

“Minerals that do things...”

Hands-on demonstrations of mineral properties

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Sink & Float Rocks

Object: Students experience the **density** of rocks and minerals first-hand.

Procedure description: Students heft samples of pumice and scoria and guess if they are heavier or lighter than water. Then they simply drop the specimens into a tank of water to test if they will float.

Specimens to test: Pumice, scoria (lava rock), obsidian, quartz, galena.

Equipment needed

A large, transparent, plastic tank or bucket half-full of water (the shape doesn't matter, but size depends in how big your biggest piece of pumice is), a towel or a two-foot by two-foot carpet, and a pair of tongs (salad tongs will work). It is important to get a plastic tank or bucket rather than a glass one: a glass tank will only last as long as it takes for a student to drop a big chunk of obsidian or galena into it, cracking its bottom. A clear plastic jar such as those used to sell pretzel rods will work well. The tongs are good for fishing out samples from the tank and the carpet or towel helps keep wet rocks from dripping water everywhere.



Scientific discussion

Pumice is a volcanic rock. It forms because it has a considerable amount of gas whipped into it while it is still molten. Upon hardening, the gas bubbles become millions of tiny pockets, filled with air. If a specimen has enough of the pockets such that its bulk density is less than that of water, it will float. Most chunks of pumice will float but some specimens will sink. Try to find some samples that will sink along with a bunch that float – “sinkers” are always fun because they will fool most students. Pumice, sold as “pumice stone,” is used to scrub calluses off the bottom of your feet. If you can't find pumice elsewhere, try looking in a health and beauty supply store for “pumice stone.”

Sink & Float Rocks Page 2 of 2

Scoria is a volcanic rock similar to pumice, but it tends not to have as many gas pockets as pumice. Having fewer air pockets, scoria is denser and, even though it looks similar to pumice, most scoria samples will sink in water. Scoria is the “lava rock” used in gas barbeque grills and it is also used as a decorative ground cover in gardening (often colored dark red). You can buy samples of scoria as many garden supply centers. Most scoria is much denser than pumice, but try to find some scoria chunks that will float along among those that sink.

Note that some floatable pumice or scoria can become water-logged and sink after sitting in water too long.

Additional possibilities: With a little practice, you can sense some density differences by heft alone. One way to test this is to select similar sized specimens of pumice, scoria, obsidian, quartz, and galena. Pumice will be lightest, followed by scoria. Obsidian and quartz are very close in densities. Galena, being lead sulfide, is considerably more dense than quartz. One dramatic way to demonstrate this is to blindfold a student, then have him or her hold each specimen in turn and try to rank it according to density.

It is also possible demonstrate density differences with a simple balance beam. Chose a piece of galena, then find a chunk of (dry) pumice that weighs the same amount (if necessary you can trim a heavier chunk of pumice down). Using a yardstick, attach the galena and pumice to opposite ends of the stick. Then show that the stick will balance on its mid-point. (You can balance the stick on the edge of your hand, or cut a triangular shaped block of wood to act as the fulcrum.) The pumice, of course, will be visibly much larger than an equivalent weight of galena.

Sinking wood makes an interesting addition to a sink & float demonstration. Some wood is slightly denser than water and thus will sink. You can get pieces of ironwood, for example, from science supply houses, that will sink readily. I purchased one package of six pieces – five of them sank and one floated in cold water. Another source of sinking wood is your local pet shop. Among the aquarium supplies you may find sinking wood (sometimes called Mopani wood) of various colors that is intended for aquarium decoration, but it will work well in your sink & float demo.

Notes for demo tables: If you are doing demonstrations for large numbers of visitors (such as at a booth at a trade show) you may want to put your sink & float specimens in sealed containers. Place a piece or two of pumice and scoria in a cleaned, clear plastic pretzel or peanut butter jar along with some water, then seal it up. You can demonstrate sinking and floating by simply turning the jar upside down allowing visitors to see which pieces settle to the bottom and which float. “Minerals that do things...”