

The Mohs Test: How to Compare the Hardness of Minerals

Problem: Some minerals are harder than others because of how strongly their atoms are bound together at the molecular level. How do we find out which minerals are harder and which are softer?

Materials:

- 8 mineral samples: *amethyst, azurite, calcite, lodestone, mica, rose quartz, talc, pyrite*
- 1 fingernail (your own is fine!)
- 1 copper penny
- 1 steel nail
- 1 piece of quartz
- 1 pencil
- 1 piece of lined or graph paper

Procedure:

1. Along the top of the paper, create columns by writing Mineral, Fingernail (2.5), Copper (3), Steel (5.5), Quartz (7), and Hardness.
2. Write the name of each mineral sample in a list down the left-hand side of the page under "Mineral."
3. Put each mineral sample on top of its name on the paper.
4. Starting with the first mineral, test how hard it is by trying to scratch it. First try to scratch it with your fingernail, then the copper, then the nail, then the quartz. Be careful! Sometimes something that's much softer than something else will leave a line of powder that looks a lot like a scratch. If you think you have a scratch, rub at it with your thumb. If it's just powder, it'll rub off, but if it's really a scratch, it'll still be there.
5. If you can scratch the mineral with your fingernail, put an "X" in the "Fingernail" column. If not, leave it blank and go on to the next column. If you can scratch the mineral with copper, put an "X" in that column. Keep going until you have tried to scratch the sample with all of your hardness testers. If nothing makes a scratch, leave all of the columns blank.
6. Your testing materials will leave a scratch if they are the same hardness as or harder than the sample. If you get a scratch, the hardness of the mineral is probably somewhere between the hardness of that testing material and the one before it. So, for example, if the quartz and the nail leave scratches on a sample but the penny doesn't, the hardness of the sample is most likely somewhere between copper, hardness 3, and steel, hardness 5.5. So split the difference and call it a 4 on Mohs' Hardness Scale. Write this number down in the "Hardness" column.
7. If not even the quartz will make a scratch, your sample is harder than quartz (7), so write ">7" in the "Hardness" column. If all of the tests produce a scratch, your sample is softer than fingernails (2.5), so write "<2.5" in the "Hardness" column.
8. Repeat this procedure for all of your samples.
9. When you're done, turn the piece of paper over or use a new piece of paper and write a list of your mineral samples again. This time, instead of putting the names in alphabetical order or whatever order you used the first time, list them in order of hardness, from softest (lowest number) to hardest (highest number). You now have a relative hardness scale of your samples.

Rock Formations

There are some amazing natural rock structures in the world. They are either naturally formed or formed in various ways of erosion: (worn away) by glaciers, blowing sand in the desert, water or weathering such as wind and rain. There are three types of naturally formed rocks:

1. **Sedimentary.** This means they formed grain by grain, layer by layer, either in the water where rocks and dirt settle to the bottom or on land by erosion.
2. **Metamorphic.** This means the rocks are made from other kinds of rocks or minerals. This happens with heat, pressure and chemical reactions.
3. **Igneous.** These kinds of rocks are made when lava or molten rocks cool and become solid. Sometimes these have crystals that form in them. Erosion then forms the lines and curves of these rock formations. One igneous rock formation is Half Dome in Yosemite National Park.



A Mushroom Rock formation in Mushroom Rock State Park in Kansas. It was formed by the erosion of a harder rock on top of a softer rock. Part of the rock is sandstone.



Jug Rock

Jug Rock is made of sandstone. It is in Shoals Indiana in the Valley of the East Fork of the White River. Jug Rock is the largest free-standing table rock formation or "tea table" in the USA east of the Mississippi River. It is 60 feet high and 20 feet in diameter.



Half Dome Photo by: Rainer Hübenthal posted on Wikipedia

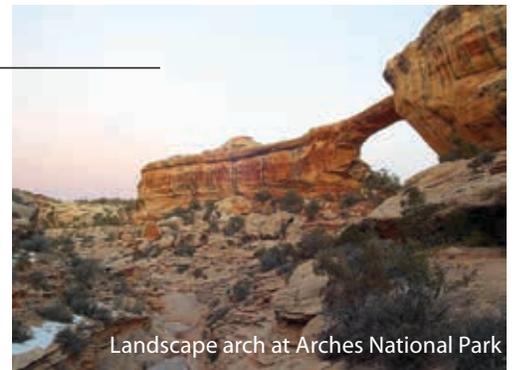
Rock Trivia

1. What are the three types of naturally formed rock formations?

2. What kind of rock is Half Dome in Yosemite National Park?

3. What is another name for a table rock formation like Jug Rock?

Owachomo Bridge at Natural Bridges National monument



Landscape arch at Arches National Park