

Stone

Found in such items as jewelry, arrowheads, rock art, sculpture, mineral specimens, and fossils

Identification and General Information

Stone items come in a wide variety of forms, including mineral specimens, sculpture, jewelry, flaked lithic tools, fossils, cave paintings, and even outdoor rock art such as petroglyphs. Some stone items are sturdy, intended for use outdoors or on the ground, while others are more polished and fragile. In general, stone is one of the most stable materials as long as it is protected from physical and chemical damage.

In spite of this stability, stone can still be damaged. While it is often thought to be among the hardest materials known, it is actually softer and weaker than some metals. Most stone is brittle, and certain types are fragile and especially prone to damage. If stone items are handled improperly, they will break. Some stone is so soft that it can be scratched with a fingernail. Certain types of stone, such as blue celestite, turquoise, and brown topaz, can be faded by light. Poor-quality semiprecious stones may have been dyed to accentuate their colors, and these dyes can also fade when exposed to light. Almost all stone can be deteriorated by weather and pollution. Stone items sometimes acquire a patina after many years of use. Patinas on stone are composed of accumulated layers of handling residues, such as oils and dirt. On outdoor stone items, patinas form also from prolonged weathering.

Geologists divide stone, or rock, into several broad categories: *sedimentary*, *igneous*, and *metamorphic*. Each category contains several different types of stone. The stone in each category is formed in a certain way, which influences how it performs and the use to which it can be put. In other words, each category has unique characteristics, such as hardness and the way that it

fractures or breaks when struck, that determine what kinds of items are made from it. For example, certain types of tools are sometimes made of basalt because it is extremely hard and has some porosity so it is abrasive. Pipe bowls are often made of catlinite or steatite, stones that are resistant to cracking when heated.

Basic Care and Storage

For the most part, stone items stored indoors have fewer problems than items made from other materials. Nevertheless there are concerns. Large stones are heavy, and heavy items are difficult to move and can break without proper support. Flaked stone can have thin, sharp, brittle edges that are easily broken. Sculpture is usually made of softer stone, which is more porous and stains easily. Gemstones and mineral specimens can be altered or damaged by light and pollutants.

Most stone can be safely stored at any temperature below 100 degrees Fahrenheit, and at a relative humidity below 60 percent. At higher humidity, molds and lichens can grow on stone, and soluble salts within the stone can be mobilized. Also, metallic mineral seams can corrode and stain stone, and iron pyrite can react and be converted to iron sulfate, which can turn to powder and cause the stone to fall apart.

Salt efflorescence is caused by the movement of soluble salts in stone. It looks like a powdery white film or a hard white crust and can cause spalling, flaking, and the loss of pieces of the stone. Efflorescence occurs when the stone dries out and the salts rise to the surface, being left behind as the water evaporates. The salts then crystallize and generate tremendous force, which can cause pieces of the stone to fall off. Stone items found buried or lying on the surface of the ground may contain these soluble salts. Salts are usually introduced to stone from rising dampness in the ground. This will not happen indoors but can occur when a stone item is displayed outside. When stone is stored or displayed on cement, even indoors, water can travel

through the cement and into the stone. In these cases, rising dampness can be blocked by placing a water-impermeable material under the stone, or by placing the item on a raised shelf. Low humidity, below 35 percent, can also cause some types of stone to crack as they lose water.

Special Pest Concerns

Insects will not attack stone items but may be attracted to residues on the stone, such as paper labels. As mentioned earlier, lichens often grow on stone that is outdoors. Lichens are extremely aggressive weathering agents for stone and generally should be removed if the item needs to be preserved (see *Cleaning and Minor Repairs*, below). Lichens growing on stone usually look like round patches with a soft or powdery appearance. The use of chemical poisons to control the growth of lichens should be avoided. These chemicals are damaging and will not prevent lichens from reforming. A better solution is to make sure that water, which supports the growth of lichens, is kept away from the item. This water comes in many forms, including rain, morning dew, and lawn sprinklers.

