

WHAT IS A MINERAL, ANYWAY?

Question: What is a mineral, anyway?

Core Content

- SC-M-1.1.1** A substance has characteristic physical properties (e.g., density, boiling point, solubility) that are independent of the amount of the sample. A mixture of substances often can be separated into the original substances by using one or more of these characteristic physical properties.
- SC-M-1.1.2** The chemical properties of a substance cause it to react in predictable ways with other substances to form compounds with different characteristic properties. In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways.

Objectives

Students will be able to

1. Differentiate mineral from non-mineral materials.
2. Develop their own system to differentiate between minerals.
3. Use prepared charts to name minerals.

Materials (for 6 groups):

- 6 plastic bags, each containing a piece of wood, brick, concrete, coal, and two minerals: halite (salt) and quartz;
- 6 plastic bags, each containing three pieces of 15 different minerals
- 6 bottles of dilute HCl (or vinegar); six magnets; 6 streak plates; six glass scratch plates (**none of these will be given out until step 11.**)

Procedure/ Time:

Time: two blocks, or three 55 minute periods.

Work in groups of 4 or 5.

1. Ask students to sort out bag of materials into mineral and non-mineral. (Each bag has 6 materials, including wood, coal, brick, concrete, and two minerals)
2. Then lead a class discussion with the following questions:
What is a mineral? (halite, quartz)
What's not? (wood, coal, brick, concrete)
Why not?
3. End the discussion by defining mineral (solid, homogeneous, nonliving substances
4. occurring in nature which have a definite chemical composition).
5. Explain to the students: Minerals have unique physical properties, which then allow us to tell them apart, and thus to identify them.
6. Then give each group a bag of the mixed minerals: 15 minerals, with three pieces of each.
7. Have students separate minerals into their piles of three. As they are working ask students: How many different minerals do you have? (3 samples of each of 15 minerals for each student table) Many students will have trouble telling various white minerals apart.

8. Ask each group to make a list of properties used to sort out the minerals. (For example, such characteristics as flat parallel surfaces-cleavage; color; light versus heavy; one will scratch another. **Don't tell them what characteristics to use.**)
9. Begin another class discussion, with each group contributing the characteristics they used to tell these minerals apart (make a chart on the board). Discuss which samples could not be separated by the student groups.
10. Explain that because minerals have unique chemical composition and arrangement of atoms (they are crystals), they have unique physical properties that allow us to identify them.
11. Now make the additional materials available to the groups to test other physical properties and give students charts with physical properties and mineral and ask the students to identify their minerals.

Assessment

The groups will be assessed by checking the completed identification of the minerals at each table.

WHAT IS A MINERAL, ANYWAY?

1. How many different ways can you separate and classify the items in the bag? Be as creative as you want, but make sure you have an explanation.
2. Can you tell which items are minerals? Why or why not?
3. Can you tell which items are not minerals? Why or why not?
4. As a class, and with your teacher, define a mineral

Minerals have unique physical properties, which then allow us to tell them apart, and thus to identify them. There are five different minerals (three pieces of each) in the bag you were given. Can you separate the minerals into their piles of three?

5. Make a list of properties that you think might be helpful to sort out the minerals.
6. Share your properties with the class, and as a class, make a new set of properties that could be used to sort out the minerals.