

# Feldspar

*Michael J. Potter, the feldspar commodity specialist for the U.S. Geological Survey, has compiled the following information on feldspar, the most abundant rock-forming mineral on Earth.*

The United States is the third leading producer of feldspar worldwide, after Italy and Turkey, according to data published by the U.S. Geological Survey. Foreign analysts indicate that China is also a leading feldspar producer, but official production data are not available. Feldspars are aluminum silicate minerals that contain varying proportions of calcium, potassium and sodium. Usually occurring in igneous rocks, feldspars are estimated to constitute 60 percent of Earth's crust.

Glass, including containers and glass fiber for construction, is a major end use of feldspar and feldspathic materials in the United States. In glassmaking, alumina from feldspar improves product hardness, durability and resistance to chemical corrosion. Typical feldspar content in glass containers is about 8 percent; content in insulation fiberglass is up to 18 percent. Demand for new glass containers — and therefore feldspar — has lessened with increasing competition from aluminum cans, recycled glass, and paper and plastic (polyethylene terephthalate) containers.

The other major use of feldspar is in ceramics, where the alkalis in feldspar (calcium oxide, potassium oxide and sodium oxide) act as a flux to lower the melting temperature of a ceramic mixture. Fluxes melt in early stages of the firing process, forming a glassy (vitreous) matrix that bonds together the other components of the system. Different types of ceramics require different degrees of so-called vitrification.

Typical feldspar contents in ceramic bodies are the following: 10 to 55 percent in floor and wall tiles; 5 to 30 percent in chemical porcelain and hotel china; 25 to 35 percent in sanitaryware; and 30 to 50 percent in electrical porcelain. The United States has been importing around 75 percent of its tile requirements in recent years from such countries as Italy, Spain, Mexico, Brazil and Indonesia (in decreasing order).

A major U.S. producing area is near Spruce Pine, N.C., where the feldspar ore is alaskite, which is a coarse-grained pegmatitic granite. The Black Hills of South Dakota is another mining area, where pegmatite material is treated to produce potassium feldspar. In Virginia, one company mines aplite, which is a lime-soda feldspar. In Ontario, Canada, and northern Norway, another igneous source rock called nepheline syenite, which contains feldspar and the feldspathoid mineral nepheline, is mined. Also, some feldspar is mined as feldspar-silica sand from certain beach, dune and river sand deposits that were eroded from granitic rocks in California, Idaho and Oklahoma.

Worldwide, at least 50 countries produced more than 10 million tons of feldspar in 2003. Italy produced an estimated 2.5 million tons of feldspar and feldspathic materials, followed by Turkey with 1.7 million tons and the United States with 800,000 tons. Other significant producing areas were Asia and Europe.

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Sample of feldspar microcline. Image from *Minerals in Your World*.