

NAME THAT MINERAL!

Background Information for Activity Leaders

Overview

Children will examine and observe some of the physical properties of various minerals. They will become aware that minerals can be identified by their physical properties.

Key Concepts

- Geologists are scientists who study rocks and minerals to better understand the processes that shaped the earth.
- By carefully observing and describing the properties of minerals, children will begin to notice that they are not all the same.
- Many minerals have different **colors**. Some minerals' colors are identical to other minerals' colors. For this reason, color is not the only physical property that geologists look at to identify a mineral. For example, gold and iron pyrite (fool's gold) have the same color.
- **Luster** is a description of the way light interacts with the surface of a crystal. Below are some of the common terms used to describe luster:
 - Dull - a non-reflective surface of any kind
 - Metallic - looks like metals
 - Pearly - looks like a pearl
 - Silky - looks like silk
 - Vitreous - looks like glass
 - Waxy - looks like wax
- **Cleavage** describes how easily a mineral breaks. In this investigation the descriptions are limited to "perfect cleavage," which means easy to break, and "poor cleavage," which means difficult to break.
- **Streak** is closely related to color, but it is a different property. The color of the mineral may be different than the color of its streak. The way to test for streak is to rub a mineral across a white unglazed porcelain tile and examine the color of the streak of powder left behind. This is one way you can tell the difference between gold and iron pyrite. Gold gives a 'yellow' color streak, while iron pyrite streaks greenish black.
- A mineral demonstrates **double refraction** when it creates a double image when you look through it. The best way to test for this property is to place the mineral over the writing on a book or newspaper and observe whether you see a double image of the text.

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Background Information for Activity Leaders

- Minerals that are **magnetic** range in magnetic strength from being capable of lifting steel rods to barely turning the needle on a compass. Magnetism is somewhat of an unreliable property as not all specimens may demonstrate it. Some minerals are not magnetic, but are attracted to magnets.
- **Fluorescence** occurs when light from an ultraviolet lamp reacts with the chemicals of a mineral and causes the mineral to glow.
- **Hardness** can also be an important physical property to identify minerals. In this lesson hardness will not be tested due to the need for tools that may pose a danger to children, such as metal knives or nails.

What to Expect

- Primary age school children should be encouraged to closely observe the objects and materials in their environment, note their properties, distinguish one from another, and develop their own explanations of how things might have become the way they are.
- Children may be successful in observing details of rock and mineral samples. However, they will not be able to differentiate between geologically relevant and irrelevant properties. For example, whether the child considers the sample to be 'pretty' or 'ugly' is not considered to be geologically relevant.
- Younger children may not be able to identify the names of the minerals. The significance of doing the lesson is to give them the opportunity to be exposed to mineral samples that can be carefully observed, not to name them.
- Children also learn that the more data one gathers, the more certain one can be in identifying the mineral. Gathering data is like gathering evidence. In this case to identify the mineral.
- Children will learn to use a scientific 'key' as a means of identification. A 'key' is a way to identify object based on their properties.

Common Misconceptions

- *Children may think: "Each type of mineral can be identified by its color."*

Color is not a good property to rely on to identify minerals. Many different kinds of minerals have the same color.

- *Children may think: "A mineral can be identified by using only one property."*

Most minerals can vary in their physical appearance from specimen to specimen, so it is important to take into account various physical properties before classifying a mineral.

NAME THAT MINERAL!

