It is also desirable for many alloys such as bronze or brass. This particular specimen was mined in Southeast Missouri at a Doe Run lead mine.

Galena – This shiny silver mineral is Missouri's state mineral, lead sulfide (PbS), and it is mined as the primary source of lead. What is the number one use of lead? Vehicle batteries! But don't forget X-ray shielding, bullets, solder, and even crystal goblets. Note the distinctive cubic shapes. You may also note that this is a particularly dense (heavy) mineral. Please wash your hands if you handle this specimen. This specimen came from a Doe Run lead mine in Southeast Missouri.