



STONE
PROFESSIONAL

Natural Stone Identification Guide

Identifying natural stone

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| What you need: <ul style="list-style-type: none">– Rock ID flowchart– Dropper bottle of 10% hydrochloric acid– Magnifying glass– Glass tile– Steel nail– Copper penny– Mohs hardness test picks – optional but really nice | Ideally, the stones are <ul style="list-style-type: none">– Unsealed– Have at least one rough, broken edge |
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General instructions

Start by using the glass test to separate silica-based stones from calcite-based stones

From there, you can use other traits like color, texture, and pattern to figure out the specific stone type.

The flow chart should lead you toward the correct grouping of stones. Whenever possible, go with the stone's properties first (like hardness or reactions with acid) versus its color or pattern. Looks can sometimes be deceiving but a stone's properties never lie. Furthermore, the properties of a stone (hardness, resistance to acid, porosity) guide us how best to work with it.

The first step with any unknown stone is to get an approximate feel for its hardness.

Glass is around 5.5 on

Mohs scale, and, conveniently, this dividing line is very handy for classifying natural stone.

- Silica-based stones are harder than glass
 - Granite, (and granite's cousins, gneiss, granulite, and schist) quartzite, and sandstone
- Calcite-based stones are softer than glass
 - Marble, limestone, travertine, onyx

How to do the glass test:

- Use a glass tile.
- Find a rough section of the stone, preferably a pointy edge. Don't use an edge that has been epoxied.
- Put the glass tile on a table, and then try to scratch the tile with the stone. Press hard.
- Inspect the scratch. Is it really a scratch? Or is it a powdered trail of crumbled rock?
- When a stone scratches glass, you can often feel it bite into the glass and you can hear it grind.
- When a stone does not scratch glass, it may feel slippery on the glass and doesn't make any noise.
- If the stone is variable and has more than one color or type of mineral in it, repeat the test in different places.



What if there is no broken edge to use, such as a full slab with epoxied edges?



- You can do a similar test with a knife blade or an awl. Try to scratch the rock with the tip of the blade. Granite and quartzite will be scratched lightly or not at all. Calcite-based stones will be easily gouged.
- You can also use the Mohs hardness picks and try to scratch the surface of the stone with picks of varying hardness until you get a sense for the approximate hardness of the stone. It's usually not necessary to dial in the exact hardness.

Using the flow chart, the results from the glass test lead you to two different sections of the chart – the harder stones

are on the right side and the softer ones are on the left. The backside of the flow chart has some detailed views of certain stones.

Part 1 – Stones that scratch glass

How to differentiate between silica-based stones

These stones all have fairly similar properties, so you can use visual differences in color, pattern, or texture to tell them apart. In the stone industry, many of these stones are grouped together, which is fine because they are all made out of similar minerals and can be treated in a somewhat similar way.

Granite

Can be nearly any color: mostly white, light grey, cream, brown, dark grey, green, or black

If light colored, granite has individual specks of colors – each ‘speck’ is an individual mineral crystal. They can be millimeters across or over a foot across (as in Patagonia).

If dark colored, then individual mineral ‘specks’ may not be visible. Example: Absolute Black or Jet Mist.

Gneiss

Definitive bands of lighter and darker minerals. The bands can be thick or thin; straight or wavy. Gneiss and granite are made of the same minerals and can be treated similarly.

Schist

Schist is glittery because it’s made of mica minerals. Large flakes of mica make the stone weak, messy, and nearly impossible to polish. Small mica grains add a nice luster without making the stone too troublesome

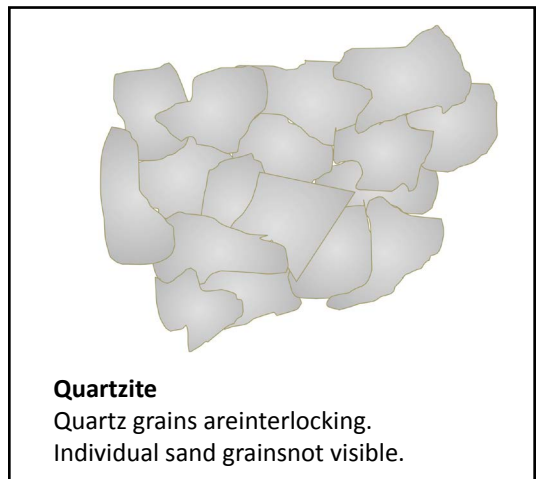
Quartzite

Patterns tend to be softer, with colors diffused throughout the stone.

