MINERALS ACTIVITY—TWO PARTS

The purpose of this lab is to introduce the concept of minerals. In the first part, Students will discuss the properties of minerals and observe examples of minerals. In the second part, students will look closely at the properties of salt, and specifically observe the dissolving property of salt.

PART I:

Materials I:
Mineral set
I got sewing boxes from the dollar store and bought minerals from Ward’s science supply online. For each mineral, I bought the set of hand specimens for 10 students.
Minerals I used were:
Quartz, calcite (which you can get for free from the Florida Geological Survey or just by asking me), hematite, biotite, amphibole, plagioclase, and orthoclase. If you need help with this, let me know.
I used white out and a permanent marker to label the minerals with numbers (ex: 1- calcite, 2-quartz, etc.) and then made a key and taped it to the inside of each box).
Hand lens

Invitation I:

1. Does anyone know what a mineral is?
2. Can you name any minerals? (Diamonds, quartz, salt, asbestos, sulfur, copper)
3. Can you think of anything we use that is a mineral? [Kitty litter (a type of clay mineral), table salt (halite), gems, fertilizer (apatite- phosphate), pencils and electrodes (graphite), make up (mica), etc.]

Exploration/ Concept Introduction I:

Hand out set of minerals and a magnifying glass to each group of students.

1. What is a mineral? (Come up with a five part definition)
2. Look at your minerals. What things can you tell me about those minerals?
3. Do they eat? Breath? Are they alive?
4. What else? …Ok, so you are giving me properties of your minerals. So you think all minerals have describable physical properties? (They do and we will come back to that later.)
5. Do minerals have particular shapes? Show some crystals
6. What are these shaped things called? \(\text{Crystals. Crystals are formed because atoms are ordered into patterns as they are incorporated into the mineral. As more atoms are incorporated, they attach themselves in an orderly way to make the same shape get bigger and bigger.}\)

7. Do you think all minerals have these ordered crystal patterns? Why or why not?

8. Well, what if you had a bunch of individual crystals that grew together? \text{Show calcite growing together.} Would you still be able to see their crystal pattern after they had grown together and filled in all available space? \(\text{(No) Why or why not?}\)

9. Ok, so you would not be able to see them because they have grown together. Did they still start out aligning themselves along crystal patterns?

10. So that must be another part of what a mineral is: something that has an ordered crystal pattern

11. Any other ideas about what a mineral is? Where do you find minerals? Discussion

12. So they can be found in nature. They are: \(\text{(Naturally occurring)}\)

13. Ok, so these are the first 4 parts of the definition of a mineral. The last part has to do with the chemistry of the mineral. Can you throw clay and orange juice together and make quartz? How about yogurt and flower to make calcite?

14. So you have to put specific things together for a mineral form? So any mineral has a specific chemical composition

15. You can write out the chemistry of a mineral. Quartz has a chemical composition of \(\text{SiO}_2\) or silicon dioxide. Any quartz you find will have that composition. Ok, take a minute to copy down our definition of a mineral.

\textbf{Application I:}

1. So, if this is a definition of a mineral, is my skin a mineral? Why not? \(\text{(Go through definition for each) it is living}\)

2. Is your pen a mineral? \(\text{(It is not naturally occurring)}\)

3. What about air? \(\text{(No crystalline structure)}\)
PART II:

Materials II:
Mineral set
Hand lens
Clear cup each group
Table salt
Thick string
Pencil or stick
Water
Permanent marker (for names on cup)
Scissors (to cut string)

Invitation II:

1. How about table salt? [(Go through definition) It is non living, naturally occurring (sea water), you can describe its properties, the chemical comp is NaCl (sodium chloride).]
2. Does it have a crystal pattern?

Exploration II:

Hand out to each group:
One clear plastic cup with some salt in the bottom,
One string
One pencil or stick

Have students observe the shape of the salt crystals before they are dissolved.

1. What shape are the salt crystals? Do you think the crystals we grow will be the same shape? We will experiment and find out.

Have students tie string to stick and write names on their cup. While they are doing this pour very warm water into each cup (only need to fill cup ~1/4 full). Most salt should dissolve and a little should remain solid. If all dissolved, give group more salt. Place stick over cup so string hangs in water. Leave cups where they can sit undisturbed for a week.

1. Let’s talk more about the minerals that you have in front of you (mineral box). We said in our definition of a mineral that it has describable properties. Can anyone give me an example of what a physical property is?
2. I want each group to divide up the minerals in front of you into two or three groups based on one property. For example if we were to divide up all of the pencils in the classroom based on a property, what is one property we could use? (Color, length, etc.)
3. Ok, so each group pick one property and divide up your minerals based on your property. Don’t tell any other group which property you have chosen. You have three (5?) minutes.

**While they work put index cards on each table with a # on it.**

1. Now, leave your minerals as you have divided them. When I say to move, your group will go to another table and try to guess what property they used to group their minerals. You will have one minute at each table and I will tell you which way to move through the tables. Bring your paper with the definition of a mineral with you. For each table, write the table number and your guess at the property they used to group the minerals. Does anyone have any questions about the directions?

**Instruct them on how to move through the tables.** You can go to the first table now.

At the end have the students return to their seats. Each group will tell their group number and the property they used to group their minerals. If there is time, have a discussion about what property people thought they used. Write all properties on the board.

**Concept Introduction II:**

1. Which properties do you think geologists might use to classify minerals? *Go through list and cross our properties like size and weight. Discuss why they would not be appropriate to use but why other properties are more useful.*

2. If there is time mention that geologists look at: Color, hardness, streak color (what color the mineral powders), density (sometimes called specific gravity—a comparison of the density of the mineral to the density of water), and crystal structure

**Application II:**

1. Do you think that observable properties of a mineral might differ from specimen to specimen?

2. If so, how would you figure out what mineral you had? *(You could test the chemical composition)*
Minerals Key:
1. Orthoclase
2. Biotite
3. Quartz
4. Hematite
5. Plagioclase
6. Amphibole
7. Calcite