



National Teacher Training Institute



Lesson Plan

Bubble, Bubble, Soil and Fun!

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Suggested Grade Level: 5

Time Allotment: Three 45-minute periods.

Overview:

The beginnings of cleanliness date back to prehistoric times when man realized that he could wash himself with water. Even a soap-like substance found in clay cylinders during the excavation of Babylon is evidence that soap making was known as early as 2800 B.C.

After examining Web sites, students will participate in a lab testing some of the specific physical properties of talc. Also, they will participate in creating a sculpture through soapstone carving.

The following physical properties will be used in this lesson:

- Talc is a very soft mineral and on the Moh's Scale of Hardness, it is rated a number 1 (diamond being 10). When applied to paper it will leave a streak.
- Talc's streak is white.
- Color variations range from snow-white to black, including greenish-gray and variations of green, pink, and even red. (Color is a function of value for its industrial use).
- Talc's luster is dull to pearly or greasy



Vocabulary

- **Hardness:** Relative resistance of a mineral to scratching. Hardness is rated on a comparative basis as determined by the Moh's Scale. In the Moh's scale, diamond is the hardest mineral and receives a hardness value of 10, while talc is the softest mineral and is rated one on the Moh's scale.
- **Lubricity:** The capacity for reducing friction.
- **Luster:** The manner in which light reflects from the surface of a mineral is described by its quality and intensity.
- **Moh's Scale of Hardness:** The ten-point scale of mineral hardness, keyed arbitrarily to the minerals: talc (1), gypsum (2), calcite (3), fluorite (4), apatite (5), orthoclase (6), quartz (7), topaz (8), corundum (9), and diamond (10). This scale is based upon a "harder" mineral's ability to scratch a "softer" mineral.
- **Streak:** The color of a mineral in its powdered form, usually obtained by rubbing the mineral against an unglazed porcelain tile to see the mark it makes. A mineral that is harder than the tile must be pulverized by crushing.
- **Soapstone:** A rock composed mostly of talc, chlorite, and carbonated minerals that are suitable for carving or dimension stone.
- **Talc:** The softest mineral with a hardness of 1 on the Moh's Scale of Hardness.

Subject Matter: Geology, Chemistry, and Mineralogy

Learning Objectives

Students will be able to:

- Identify the physical properties of the mineral talc.
- Describe the process to test some of the general physical properties of talc.
- Differentiate between the various types of talc tests.
- Explain why the general physical properties of talc make it an excellent mineral for use in diversified commercial products.
- Articulate why talc's physical products would make it more efficient for use in commercial products than other minerals higher on the Moh's Scale of hardness.
- Create for assessment a sculpture from soapstone.

Science Standards:

Content Standard 1: Students design, conduct, evaluate and communicate scientific investigations.

Content Standard 2: Students demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.

Content Standard 5: Students understand how scientific knowledge and technological developments impact society.

Content Standard 6: Students understand historical developments in science and in technology.

Websites:

Luzenac -- Talc products

www.luzenac.com

Einstein's Emporium -- Science and Nature Superstore

www.einsteins-emporium.com/earth/minerals/ (Can also be used for ordering talc and soapstone)

S&C Soapstone -- Soapstone Products www.SCSOAPSTONE.COM (ordering soapstone for art project and for viewing colors)

The Compleat Sculptor, Inc -- Sculpting Products

www.sculpt.com/catalog (ordering soapstone for art project and for viewing colors)

The Mineral Gallery -- The First Internet Rockshop

<http://mineral.gallery.com>

The Mineral Talc

<http://mineral.galleries.com/minerals/silicate/talc/talc.htm>

Soapstone Sculptore

www.sandycline.com/sculpture

This Web site has been developed to help those people interested in soapstone.