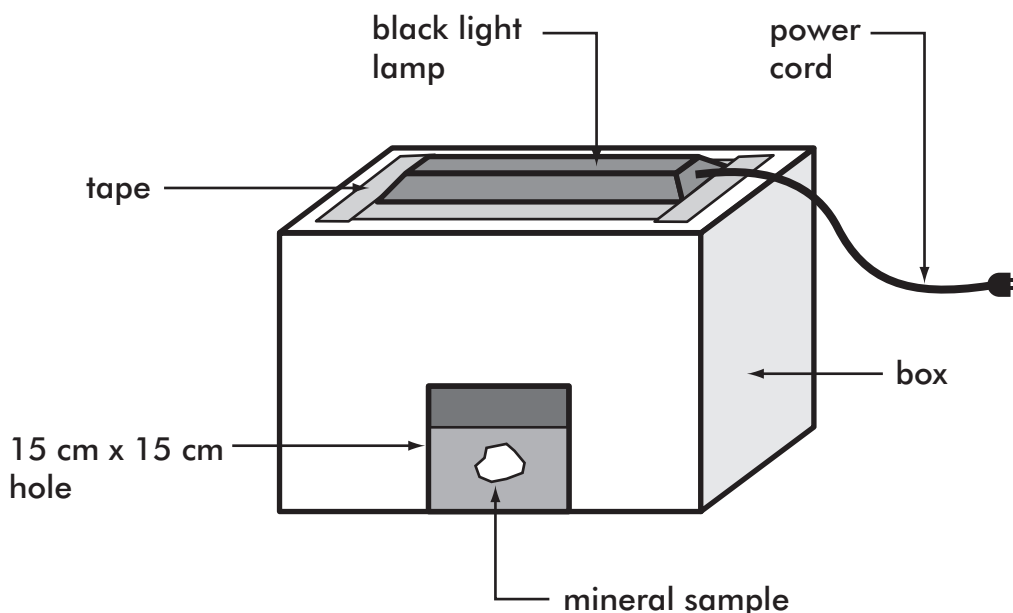
Instructions to Build Shortwave, Black Light Viewing Box

Materials

- (1) shortwave black light lamp
- (1) box large enough to house the shortwave black light lamp
- (1) roll of duct tape
- (1) pair strong scissors or safety cutting knife

Directions

1. Use the scissors or safety knife to cut a hole at the top of the box which allows you to place the lamp face down.
2. Use the duct tape to secure the lamp to the box.
3. Use the duct tape to cover any openings or structurally weak areas of the box.
4. Use the scissors or safety knife to cut a 15 cm by 15 cm square opening in one of the sides of the box.
5. To view mineral samples, place the sample inside the box through the square opening, and turn on the shortwave black light lamp. View the sample in the opening.
6. Using the light inside the box as directed will cause no harm. Warn children not to remove the light from the box or look at the light directly because it may cause retinal damage.



NAME THAT MINERAL!

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Physical Properties

Attach a picture of the mineral here!

Name of Mineral: _____

Color: _____

Luster: _____

Cleavage: _____

Streak: _____

Double Refraction: YES / NO

Magnetism: YES / NO

Fluorescence: YES / NO

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Mineral Observation Cards

Color

What colors do you observe?

Streak

Rub the mineral across a white unglazed porcelain tile.

What color "streak" does it leave behind?

Magnetism

Bring a magnet hanging from a string close to the mineral without touching it. Does the mineral attract the magnet?

Luster

Which term best describes the way the mineral looks?

- Dull
- Waxy
- Metallic
- Silky
- Pearly
- Vitreous (looks like glass)

Fluorescence

Place the mineral inside the shortwave black light viewing box.

Does it change color under a black light?

Cleavage

Which best describes the way the mineral breaks using a plastic knife?

- perfect cleavage - easy to break off
- poor cleavage - difficult to break off

Double Refraction

Place the mineral on top of newspaper print.

Do the letters appear to be doubled?

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Mineral Identification Key

1. Biotite: This mineral is usually black to brown. It has perfect basal cleavage so it breaks into thin sheets, with vitreous luster (resembling the look of glass).

2. Willemite: This mineral appears fluorescent green under short-wave ultraviolet light. It can be scratched with glass or a knife blade. It has good cleavage, so when it breaks it leaves mostly smooth surfaces and some rough surfaces. It's appearance can be translucent. It's luster is resinous (resembling the appearance of resin) or vitreous luster (resembling the look of glass). Willemite is often found in the rocks commonly known as marble.

