The Nature of Science – How can minerals be defined by their properties?

Minerals can be found almost anywhere. Some are used to make things we use every day, like pots and pans and bicycles. Even though there are over 4,000 kinds of minerals, they all share five characteristics:

1. Minerals are formed by natural processes. Minerals can solidify from magma, precipitate out of a solution, or form as a solution evaporates.
2. Minerals are inorganic, which means they are not alive and never were.
3. Minerals are solids.
4. Every mineral has its own distinct chemical composition.
5. A minerals’ atoms are arranged in a repeating pattern that is unique to that mineral.

Although all minerals share common characteristics, each mineral has its own unique physical properties. Appearance, color, luster, cleavage/fracture, streak color, and hardness are some of the physical properties used to identify a mineral. When identifying a mineral, it is important to examine all the properties of the mineral. For examples, to differentiate between the minerals gold and pyrite, physical properties besides color ad appearance would have to be tested.

In this Virtual Lab, you will examine physical properties of various minerals. You will identify mystery minerals by performing scientific tests.

Objective:

* Identify minerals by testing them for key properties

Procedure:

1. Click the Video button.
   1. Watch the slide show to learn about the properties of minerals.
2. Select a mystery mineral from the tray.
   1. Click and drag it to the test plate.
3. Click the Toolbox to see the available tools.
4. Conduct one of the four tests on the mystery mineral.
   1. Click the magnifying glass.
   2. Drag it over the mystery mineral to test the minerals luster, color, and cleavage/fracture.
   3. Record your test results in your data table.
5. Open the Toolbox and click the streak plate.
   1. Drag the mystery mineral over the streak plate to test the streak color.
   2. Record your test results in the Table.
6. Open the Toolbox and click the piece of glass.
   1. Drag the mystery mineral over the piece of glass to test the minerals hardness.
   2. Record your test results in the Table.
7. Open the Toolbox and click the fingernail scratch tool.
   1. Drag the mystery mineral over the fingernail scratch tool to test the minerals hardness. Record your test results in the Table.
8. Click the reference cards.
   1. Use the left and right arrows to page through the cards.
   2. Compare the data you collected to descriptions of the minerals shown on the reference cards.
   3. Determine the identity of the mystery mineral.
   4. Click the arrow on the front of the test plate.
   5. Select the name of the mystery mineral.
   6. Click Check.
9. Test other mystery minerals and record the results in the Table.
10. After testing the minerals, complete the Journal questions.
11. Repeat the activity several times. Click the Reset button to see a new set of mystery minerals.

Data Collection: Prepare a Data Table with headings like the ones below, adding as many rows as needed to record results for all tests on all minerals…. use Letters to identify them

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Mineral | Luster | Cleavage/Fracture | Color | Streak color | Hardness | Name |
| A |  |  |  |  |  |  |

Journal Questions: How can minerals be defined by their properties?

1. For each mineral you tested, which test was most helpful in identifying that particular mineral?
   1. Why?
2. For each mineral you tested, which test was least helpful in identifying that particular mineral?
   1. Why?
3. Why is streak color more reliable than mineral color as an identifying characteristic?
4. Why do you think some minerals are easier to identify than others?