Wollastonite

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When asked about wollastonite, most people respond “wollasta-what?” That’s because the wollastonite industry in the United States is relatively small and not highly publicized. Furthermore, the general public does not have any direct contact with wollastonite despite its use in many consumer products, ranging from car brakes to paint.

Wollastonite, a calcium metasilicate, has an ideal composition of 48.3 percent calcium oxide and 51.7 percent silicon dioxide, but it can also contain trace to minor amounts of aluminum, iron, magnesium, manganese, potassium, sodium or strontium substituting for calcium. Wollastonite occurs as prismatic crystals that break into tabular to acicular (needle-shaped) fragments. It is usually white but also may be gray, cream, brown, pale-green or red depending on its impurities and grain size.

Wollastonite forms when impure limestones are metamorphosed or silica-bearing fluids are introduced into calcareous sediments during metamorphism. It can also crystallize directly from a magma that has high carbon content, but this is a less common occurrence.

Uses for wollastonite vary considerably, but it is primarily used in automobile brakes, ceramics, metallurgical processing, paint and plastics. The properties that make it useful include its high brightness and whiteness, low moisture and oil absorption, low volatile content and the needle-like nature of some wollastonite.

In ceramics, wollastonite decreases shrinkage and gas evolution during firing, increases strength, maintains its brightness during firing, permits fast firing and reduces cracking and glaze defects. In metallurgical applications, wollastonite serves as a flux for welding, a slag conditioner and a coating to protect the surface of molten metal during the continuous casting of steel. In paint, it improves the durability of the paint film, improves paint’s resistance to weathering, reduces pigment consumption and acts as a flatting and suspending agent. In plastics, it improves tensile and flexural strength, reduces resin consumption and improves stability. Surface treatments frequently are used to improve the adhesion between the wollastonite and the plastic compounds to which it is added.

Wollastonite is also used as a substitute for asbestos in floor tiles, friction products, insulating board and panels, paint, plastics and roofing products, because the mineral is similarly resistant to chemical attack, inert, stable at high temperatures and its needle-like shape improves flexural and tensile strength of the finished products.

In the United States, plastics account for an estimated 35 percent to 40 percent of wollastonite used; ceramics, 25 percent to 30 percent; followed by paint, friction products and miscellaneous other uses. Outside of the United States, ceramic applications are estimated to account for 40 percent to 50 percent of wollastonite sales, followed by polymers at 20 percent to 25 percent of

sales, and in lesser amounts, coatings, construction, friction products and metallurgical applications.

Current world production of crude wollastonite ore is estimated to be about 660,000 tons per year. Sales of refined wollastonite products are estimated to be between 500,000 and 550,000 tons per year. China is the leading producer of wollastonite with an estimated production of about 350,000 tons per year. The next leading producing countries are India with 129,000 tons per year; the United States, less than 125,000 tons per year; Mexico, 40,000 tons per year; and Finland, 16,000 tons per year.

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Sample of wollastonite with penny for scale. Image from *Minerals in Your World*.