

Garnet

Donald Olson, the U.S. Geological Survey Garnet Commodity Specialist, has compiled the following information on garnet, a colorful mineral used as gemstones and sandpaper.

Garnet is the general name given to a group of complex silicate minerals, all with isometric crystal structure, similar properties and chemical compositions. Garnet occurs in every color of the spectrum except blue, but it is most commonly red, purple, brown and green. Garnet necklaces dating from the Bronze Age have been found in graves and also among the ornaments adorning the oldest Egyptian mummies.

However, garnet's angular fractures, relatively high hardness and specific gravity, recycling potential, chemical properties (it is inert and nontoxic), and lack of crystalline silica, make it ideal for many industrial applications. While some people may be familiar with industrial garnet from its use in sandpaper and nail files, the largest industrial uses are in abrasive blasting, waterjet cutting, water filtration, abrasive powders and anti-slip coatings.

Garnet resources are large and occur in a wide variety of rocks, particularly in gneisses and schists. The mineral also occurs in veins and other contact-metamorphic zones in limestones, pegmatites and serpentinites. In addition, alluvial garnet is present in many heavy-mineral sand and gravel deposits throughout the world, and is the source of most U.S. industrial garnet.

In 2004, total world industrial garnet production was estimated at over 440,000 metric tons, with Australia, Canada, China, India and the United States as the leading producers. The United States produced about 6.5 percent of the industrial garnet mined worldwide, with three mines in Idaho and New York providing an estimated 28,400 metric tons valued at \$3.05 million in 2004.

In 2004, the United States imported about 34,600 metric tons and exported approximately 11,000 metric tons. U.S. consumption in 2004 was about 56,700 metric tons.

During 2004, seven mines located in California, Idaho and Montana produced an estimated \$56,000 worth of gemstone garnet. Other U.S. mines in Alaska, Arizona, Colorado, Connecticut, Maine, New Hampshire, New York, North Carolina, Pennsylvania, Oregon and Virginia have produced significant gem garnet commercially in the past.

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Samples of garnet from Warren County, New York: almandite garnet blasting abrasive (top left); faceted gem almandite garnet (top right); and almandite garnet in amphibolite, (bottom); dime for scale. Image from USGS.