

Mineral Identification Lab

Original Lesson by Marcella Welch

Focus on Inquiry

The student will use the physical properties of minerals to test and identify a group of minerals.

Lesson Overview

Students will review the physical properties that are used in identifying minerals (color, streak, cleavage or fracture, chemical properties, luster, etc.) They will then classify the minerals according to their properties.

Duration 80 min.	Setting Classroom	Grouping 3-4 students	PTI Inquiry Sub skills 3.3, 3.4, 3.7, 4.3, 5.2, 7.2, 7.3
----------------------------	-----------------------------	---------------------------------	--

Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
<i>Engage</i>	5-10 min.	3.7, 5.2	Projector or overhead may be used	2	Using pictures or samples of minerals the teacher will ask the students how are minerals identified.
<i>Explore</i>	40 min	3.3, 3.4, 3.7, 4.3	Computer with Internet access	2,3	Students will test minerals for their physical properties in order to identify them.
<i>Explain</i>	15-20min.	4.3, 7.2, 7.3	None	3	Students will identify which properties were useful and not useful in identifying minerals.
<i>Expand</i>	10 min.	3.3	Computer with Internet access	3	Students will be challenged to identify a "mystery" mineral.
<i>Evaluate</i>	N/A	7.3	None	N/A	Teacher developed rubric for data collection and discussion.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Use appropriate tools and techniques to gather, analyze, and interpret data.
 Develop descriptions, explanations, predictions, and models using evidence.
 Think critically and logically to make the relationship between evidence and explanations.
 Communicate scientific procedures and explanations.



National Science Education Standards – Earth Science

Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.

Louisiana Grade Level Expectations – Inquiry

- Gr. 8, Inquiry GLE#7 – Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
- Gr. 8, Inquiry GLE#12 – Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
- Gr. 8, Inquiry GLE#13 – Identify patterns in data to explain natural events (SI-M-A4)
- Gr. 8, Inquiry GLE#19 – Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
- Gr. 8, Inquiry GLE#22 – Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)



Louisiana Grade Level Expectations Earth Science

Gr. 8, GLE #16 – Compare the physical characteristics of rock and mineral specimens to observe that a rock is a mixture of minerals (ESS-M-A5)
 Gr. 8, GLE#17 – Describe the properties of minerals (e.g., color, luster, hardness, streak) (ESS-M-A5)

Materials List (per group)

- 4-5 minerals
- hand lens
- copper penny, glass slide, iron nail, streak plate or unglazed tile,
- fresh vinegar and eye dropper
- compass or magnet
- Blackline Master # 1.
- computers with internet access

Advance Preparation

1. Prepare your labs with the equipment listed above for each group.
2. Make sure your class understands the various properties used in identifying minerals.
3. All classes should have had experience using a streak plate and testing minerals for hardness.
4. Review the physical properties and ways to identify minerals with the following website, Mineralogy4Kids, http://www.minsocam.org/MSA/K12/K_12.html
5. Check to make sure that all website are functional.

Other Information

Learning Objective

The student will...

- identify and classify a group of minerals by testing their physical properties.

Prior Knowledge Needed by the Students

Students need to understand the various properties used in identifying minerals.

Students should know how to properly use a streak plate and how to test for mineral hardness.

Procedure

Engage

1. The teacher can have a variety of pictures of minerals (i.e.: diamonds, rubies, sapphires, jewelry, etc.) and products that are made from minerals (copper, iron, computer chips, cars, cell phones, metal cups, etc).
2. Next, use the pictures (or the like) showing how we mine for these minerals such as caves, and samples of various types of mining (shaft and strip).
3. Ask the question: How do scientists identify these minerals? Allow all answers
4. Now inform the students that they will collect a group of the minerals and use their physical properties to test and identify them.
5. Once they have identified the names of these minerals they will then search to find out how these minerals are used.

