Obsidian Encyclopedia Article

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Contents

Obsidian

Obsidian is volcanic **glass** with a chemical composition similar to that of **rhyolite** or **granite**. It is most commonly black, although greenish to reddish and banded varieties also occur. In addition to its dark color and glassy luster, obsidian is characterized by bowl-shaped or concave conchoidal fractures.

In the hands of a skilled practitioner, obsidian can be worked into razor sharp stone tools such as knives and spear points. Thus, obsidian tools are often found during archaeological excavations. Obsidian is also used for scalpel blades by some modern surgeons because obsidian blades can be sharper and thinner than their steel counterparts.

Obsidian is formed from silica-rich **lava** that cools too quickly for **crystals** to grow. The result is a glass that does not possess the regular crystal structure of **minerals** in rhyolite and granite, even though all three have the same general chemical composition. The lack of crystal structure is also responsible for the conchoidal fractures characteristic of obsidian. The dark color of obsidian is due to the presence of **iron** oxide minerals distributed throughout the otherwise clear glass. Magnetite produces black obsidian, whereas more highly oxidized hematite produces reddish varieties. Because its silica content makes it extremely viscous, the rhyolitic lava that freezes into obsidian is extremely resistant to flow and obsidian is most commonly found in small dome-like bodies very close to volcanic vents.

Obsidian artifacts and outcrops can be dated using the thickness of a hydration rind that forms when **water** vapor diffuses into a freshly broken surface. The age of the fresh surface is estimated by comparing the rind thickness with the results of a mathematical model of water vapor diffusion through obsidian. Rind thickness was originally estimated using optical microscopes, but recently developed techniques such as secondary ionization mass spectrometry provide more accurate measurements of the rind thickness. When applied to artifacts, the method gives the age of fractures produced when a human made the tool; when applied to **rock** outcrops, it gives the age of fractures presumably produced during or shortly after the eruption.

See Also

Dating Methods; Minerals; Pumice; Volcanic Eruptions; Volcanic Vent; Volcano