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# MINERALS

# Activity # 4 – Breakage

**Recommendations: For grades 3-6. Can be done inside or outside** *(outside would be better, this activity can create a mess).* **Adult supervision is required and safety equipment should be worn.**

**Purpose**: To determine the way minerals break. Depending on its atomic structure, different minerals either cleave along specific planes, shapes and angles or fracture with irregular patterns.

**Materials**:

- 5 different samples of minerals
- Toothbrush and some water
- **Safety glasses**
- **Gloves**
- Hammer
- 1 Piece of paper per student
- 1 Writing utensil per student

**How it Works**:

*Context: There are two types of breakage: minerals can "cleave" on specific planes referred to as **cleavage** or they can "**fracture**" with irregular patterns.*

Cleavage Examples:

Fracture Examples:


**Step 1:** Have students remove dirt or debris from samples using a toothbrush and water. Then, number the samples from #1-5.

**Step 2:** Copy the chart below on a sheet of paper *(1per student)*.

| Sample #: | Guess: | Cleavage or Fracture?: |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

**Step 3:** In the chart have students guess how they think their 5 samples will break apart, cleavage or fracture?

**Step 4:** On a flat surface, with safety glasses and gloves, use the hammer to break the 1st sample *(when using the hammer make sure to be aware of surroundings and other people because bits will go flying)*. One hit will do it!

**Step 5:** Collect the bits of your sample and examine how it broke apart. Did it "cleave" into flat surfaces? Or did it "fracture" into irregular shapes? Record your finding on the chart.

**Step 6:** Repeat steps 4 and 5 for the remaining four samples.

**Conclusion:**

How did the students guesses match up with how the minerals broke apart? After finishing this experiment with your original 5 minerals you can have students redo this activity with new samples and see if their guesses are more accurate this time around.

Minerals that have cleavage can be divided into categories bases on how many cleavage planes they have and minerals that fracture can be divided into categories based on how they fracture.

If you would like to dive deeper and figure out the exact way your mineral cleaves or fractures, check out "Types of Cleavage and Fracture Activity" from the list of activities on our website.

Also, now that you have figured out which of your samples cleave and which fracture, **try out the other 3 activities** to see if you can identify the type of minerals you have. The other activities are:

- Minerals 2 - Hardness
- Minerals 3 - Luster
- Minerals 5 – Streak test

**Resources:**

**Check out this YouTube video!**

https://www.youtube.com/watch?v=XEQ8m75yw10&t=9s