Explore

1. Students will pick up their prepared trays, or will collect the necessary materials for testing and identification of their minerals.
2. Students will **collaborate** and decide what **physical properties/tests** they will use in order to identify their minerals.
3. Each student will have a lab sheet. They need to **list the physical properties** and tests that the group decides to use on their lab sheet.
4. The mineral identification sheet will be issued **ONLY WHEN THE GROUP HAS FINISHED** their testing.

**Explain**

1. Students will use the mineral identification sheet (Backline Master #1) to confirm the identification of each mineral. Also helpful is the website: Common minerals and their properties, <http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/minerals.html>, which the students can use to confirm their answers.
2. Students can **create a chart** showing their minerals names and the property that was **most helpful** in identifying them.
3. Students can post or present their chart to the class

Expand

1. Students can research the minerals that are mined in the various states. A useful website is <http://www.msha.gov/KIDS/MINING.htm>.

Evaluate

1. Completion of the lab sheet.
2. Presentation of their data and findings in a chart or other form.
3. Picture of the U.S. state and minerals that are found in each one.

Blackline Master

1. **Mineral Lab Sheet**

Supplementary Resources**Mineralogical Society of America's Mineralogy4Kids**

http://www.minsocam.org/MSA/K12/K_12.html

Click on the tab "Minerals in Your House" to learn about uses of minerals in the home.

Natural Resources Canada: Minerals and Metals at Home

http://www.nrcan.gc.ca/mms/scho-ecol/tour/intro_e.htm

This website covers how minerals and metals are used and mined.

Name: _____ Date: _____ Class Hour: _____

Mineral Lab Sheet

Focus Question: Which physical property(ies) is (are) most useful to identify an unknown mineral?

Hypothesis: _____

Materials: (per group of students)

- Hand Lens
- Copper penny
- Glass slide
- Iron nail
- Streak plate or unglazed tile
- Fresh vinegar in dropper bottles
- Compass or magnet
- Identification sheet of mineral properties
- Hardness scale

Use the following scale when testing for hardness

- | | |
|-----|--------------------------------------|
| 1-2 | Scratched easily with the fingernail |
| 3 | Copper penny can scratch mineral |
| 4-5 | Iron nail can scratch mineral |
| 6-7 | Mineral can scratch glass |
| 7+ | Mineral is scratched by glass |

Procedure:

1. As a group, collaborate to determine which physical properties (example: hardness) you will test in order to identify the minerals.
2. Sketch each of your minerals in one of the rows of your data table.
3. Once you have determined which five physical properties you can conduct tests for, label each box in the data table below with a property. Example, Property # 1 may be labeled Streak Test, if your group has determined that you have the materials to conduct a streak test and that a streak test would be beneficial in identifying your minerals.
4. Pick a mineral. In the data table, draw a sketch of the mineral you are testing.
5. Using the mineral identification sheet, conduct tests for each physical property to identify the mineral.
6. Record the properties discovered under the correct property box. Example, after doing a hardness test, you discover the mineral you were testing has a hardness of 1.5. So under the box labeled "Hardness," you write 1.5 for that mineral.
7. Record the name of the mineral in the box labeled "Name of Mineral."
8. Repeat steps 3 and 4 for the remainder of minerals. Be sure you fill in your data table as you go.
9. Upon completion of the data table, answer the questions in the analysis and conclusion sections.





Mineral Identification Data Table:

Sketch of Mineral	Property #1 ()	Property #2 ()	Property #3 ()	Property #4 ()	Property #5 ()	Name of Mineral
Mineral #1						
Mineral #2						
Mineral #3						
Mineral #4						
Mineral #5						

Analysis:

1. What properties did you find helpful in identifying your minerals? Explain why they were helpful.
2. What properties were not helpful? Explain why they were not helpful?

Conclusion:

1. Was your hypothesis supported or not? Why or why not?
2. What is the most important thing you learned about minerals by doing this lab activity?