



Fizzy Fun!

Grades K – 12

Introduction

There are a lot of ways to tell one mineral from another. Color and shape are good indicators, but they can deceive you. Mineralogists (people who study minerals) have other ways to test samples to see what they are. One of those ways is called the **acid test**. What happens when you put acid on different minerals? What does the acid test tell you?

Safety Suggestions

- Safety goggles required.
- Do not put your hands on your face or near your mouth while doing this activity.
- This activity produces mineral particles and dust. Be careful to not inhale any of the dust produced.
- Caution: sharp objects. Be careful not to scratch yourself with the steel nail, and always work with an adult.
- Do not put any of the materials used in this activity in your mouth.
- Vinegar is a dilute acid, and it may irritate your skin.
- Thoroughly wash hands after this activity.
- Disposal: At the conclusion of this activity, the paper used to cover the work area and any dust or mineral particles, along with the paper towels, can be disposed of in the trash.

Materials

- Set of mineral samples (1-inch samples), including some that contain calcium carbonate and some that do not. You can adjust this based on how many people will participate. Some you could use are:
 - Chalk [make sure it contains calcium carbonate (CaCO_3) and not calcium sulfate (CaSO_4)]
 - Marble chips (can be purchased at a hardware store)
 - Calcite (it's nice to have a clear piece)
 - Lodestone
 - Quartz
 - Pyrite
 - Note: You can also use eggshells and seashells as sources of **calcium carbonate (CaCO_3)**.
- Bottle of vinegar
- Glass or ceramic cup
- Pipette Dropper
- Magnifying glass
- Steel nail
- Paper towels
- Pencil and paper

Procedure

1. Create column headings across the top of your paper by writing "Sample," "Fizz," and "Powder."
2. Down the left-hand side of the page, under the word "Sample," write the name of each mineral sample.
3. Cover your work area with a sheet of brown paper or old newspaper.
4. Pour an inch or so of the vinegar into the cup. Draw up some vinegar into the pipette dropper.
5. Put the first mineral sample on the paper towel. Use the pipette dropper to place a drop of vinegar (remember, this is a dilute acid!) on the sample.
6. Look at it closely with the magnifying glass. Is the vinegar bubbling and fizzing? If so, write "yes" in the Fizz column, and skip the next step. If not, write "no" in the Fizz column and go to the next step.

7. If the vinegar *didn't* fizz in the last step, try to scratch your sample with the steel nail. If the nail won't scratch the sample, write "too hard" in the Powder column. If the sample does get scratched, there will be a little powdered mineral in and around the scratch. Put a drop of vinegar on the powder.
8. Use the magnifying glass again. Is the vinegar fizzing now? If so, write "yes" in the Powder column; if not, write "no" there.
9. Repeat steps 4-7 with all of your samples.
10. Examine your results and analyze using information in the How does it work? section.

How does it work? Where's the chemistry?

Minerals (or other substances like eggshells and seashells) that are made out of calcium carbonate (or CaCO_3) will usually fizz on the first try. When calcium carbonate and acetic acid (vinegar) combine, a chemical reaction takes place and carbon dioxide gas (CO_2) is released. That's why you see the bubbles.

If the mineral is made of calcium carbonate and the atoms are bound together really tightly, you might need to scratch them to make some powder out of them before they'll fizz. This is one way mineralogists tell the difference between calcite and dolomite, two similar-looking carbonate minerals. If the mineral did not fizz at all — even after you scratched it with the nail — then it probably doesn't contain any calcium carbonate.

References

- www.education.com/science-fair/article/Acid-Test-How-Minerals-Apart/