"Minerals that do things…"

Hands-on demonstrations of mineral properties

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Mineral Taste Test

Object: Students will experience minerals and rocks via their sense of **taste**. Some common minerals dissolve quickly and have a distinctive taste; others don't dissolve, but have a characteristic textures when tasted.

Procedure description: Small samples of the various specimens are placed in individually labeled containers (small zip-locks or film canisters) so that students can taste test them. Students taste the samples and compare the tastes – they get to keep the samples. The best way to taste-test water-soluble minerals is wet your finger, rub your damp fingertip on the mineral, and then rub your finger along the edge of your tongue. This limits the amount of mineral ingested. Braver students will lick the samples with the tips of the tongues. When testing for texture, however, it is necessary to actually put a small amount of the mineral or rock in your mouth.

Specimens to test: Calcite or quartz crystals; granular halite; hanksite; epsomite or Epsom salts; rock candy; bentonite; kaolinite; pyrite.

Equipment needed: Used film canisters (you can get them for free from most camera shops) or small individual seal/lock plastics bags. Break up a small amount of each mineral or rock and place the chips in properly-marked containers.

Scientific discussion: Halite, also called rock salt (sodium chloride – NaCl), has a salty taste – this is where we get our table salt. Hanksite is a sodium potassium sulfate carbonate chloride mineral, $Na_{22}K(SO_4)_9(CO_3)_2Cl$, and also has a salty taste.

The mineral epsomite and man-made Epsom salts are chemically identical: they are both hydrated magnesium sulfate, $MgSO_4 \cdot 7H_2O$. A related mineral, hexahydrite, is also a hydrated magnesium sulfate mineral, $MgSO_4 \cdot 6H_2O$. It is easier to find Epsom salts (in most grocery stores) than the mineral epsomite. All of these have the same bitter taste.

Quartz and calcite, if well cleaned, should have no taste. They are useful as blanks. Cleaning specimens well and rinsing them well is important. Students may report that many specimens may taste salty because salt in the sweat in their hands gets onto the specimens. I even heard of one episode wherein a geology student was reporting that each specimen he examined tasted salty – it turned out that the student in line before him had been using some 10% hydrochloric acid to test each mineral for reactivity, hence the salty taste!

Of course, one cannot wash halite, hanksite, or rock candy, because they are very soluble in water. They will even dissolve in just the sweat on your fingers. If you touch halite, then taste-test calcite, you'll probably transfer salt from the halite to the calcite.

Pyrite sometimes has a "sulfurous" taste – this is really a smell. Much of what we call a taste is really a smell.

Some specimens have a characteristic texture. Most rocks or minerals will be gritty when crushed up and tasted. Bentonite is a clay, generated from alteration of volcanic ash. It is composed of smectite clay minerals, mainly montmorillonite. It has the interesting property of having a smooth or creamy texture (rather than being gritty) when placed in the mouth. We take advantage of this creamy texture when we use it in non-dairy coffee creamers (yes, you really are putting a rock in your coffee!).

Other minerals have a characteristic tendency to stick to your tongue when tasted. Magnesite, kaolinite, montmorillonite, and chrysocolla fall in this group. When dry, these minerals absorb water and stick to your moist tongue.

Additional possibilities: Being man-made, rock candy is not a mineral even though it looks like one. Still including it in this taste test is a good treat especially if you give it to the students after they have already tasted salty and bitter minerals. You can purchase rock candy (really just sugar crystals) on small wooden sticks – sometimes it has been dyed or flavored as well. Rock candy that is precipitated from maple sap will have a maple flavor.

Other minerals can also be taste-tested: Borax has a sweet alkaline taste. Ulexite is alkaline. Sylvite is bitter. Glauberite is described as being bitter and salty. Melanterite has a sweet, astringent, metallic taste. Chalcanthite has a sweet metallic taste and is slightly poisonous.

Notes for demo tables: If you are doing demonstrations for large numbers of visitors (such as at a booth at a trade show), I've found that it is simplest to use only halite. When demonstrating taste for a group, I have each person hold out his or her hands palms-up, and then use a small hammer (a metal meat-tenderizing mallet works well) to knock small chips of the rock salt onto their palms. They can then taste the chips using their fingers or their tongues.

Special Note: Do not use other minerals or materials for this demo unless you are sure that they are safe.