3. Calcite/Iceland Spar: While there are over 300 forms of calcite, they all have a unique optical quality known as double refraction. Writing viewed through Iceland spar will appear twice, or doubled.

4. Pyrite: Also known as "fools gold," pyrite is a common mineral with a bright metallic luster that often is mistaken for gold. It has a yellowish color and often forms cube-like masses. The easiest way to tell pyrite and gold apart is to perform a scratch test on a unglazed white tile. While the mineral gold scratches yellowish-gold, pyrite scratches black.

5. Hackmanite: This mineral is fluorescent in short-wave ultraviolet light. Hackmanite fluoresces pink, however it quickly loses its color when exposed to light. The color alteration between pink and colorless can be repeated again and again.

6. Magnetite/Lodestone: Lodestone is a naturally occurring magnetic form of magnetite. Magnetite is a hard mineral and very heavy, with no cleavage. The minerals that are magnetic range in magnetic strength from being capable of lifting steel rods to barely turning the needle on a compass.

NAME THAT MINERAL!

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Data Collection Sheet

Name: _____

Date: _____

WONDER If you had several different minerals, how could you identify them?

RECORD Use the Data Table to organize your mineral observations. The minerals are numbered from 1 to 6 according to their sticker number.

Data Table

name	color	luster	cleavage	streak	double refraction	magnetism	fluorescence
1.							
2.							
3.							
4.							
5.							
6.							

CONCLUDE What did you discover about the minerals you observed? How were you able to identify them?

Set Up the Expedition

Materials:

For the activity leader:

- **Name That Mineral!** Learning Cards
- (3-5) copies of the physical properties template
- illustrations of minerals depicting the tested physical properties
- (1) key to names of minerals
- (1) shortwave black light lamp
- (1) banker box (or similar box)

For each group:

- (1) set of 4-6 mineral samples
- (1) unglazed white ceramic tile
- (1) plastic knife
- (1) crayons
- (4) sheets of white paper
- (1) packing tape
- water
- salt

For each child:

- (1) **Name That Mineral!** Data Collection Sheet
- (1) large plastic cup
- (1) craft stick
- (1) 15 cm length of packing string

Prepare the demonstration:

1. Gather several pictures of minerals from books or other sources to demonstrate the variety of minerals found on Earth. Use the physical properties template in this lesson to organize information about each mineral.
2. Place a crayon, a white sheet of paper, a plastic knife and the shortwave black light viewing box on the presentation table.

Prepare the exploration:

1. Build a shortwave black light viewing box following the instructions provided in this Trainer's Guide. Place the box at a station all children can access.
2. Verify that all mineral number stickers are affixed properly; remove any other identifying information.
3. Prepare a gallon of super-saturated salt solution for the EXTEND section following the directions in this lesson.

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Activity Leader's Guide

Group Size: 4 children

Time: 45 minutes

Engage

- 1 Gather the children together.

Say:

"Many kinds of minerals can be found on earth." Display the pictures you gathered of various minerals.

Say:

"Minerals can sometimes be identified using physical properties. Physical properties are those properties of minerals that can be observed by your senses. Color, luster, streak, cleavage, magnetism, and fluorescence are some of the physical properties that can be used to identify minerals."

- 2 Use the pictures of various minerals to discuss with the children the different physical properties of each. Be sure to use the words: color, luster, streak, cleavage, magnetism and fluorescence!

Say:

"Let's practice classification using this crayon." Raise a crayon up for all to see. Children will practice identifying different physical properties using a crayon.

Ask the following questions; give each child an opportunity to name a physical property.

"What color is this object?" Allow the children to describe the color.

"Describe its luster." Crayons usually have a waxy luster.

"Which color does it streak?" Draw on a sheet of paper with the crayon to simulate a streak test.