Routine Handling

Smooth stone items are best handled with bare clean hands or nitrile or latex gloves, as they can be too slippery for cotton gloves. Rough-textured stones can be handled with clean dry hands, although some porous stones easily absorb oils from hands and should be handled with cotton, nitrile, or latex gloves.

Display Issues

Stone items can be used for display with fewer concerns than most other materials can. Many gemstones, however, can be faded by light. Any stone that has been painted, dyed, or otherwise

decorated may also be sensitive to light. If you keep these concerns in mind, items made of stone can be displayed in higher light levels than those made of other materials.

Mounts and Supports

Even though stone is a strong material, items may still need additional support. Because of stone's heavy weight, mounts and storage supports may require additional reinforcement.

Vibrations from foot or automobile traffic can shift items and put them in peril. Some stone items that are heavily weathered or thinly carved can be very weak and require significant support.

Cleaning and Minor Repairs

Stone items require only occasional dusting. Avoid using household sprays or cleaners on stone since they leave harmful residues. Cleaning stones in jewelry with commercial jewelry cleaners or common detergents can be harmful to both the stone and any metal. Stone items can usually be cleaned safely by dusting them with a soft-bristled brush or soft cotton cloth or by vacuuming using a micro-attachment as appropriate.

Before cleaning a stone item aggressively, carefully consider whether the item really needs it. Some stains, such as iron stains on limestone, are practically impossible to remove without damaging the item. If cleaning with a brush, cloth, or vacuum is not sufficient, some stone may be cleaned of soil by simply washing with water. Pressurized water, such as from a pressure washer, is often used to clean outdoor stone items, but this can cause significant damage, both by breaking off pieces of loose stone and by etching lines in the stone that are cleaner than other areas. Using an everyday low-pressure garden hose is much safer. Blast cleaning outdoor sculpture, using pressurized particles such as sand, glass beads, or powdered

walnut shells, is another common cleaning technique. This is too aggressive and will rapidly cause damage. Blast cleaning has the further disadvantage of removing protective patinas and opening up the pores on the surface of the stone to the weather, which greatly accelerates deterioration.

The presence of lichens on outdoor stone can be very damaging. Usually lichens can be removed with a stiff-bristled plastic brush and some water. The use of bleach should be avoided. Bleach will kill the lichens, but it will often weaken or damage the stone and leave a corrosive chlorine residue behind.

Some stone items can be cleaned with an eraser. Use a white vinyl block eraser such as the Staedtler Mars Plastic or the Sanford Magic Rub. Additionally, dry cleaning sponges made of vulcanized rubber, also called soot removal sponges, work well for removing fine particulate dirt from relatively smooth surfaces. Various solvents can be used to clean stone items that have been defaced by graffiti. Generally this should be done very carefully as the solvent may remove dirt around the graffiti, causing lighter areas to form. Contact a conservator for guidance.

Stone items can be difficult to repair because few adhesives are strong enough to support the weight of the stone. Avoid using the common adhesives such as epoxy resins, superglue (cyanoacrylate), ultraviolet-curing adhesives, and polyester resins, because these adhesives are difficult if not impossible to safely remove should that become necessary. Emulsion adhesives such as Elmer's glue should be avoided because they discolor and are very difficult to remove. Special adhesives used by conservators are available from conservation suppliers, but these need to be carefully prepared before use. Many hardware stores carry other adhesives that contain cellulose nitrate and cellulose acetate. These adhesives, such as Uhu brand glue, behave similarly to the adhesives used by conservators. Unlike most types of adhesives, these can be easily

removed by a conservator, unless the stone is very porous. Contact a conservator to help you select the proper adhesive for the job. For very heavy fragments, dowels or pins are necessary to give the join better strength, but the pieces may be difficult to align properly. The treatment involves drilling into the item; this task should also be left to a conservator.