Usually light colored: white, light grey, cream. Some quartzites are vividly colored (Van Gough) with red, green, orange and (rarely) blue.

Quartzite vs. sandstone – use a magnifier to look at the individual grains.

With quartzite, the grains are fused together – single grains are not identifiable..



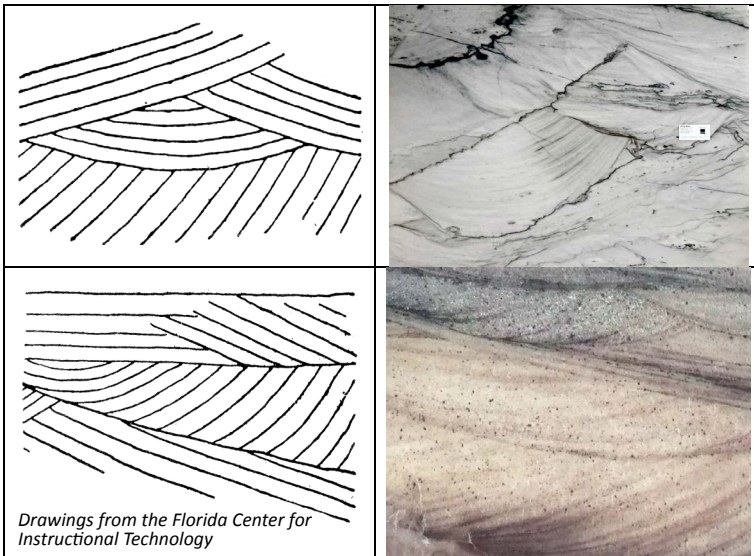
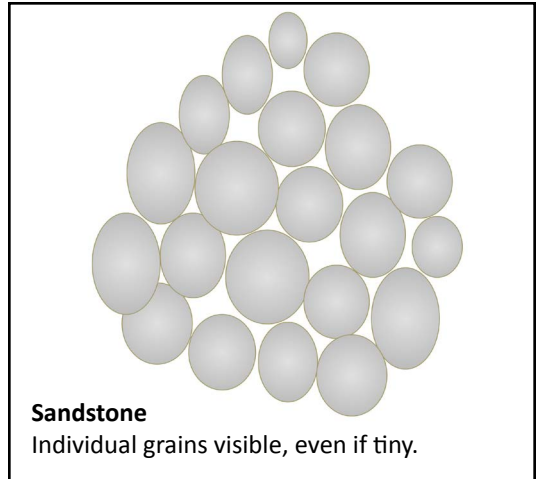
Sandstone

All sandstones:

- Have a texture that looks like sand grains or pellets that are glued together. Use a magnifier and look for individual sand grains (even if tiny, they are still identifiable).

Some sandstones:

- Have cross bedding, which is a pattern that is usually only found in sandstones.
- Are weakly cemented; you can pry grains out of the stone.



The porosity of sandstone varies widely. Some soak up water like a sponge. Others are tightly bonded and have porosity as low as a typical granite.

Examples of cross-bedding

Part 2 – Stones that do not scratch glass

If the stone does not scratch glass, it could be either:

Calcite/dolomite family

Limestone
Marble
Travertine
Onyx
Dolomite
Dolomitic marble

Soapstone-serpentine family

These two stones (as well as green marble) can be identified based on further hardness tests. See back of flow chart for details.

