

Water Jet Tools for Mineral Cleaning

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Every mineral collector, from beginner to advanced, from avid field collector to silver pick collector, will have occasion to clean mineral specimens. Various physical and chemical methods are available, and discussed in such works as Duthlar and Weiß (2008), Pearl (1982), Sinkankas (1972), and Tschernich (1992). Numerous additional discussions appear on the Mindat message boards (Mindat 2020) and the Facebook group Mineral Specimen Cleaning and Preparation (Facebook 2020).

Many methods and recipes are available for mineral cleaning. Some are based on empirical observation and scientific rationale, while others (which often fail) are based on hearsay, rumor, and old wives' tales. When deciding what procedure to use, the collector should select milder methods before harsher methods. This usually also means selecting physical cleaning methods before chemical methods.

Cleaning in water is usually the first step, often in a forceful jet of water. Ultrasonic cleaners also have significant value in mineral cleaning but are not the focus of this article. Water jet tools have numerous cleaning and safety advantages, as discussed below.

Regardless of cleaning protocol - physical or chemical - **safety must be of the utmost concern**. **Appropriate impact-resistant safety glass with side shields must always be worn**. The collector might be tempted to think, "Where is the danger in splashing water?" That 'splashing water' also frequently contains mineral debris which can easily damage the eyes. I was reminded of this recently as debris bounced off my glasses while using a textile gun to remove decomposed feldspar.

Water jet tools generally make a mess, as they splash water and debris in all directions. Thus it is best to work outdoors (instead of the kitchen or bathroom), and to work over a bucket. Not only does the bucket catch debris before it can clog the drain, but also serves to catch the debris for later examination.

Using any mineral cleaning or preparation tool is an art that requires some time to master. Therefore always practice on lower quality specimens to develop technique first before turning an unpracticed hand to a precious and/or expensive specimen. In some cases the scientific or monetary value of the specimen justifies investment in a professional mineral cleaning and preparation service.

The simplest and most readily available water jet tool is the **garden hose**. It presents no significant safety issues, has an effectively unlimited water supply, and is inexpensive. Compared to other water jet tools, the jet has low pressure and is unfocussed. Because of its relatively low water pressure, the garden hose has very little chance of damaging specimens. (Water pressure is a significant issue because a high pressure jet can damage readily-cleaved minerals such as fluorite, calcite, topaz, and micas.) The lack of focus reduces the cleaning precision; it is nearly impossible to direct the jet at just a small area on the specimen.

Low pressure alternatives include **paint sprayers** (a topic not explored by the author), **toy squirt guns** (suffer from low water capacity, potential wrist fatigue, and difficulty directing the water stream to the precise spot where needed), or a '**super soaker**' **toy** (has all the drawbacks of a garden hose, plus a somewhat limited supply of water).

Another potentially-useful low-pressure jet tool is the **oral irrigator** (dental water flosser; Figure 1). These devices provide a focused, continuous stream of water by pumping from a small tank. Only the lightweight nozzle is handheld (the bulk of the unit sits on the table or floor), so wrist fatigue is not an issue. The pressure can be adjusted, and is significantly less than the spot cleaning gun (see below). In one unit, the tank holds 600 mL water, which empties in 90 seconds to 5 minutes (depending upon the pressure setting). This time is often adequate for cleaning a single specimen which lacks severely encrusted dirt. Avoid the temptation to continuously refill the water reservoir to allow continuous operation, as the device is not designed for long use (the author has destroyed at least two units by 20 minutes of continuous operation). Because the water pressure produced is weak to moderate, the potential for specimen cleavage or damage is small, but cannot be ignored. Oral irrigators are typically available for \$50-100 for new units (you don't need a unit with all sorts of bells and whistles), and much less for a used unit at a second hand store. Overall an oral irrigator is a moderately-priced but only occasionally useful mineral cleaning tool.

Very popular among collectors is a **spot cleaning gun** (also called a textile gun; Figure 2). Units priced from \$38 to \$262 are available at Amazon.com. Originally designed to clean textiles, these guns deliver a highly focused, very powerful water stream via a rapidly oscillating pump mechanism. (The gun makes a distinct buzzing sound when in use.) Among the water jet tools for mineral cleaning, the spot cleaning gun provides by far the most

powerful stream. Avoid having this very forceful stream contact your fingers, as the result can be quite painful and damage may result. **Wear heavy gloves and safety glasses while using a spot cleaning gun to significantly reduce the chance of injury.** One experienced mineral dealer ended up in the emergency room to have mineral fragments removed from an eye because he failed to wear safety glasses while using a spot cleaning gun. The focus and force of the jet can be changed by adjusting the unit's nozzle but most users find it simpler to vary the distance between the unit and the specimen. The water stream power can be both a benefit and a curse. At close range soft materials (clay, decomposed feldspar, etc.) are easily blown away, even from deep cracks. At the same range, however, easily-cleaved minerals (fluorite, calcite, topaz, micas, etc.) can be broken.