Materials

Each student will need the following:

- A wrapped stick of gum.
 - A pop bottle cap filled with white baby powder.
 - A small piece of talc.
 - A fist size piece of soapstone.
 - A small piece of dark construction paper.
 - A porcelain tile plate.
 - A carving instrument (mallets and wooden carving tools are used by the professional artist, but you may use a sharp knife, a small hacksaw blade covered with duct tape, or a fingernail file).
- *Review safety procedures when using sharp instruments.
- Journal
 - Pencil/pen

Prep for Teachers:

1. Prior to teaching this lesson, bookmark the websites in the lesson on each computer in your classroom. When using media, provide students with a FOCUS FOR MEDIA INTERACTION, a specific task to complete and/or information to identify during or after the viewing of video segments, web sites, or other multimedia elements.

2. Prepare the hands-on elements of the lesson by:

Setting at each student's lab site the following:

- a wrapped piece of gum
- a pop bottle cap filled with white baby powder
- one sheet of black construction paper
- one porcelain tile
- one piece of talc
- one piece of soapstone

Introductory Activity:

Step 1. Ask students to unwrap their piece of chewing gum. In scientific labs "tasting" is forbidden due to safety standards.

Step 2. Have each student record in their science journals what they think the white substance is that is coating the "gum." (*Most students will think that it is sugar, but it is talc.*)

Step 3: Have an open discussion with the students as to the identity of the "mystery" white substance coating the gum. Have students put the gum into their mouths and chew. (The individual teacher will decide if the students may continue to chew the gum during this lesson or deposit it in the wastebasket.)

Step 4: Have the students take the contents in the pop bottle top and tap one-third of the contents on the top of their right hand. Rub the substance well into the skin. (Talc will not be absorbed and will turn the skin white and smooth.)

Step 5. Lead an open discussion as to what substance is in the bottle cap. (*They will relate to the fact that the substance is baby powder.*)

Step 6: Ask the students to make a list (record in their journals) of the characteristics/properties that the substance on the gum and the substance in the pop bottle cap have in common. Title the list "similarities."

Step 7: Lead an open discussion on the list of similarities of the substances. (*smooth, soft, white*) Be aware that the baby powder has been perfumed so odorless and tasteless (talc's properties) may not be listed as similarities.

Step 8: Ask the students if they can identify what mineral might produce the similar products. (*Talc*)

Step 9: Indicate to the students that as they chew the gum, they must assess what positive attributes the talc brings to the gum industry. Have students record their answers in their journals. (*To keep the gum from sticking to the wrapper,*

binding, and lubricity.)

Step 10: Have the students rub their palms together as fast as they can for 60 seconds (no stopping). Then have the students indicate (in open class discussion) how their palms feel. Record answers in journals. (*hot, sticky, rough, sore, tired*)

Step 11: Have students put one-third of the white powder (in the bottle cap) into their palms and have them repeat step 10. Record. (*Palms should feel: soft, smooth, and not as tired.*)

Step 12: Indicate to the students that a characteristic of talc is smoothness. The mineral talc is structured in thin sheets (much like a deck of playing cards or flaky Greek pastry). These sheets are very weak and any kind of shear force (Van de Waal force) applied to the talc particles cause the sheets to slide upon each other causing a characteristic known as slip or lubricity, common man's terms-reduction of friction.

Step 13: Lead a class discussion with the following critical thinking questions:

- How were the two examples of talc alike/different? (*alike: smooth, soft, slick*) (*different: one product has an odor and possible taste*)
- How do the two different products use talc for similar results? (*slip/lubricity*)
- What did talc feel like in your mouth? (*talc does not have a taste*)
- What did talc feel like on your palms? (*smooth/soft*)
- What does talc do for you to enhance your "lifestyle?" (*less friction/softness, the gum wasn't sticking to the wrapper, powder keeps baby bottoms dry*)

Learning Activity:

Step 1: Ask students to log on to www.luzenac.com. Provide your students with a FOCUS FOR MEDIA INTERACTION, asking them to go to the site and find an answer to the following questions:

- How is the physical property color measured in the four types of talc orebodies? (*whiteness or brightness*)
- Under fascinating facts about talc: What were three facts that amazed you? (*multiple answers possible*)
- What are the colors of talc that you see at this site? Which of the colors is the purest? (*white*)

Step 2: Have students take their piece of talc and rub it across the piece of black construction paper. What do they see? (*white chalk-like material*) Is it pure talc? (*depends on samples. It is pure talc if it is white and bright.*) Have students record answers in their journals.

