

Snowflake Obsidian

By Leslie A. Malakowsky

Obsidian is mineral-like, but it is not a true mineral. It's a naturally occurring *volcanic* glass that forms as an extrusive igneous rock. (Glass is an amorphous, homogeneous material with a random liquid-like structure that generally forms due to rapid cooling.) Obsidian is sometimes classified as a *mineraloid*, a mineral-like substance that does not display crystallinity.



Obsidian is a mixture of cryptocrystalline grains of silica minerals in a glass-like suspension, a super-cooled liquid. In the last stages of volcanic eruptions, when most of the other elements and the water in the lava are gone (burned up, ejected or flowed out), the remaining material chills at surface temperatures.

“Snowflake” obsidian is a variety of obsidian that is usually black with white, off-white or light brown snowflake-shaped crystal patches of the mineral cristobalite. Cristobalite is a silica polymorph (the ability of a solid material to exist in multiple forms or crystal structures) that, in the case of snowflake obsidian, forms as crystals or spherulites



during partial crystallization as the glass cools. Other names for this variety of obsidian are “flowering” obsidian and “spherulitic” obsidian.

Obsidian was named after the Roman explorer Obsius because of its resemblance to a stone he found in Ethiopia that he named *obsianus lapis*. And the English translation of *Natural History*, an early encyclopedia originally written in Latin by Pliny the Elder, includes a few

sentences about a volcanic glass called Obsidian.

Obsidian is commonly found within the margins of rhyolitic lava flows known as obsidian flows. Rhyolite is an igneous, volcanic rock of felsic composition. “Felsic” refers to rock that is rich in minerals that form feldspar and quartz. (Typically the silicon dioxide (SiO₂))

content of felsic rocks is greater than 70%.) The high silica content induces the lava to have high viscosity and polymerization (a chemical process that binds molecules together with a tendency to form glass and semi-crystalline structures rather than crystals) that causes the obsidian to be hard and brittle. That is why obsidian has a conchoidal fracture with very sharp edges.

Obsidian is found all over the world; any place that has experienced rhyolitic volcanic eruptions. This includes (but is not limited to) Argentina, Armenia, Azerbaijan, Australia, Canada, Chile, Georgia, Greece, El Salvador, Guatemala, Iceland, Italy, Japan, Kenya, Mexico, New Zealand, Papua New Guinea, Peru, Scotland, Turkey and the United States (in Arizona, Colorado, New Mexico, Texas, Utah, Washington, Oregon, Idaho, Virginia, Pennsylvania and North Carolina).



No obsidian has been found that is older than the Cretaceous age. This is because obsidian is metastable (a condition in which the material spends an extended time in a



configuration other than its state of least energy) at the Earth's surface, and over time it becomes fine-grained mineral crystals. When newly formed, obsidian has a low water content, typically less than 1% water by weight. Over time, when exposed to groundwater, it becomes progressively hydrated forming perlite.

Historically, obsidian was used in cutting and piercing tools such as arrowheads, scrapers and blades. Analyses of ancient obsidian artifacts is instrumental in understanding

prehistoric cultures. Today, obsidian is used by some surgeons for scalpel blades, although this is not approved by the US Food and Drug Administration (FDA) for use on humans. Obsidian is also carved for ornamental purposes and it is a favorite gemstone

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Editor's Note: Additional photos have been added to the original article.