The water tank on my Mystic unit holds 900 mL, which empties in about 7.5 minutes of continuous use. When full, the unit weighs about 2.1 kg, which can quickly lead to wrist fatigue in long cleaning sessions. For long cleaning sessions, I sit and rest the base of the water tank on my knee. Unlike an oral irrigator, the spot cleaning gun is designed for extended use; cleaning sessions of 20-30 minutes or more are routinely tolerated. During this time the unit's metal handle can get quite warm. When this occurs discontinue use and allow the device to cool before using it again.

The spot cleaning gun creates a water mess like the oral irrigator, but significantly more so.

When cleaning is done, remove the water tank and allow the unit to run for a few seconds to expel remaining water. (Internal rust is a prime destroyer of spot cleaning guns.) Wipe dry, and apply a few drops of high-quality machine oil to the oil hole. (I use 3-in-1 Multipurpose Oil. A three-ounce container costs less than ten dollars and will last forever.) With proper maintenance, a high-quality gun will last years, even with heavy use.

Many brand names are available (although comparing pictures suggests there are significant similarities in design, and perhaps even that there are only a few manufacturers producing a few standard guns that are sold under many brand names). When shopping, make the investment in a good brand. Units of excellent quality are not much more expensive than low quality units, especially considering the potential for improvement to your mineral collection (or seller inventory). Ask experienced collectors and dealers for a brand recommendation. My first gun was the cheapest available. It lasted maybe two weeks. I now use a Mystic (cost \$75); this workhorse has lasted years of fairly heavy use.

Despite the drawback mentioned, a spot cleaning gun is an excellent, general purpose mineral cleaning tool that is well worth the modest investment for collectors of all levels.

A water jet tool which combines the best qualities of the tools mentioned above – produces a focused stream with moderate pressure, has an infinite water supply and operation time, avoids wrist fatigue, requires little or no maintenance, all at low cost – would be quite useful. Tschernich (1992) suggested a garden hose plugged with all but a small hole, but gives no details. After some experimentation, I was able to bring Tschernich's suggestion to fruition (Figure 3). The device consists of a plastic garden hose pistol nozzle and a brass hose cap into which a 1/32" hole has been drilled. (Small hole size critical to produce useful pressure and focus.) Materials were chosen to make the device as cost-effective as possible without sacrificing usefulness. Plastic nozzles are cheaper than the least expensive metal nozzles (which are often cited as failing in their first year of use). While plastic and brass hose caps are of roughly equal price, perhaps half the plastic hose caps gave holes which produced an erratic, unfocused and/or low-force water stream.

For mineral collectors lacking do-it-yourself skills and/or tools, assembled units are available from the author.



Figure 1: An oral irrigator.



Figure 2: A Mystic water gun.

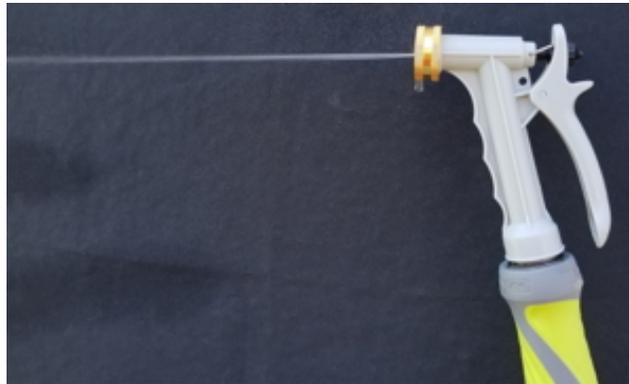


Figure 3: A Tschernisch-style medium pressure water gun.

Literature Cited

Duthaler, R. and Weiß, S. (2008): Mineralien reinigen, präparieren, und aufbewahren. Lapis, 2008.

Facebook 2020: <https://www.facebook.com/groups/418980944882223/>. Accessed August 26, 2020.

Mindat 2020: <https://www.mindat.org/discuss.php>. Accessed August 26, 2020.

Pearl, R. (1982): Cleaning and Preserving Minerals, 5th Revised Edition. Earth Science Publishing Company.

Sinkankas, J. (1972): Gemstone & Mineral Data Book. Winchester Press, pp. 233-280.

Tschernich, R. (1992): Zeolites of the World. Geoscience Press, Inc., pp. 27-32. A full-text PDF is available for download at https://www.mindat.org/book_details.php?id=74. Accessed August 26, 2020.