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Activity Leader's Guide

“Can pieces of it be cleaved, or split?” Pieces of the crayon can be cleaved using the plastic knife. The cleavage is poor.

“Is it magnetic?” It will not be attracted to a magnet, or cause a compass needle to move.

“Does it fluoresce under a black light?” Place the crayon in the shortwave black light viewing box. A regular crayon should not fluoresce.

Explore

- 3 Distribute the Data Collection and Physical Properties Sheets, Learning Cards and Mineral Observation Cards.

Say:

“Use the instructions on your Learning Card and the Physical Properties sheet to notice everything you can about each mineral.”

- 4 Allow children enough time to complete the WONDER, EXPLORE, RECORD and CONCLUDE sections of their Learning Card.

- 5 Have the Mineral Identification Key ready to show groups at the CONCLUDE step.

Conclude

Gather the children together and ask the following questions:

- 6 **Ask:**
“What physical properties were you able to notice?” Children will notice color, luster, cleavage, streak, double refraction, magnetism, and fluorescence.



Ask:

“How did your group discover the name of each mineral?” Each mineral on the chart has a different set of physical properties.

Expand

- 7 If time allows, ask the children to follow the EXPAND instructions on their Learning Card.

Say:

“A very useful and common mineral is halite. Another name for halite is salt!”

Say:

“Use a piece of yarn and the super saturated solution of salt to make your own halite crystals.”

The cups containing the salt solution and the string should be kept by a window or in another open area, where the water will have an opportunity to evaporate over several days. They should not be moved.

- 8 **Say:**
“Congratulations! You have earned your ‘Ask Me About Rocks and Minerals’ stamp. You are ready to tell people about properties of rocks and minerals.”

NAME THAT MINERAL!

Expedition Learning Card



How can minerals be classified?



physical property
geologist
mineral



Explore how the physical properties of various minerals set them apart from each other.

1

WONDER If you had several different minerals, how would you identify them?



Record your ideas on your Data Collection Sheet.

2

EXPLORE Be a geologist. Use the mineral observation cards to notice everything you can about the color, texture and appearance of each mineral.



Record what you notice on your Data Table.

Fluorescence

Cleavage

Color

Streak

Luster

Magnetism

Double Refraction

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Expedition Learning Card

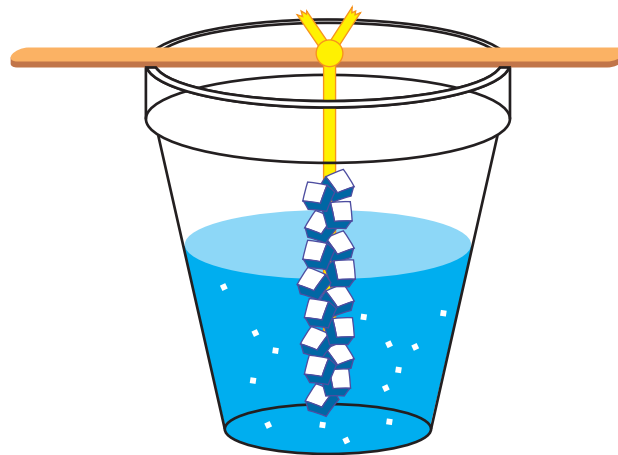
3 RECORD Notice everything you can about each mineral.

 Draw or write on your Data Table everything you noticed.

4 CONCLUDE Ask your activity leader for the Mineral Identification Key. Can you name each mineral?

 Write the name of each mineral on your Data Collection Sheet.

5 EXPAND Make your own mineral crystals. Use supersaturated salt water to make halite crystals. Use a craft stick to hang a piece of yarn in a cup of super-saturated salt solution. Watch your halite crystals grow over the next few days.



Discovery

Why did we do that?

- Minerals are identified using their physical properties.
- Physical properties can be observed by inspecting or testing a mineral.

Congratulations!

You have earned your "Ask Me About Rocks and Minerals" stamp! Now you are ready to tell people about rocks and minerals!