Step 3: Explain to the students that they have just performed a physical property test, the hardness test based on the Moh's Scale of Hardness.

Step 4: Have students take their piece of talc and their piece of porcelain plate and "streak" the plate with the talc. (Moving the piece of talc across the surface of the tile) What do they see? (*The talc will not scratch the plate and white flakes will appear on top of the plate- this is a test for color.*)

Step 5: Explain to the students that they have just performed a physical property test of streaking-used for determining color. (*They should see talc's streak as white.*) Indicate to the students that the talc industry uses color as an indicator for value. The whiter and brighter the talc, the purer, therefore; the more valuable for the industry.

Step 6: Explain to students that there are other tests that minerals undergo for testing their physical characteristics such as: fracture (talc's is uneven to lamellar), cleavage (talc's is perfect in one direction, basal), and specific gravity. (Talc has an average specific gravity of 2.7 to 2.8). But those properties will not be tested during this lesson.

Culminating Activity:

Step 1: Have students log onto www.trussel.com (soapstone art images). Provide your students with a FOCUS FOR MEDIA INTERACTION, asking them to go to the site and find an answer to the following questions:

- What colors of talc do you see being used? (*white, black, greenish-grey, red, pink*)
- Which sculpture was carved from the purest piece of soapstone? (*whitest*)
- According to the site, how can we polish our soapstone carvings when are finished with our art project? (note: Gord Reddick 8/10/01)
- How would you answer the lady who asked the question: I do not know a lot about soapstone, and was wondering if I should look for certain characteristics? (*streak, softness, smoothness*)

Step 2: Have students take their carving instruments (Remember to review safety procedures when using sharp instruments), and their soapstone.

Step 3: Tell students that because soapstone, like, talc is so soft; one can easily carve the mineral.

Step 4: Have the students log onto www.sandycline.com/sculpture/. Click on "Introduction to Carving." Have students read aloud the carving suggestions from artist, Sandy Cline.

Step 4: Ask the students to plan a carving.

Step 5: Have the students carve for two 45 minute periods.

Step 6: Ask students how the soapstone and their hands felt as they were carving their creation. (*smooth, soft*)

Step 7: Have students record in their journals what physical properties of talc they observed as they carved their creations.

Step 8: Have students critique their work based on the objectives of: date due, finished creation, and artistic theme.

Cross-Curricular Activities

Humanities:

Have students research artists working in soapstone and their personal stories. (culture)

www.sandycline.com/sculpture

Language Arts:

Have the students write about their soapstone creations. Have them list the physical characteristics (properties) of their mind sculptures.

Technological Studies:

Have students research the diversified uses of talc. Some suggested websites are:

The American Ceramic Society

www.ceramics.org

A website that discusses the use of talc in ceramics.

www.golchagroup.com/

An European industrial website describing their talc mining and milling practices.

www.indiamart.com/category/ores-metals.html

An Asian industrial website that lists several mineral extraction businesses around the world. Follow one of the mining links to see a description of their talc mining and milling practices. (Note: the use of manual labor).

www.paperonline.org A paper industry site describing an overview of the paper industry.

Visual Art:

Have students create soapstone characters for the game of chess (Pawn, Rook, Knight, Bishop, King or Queen).

Community Connections:

- If you live in a community that has a talc mine or mill, take a scheduled field trip: Montana (The Yellowstone Mine near Yellowstone National Park is the largest mine in North America), Vermont, Texas.
- Visit a paper mill and observe the uses of talc.
- Have a talc show. Gather as many products (hundreds) as students can collect for the show, and educate the community as to the many uses of talc.
- Have an art show for the community of your soapstone creations.

Student Materials:

Science journal