The Acid Test

You can use the acid test to distinguish the stones that are softer than glass. It's also not a bad idea to double-check your glass test result with the acid test. Usually, stones that are harder than glass will not etch with acid. There are some exceptions though.

The standard geologic test for acid reaction calls for a 5% to 10% solution of hydrochloric acid. Many fabrication shops already have muriatic acid on hand, which is nearly the same as hydrochloric acid. However, the dilution of the acid is important. A very strong acid will dissolve almost any stone, and it won't help distinguish between different types of stone. Thus, the correct dilution is important. The simplest way to ensure the proper concentration is to order a 10% dilution of hydrochloric acid from a laboratory supply company. Store the acid in a dropper bottle, and use it whenever you need to test if a stone might be made of calcite or dolomite.

How to do the acid test:

- Use an unsealed, un-epoxied surface of the stone. Use either the slab surface or a broken edge.
- Place one drop of 10% hydrochloric acid on the stone.
- Watch for small bubbles forming. Sometimes the bubbles are obvious, and sometimes they are subtle.
- If you don't see bubbles at first, observe the drop of acid with a magnifying glass. Look inside the drop of acid.
- If bubbles are present and easy to see, then the stone contains calcite (CaCO_3). Marble, limestone, onyx, and travertine are made of calcite.
- Test different colors and parts of the stone. White veins are commonly made of calcite.

If you see no bubbles or very subtle bubbles, try the powdered rock acid test:

- Use the tip of a pocket knife, awl, or other sharp tool to scratch up the surface of the stone and create a small pile of powdered rock.
- (If you can't easily scratch the stone or generate some powdered rock, that's a good indication that the stone is not made of calcite or dolomite, since those minerals are much softer than a knife blade.)
- Leave the powder on the stone.
- Put a drop of acid on the powdered rock.
- Observe closely – use a magnifier.
- If bubbles are present then the stone contains dolomite (CaMgCO_3). Dolomitic marble looks exactly like regular marble and the powdered rock acid test is the only way to tell them apart.

If you see no bubbles at all, in either test, then the stone does not contain calcite or dolomite.

If you did the acid test on a polished or honed surface, then you can rinse off the stone, dry it, and then inspect the surface for an etch mark. Etching can look like a lighter area, or a place where the shiny finish of the stone has become dulled. If the stone bubbled with acid, then you will almost certainly see an etch mark where the acid was, and this confirms that the stone is in the calcite/dolomite family.

If you didn't observe any bubbles, then you most likely will not find an etch mark, and this stone is made of something other than calcite/dolomite.

Note that strong acids like in rust stain removers can etch even granite and quartzite. Be sure to use a 10% dilution of hydrochloric acid for these tests.

Potentially confusing stones

There are a few stones that can yield conflicting results from the glass test and the acid test. In some cases, marble will scratch glass. This is because certain marbles contain minor amounts of quartz. This does not mean the stone is a hybrid of marble and quartzite. It is still marble, and should be sold as marble and treated as marble.

Super White

Super White is one of the stones that's frequently caught in the quartzite vs. marble mystery. Most commonly, Super White is dolomitic marble. That means it won't scratch glass and it will etch with acids. Dolomitic marble (CaMgCO_3) is slightly slower to etch than regular marble (CaCO_3), which can lead people to think that the stone won't etch. But it will still etch.

Some Super White has minor amounts of quartz mixed in with the marble. When doing the glass test with Super White, be sure to test a few different areas to get a sense for the overall rock. You may find that there are some areas that scratch glass and others that don't. This small amount of quartz does not change the overall performance of the stone. It is still dolomitic marble and needs to be treated as such.

Fantasy Brown

This is another stone that can be a bit confusing. Fantasy Brown is made of layers that have been folded and squeezed together.

Some of the layers are marble, and some are quartzite. It's best to treat this rock as marble. Do the glass or acid tests on each layer individually and you will be able to tell which layers are marble and which are quartzite.



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