

Minerals

Vanderbilt Student Volunteers for Science
Presentation

2018-2019 VINSE/VSVS Rural

Safety Considerations

- Be sure students wear goggles for the acid test.

Why is the science in this lesson important?

Minerals are vital to our everyday lives: for example, minerals are an important component of iPhones, computer chips, and magnets. New processes are currently being developed to allow us to more efficiently extract the minerals that we are currently using, as well as extract completely new materials. Careers involving innovation in the mining and metallurgy industries are extremely important in ensuring that humans use our limited supply of resources sustainably.

Set-Up

- Students should be divided into pairs.
- Refer to the minerals by number, not by name.
- Vocab words: mineral, luster, streak test, hardness test, Moh's scale, & cleavage test.
- Lead students through each test on mineral #1 (hematite). They will record their results and immediately repeat each test on their 2 unknown minerals.
- Circulate among the students and guide as needed.

Introduction

- What makes up rocks?
 - Definition of a mineral: inorganic compounds found naturally in the earth with a definite composition and structure.
- Identify minerals through different tests.
 - List of some minerals: talc, rose quartz, smoky quartz, halite, galena, magnetite, graphite, feldspar, calcite, and gypsum.

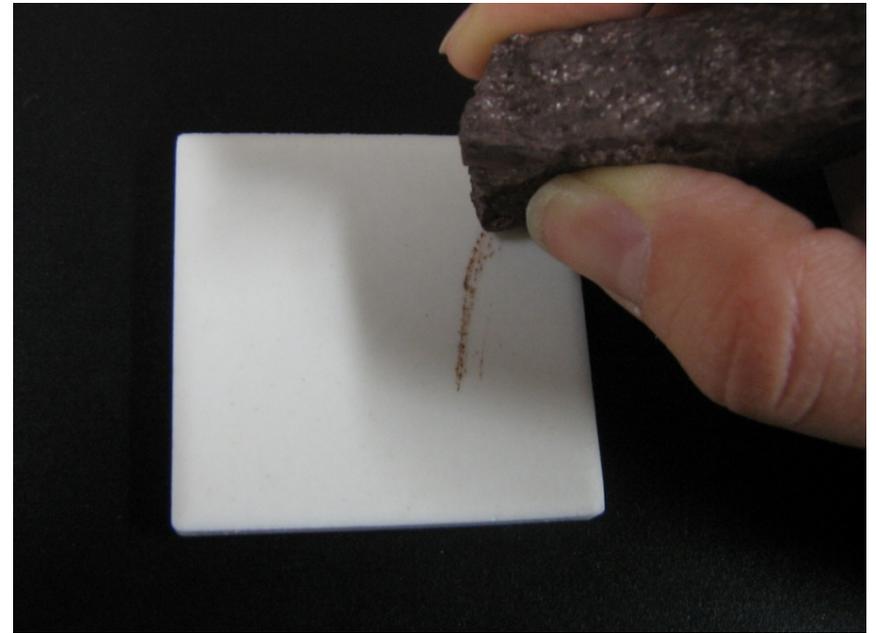
Test #1 & Demo: Streak Test

- Define a Streak Test
- Show students the two minerals that are both quartz (pink Rose quartz and white Milky quartz). The different colors are from different impurities.
- The minerals will have the same streak test. The mark left on the tile is the mineral's streak.
- Show the streak of a mineral simply by dragging the mineral across the black streak plate ONCE.



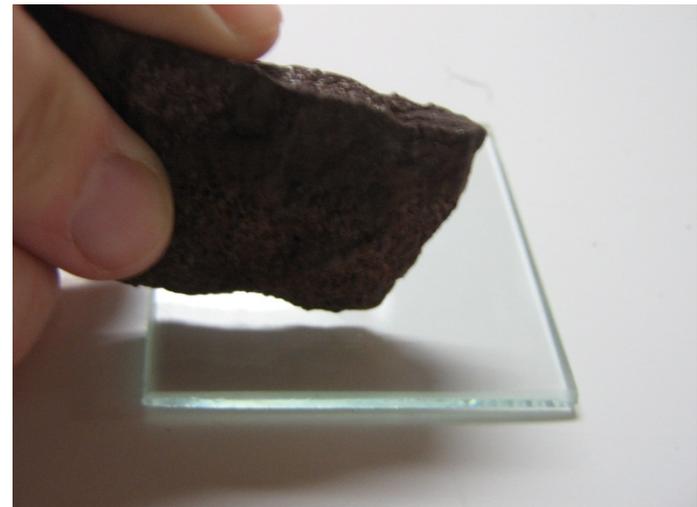
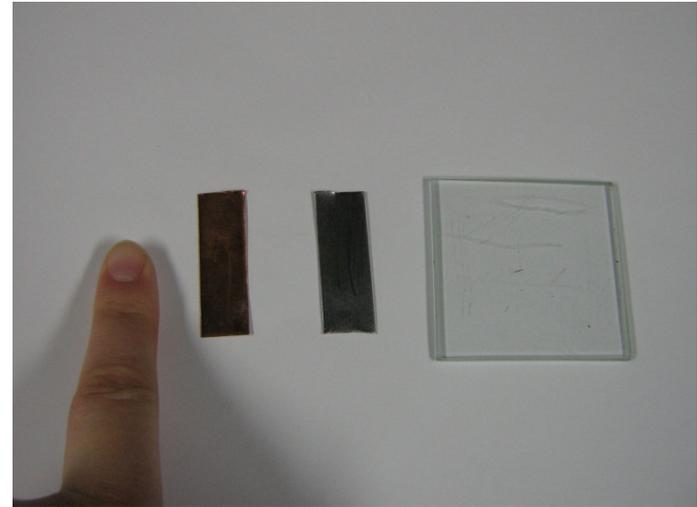
Test #1: Streak Test

- Gently stroke the edge of the mineral across the white streak plate.
- Record the color that the streak produces. If no streak appears, record "not visible" on the investigation sheet.
- **Note: Ask students to make only one streak per mineral since the tiles and minerals are needed for other classes.**



Test #2: Hardness Test

- Explain hardness and Moh's Scale.
- Use the testers in the following order to test the hardness of the mineral:
 - Piece of glass
 - Piece of iron
 - Piece of copper
 - Fingernail
- Determine the Mohs hardness of the mineral by finding the HARDEST (i.e. the FIRST) tester that the mineral will scratch. Circle that tester & its corresponding hardness on the observation sheet.
- **NOTE: Keep glass plates flat on the tables or they will snap!**



Test #3: Cleavage and Fracture Test

- Explain cleavage.
- Tell students if the mineral cleaves, they will observe flat surfaces.
 - Muscovite demo (sheets)
- If a mineral fractures, it breaks unevenly along curved or irregular surfaces (see hematite).
- Not all cleavage is as smooth as muscovite.



Cleaving minerals
(muscovite)



Fracturing minerals
(hematite)

Test #4: Luster Test

- Aluminum foil is shiny and reflects light well (*metallic luster*)
- Glass is shiny, but does not reflect (non-metallic luster - *Glassy*)
- Wood is dull (non-metallic luster - *Dull*)
- Bead container is pearly (non-metallic luster - *Pearly*)
- Show examples of non-metallic luster: glassy, dull and pearly.
- Hand lenses may be needed to see luster.



Test #5: Magnetism Test

- Touch the mineral with the magnet.
- If the mineral is attracted to a magnet, the mineral is magnetic.
 - If there is an attraction, students circle yes
 - If there is no attraction, students circle no
- Show them your sample 3 so that those who don't have that unknown can see that some minerals do actually attract a magnet.



Determine Unknown Mineral

- Students will determine their minerals using **properties of minerals handout**.
- If time allows, perform the following special properties test.

Special Properties: Acid Test

- If a mineral is a carbonate, it will fizz with acid.
- Explain that they will be doing the acid test on a **ROCK** marble (emphasize that it is not a mineral but made up of minerals).
- **If the class tends to be unruly or if enough goggles are not available for the students, the VSVS volunteers should take the acid to the groups and put it on the marble for them.**
- **Then the students can observe and record their observations.**



Special Properties: Acid Test

- Give safety goggles to each student and VSVS volunteers.
- Distribute one acid dropper bottle, one plate, and one piece of marble to each group.
- Tell students to put 1 drop on the marble and observe what happens. They may need to use their magnifier.
- Ask the students what mineral they think makes up marble by referring to the **properties of minerals handout** (*calcite*).
- Ask if they know of other rocks in the area that react similarly with acid (*limestone*).



Optional: Special Properties—Fluorescence of Minerals and Color of Minerals

- Shine black light on sample of Scapolite, which will fluoresce bright yellow.
- Show students the 12 colored mineral samples in the kit (see info in manual – share some of this information).
- While these demos are being shown, organize all materials for return to the lesson box.

Scapolite



Colored Minerals



Optional: Everyday Uses of Minerals

- Tell students to look at the Everyday Uses of Minerals Handout. As each mineral is discussed, have a VSVS member hold up the mineral from the VSVS mineral box