



Women In Mining Presents: Toothpaste With a Twist

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Presenters:

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womeninmining.org

Free K-12 Classroom Activities

- * Listed Alphabetically
- * Listed By Standard

Mining Schools

Outreach Workshops

Careers in Mining

Other Resources





MINERALS
EDUCATION
COALITION

mineraleducationcoalition.org

Free K-12 Activities Listed by Grade Level

Low Cost Supplemental Products, Posters, CDs

Minerals Database and Photos

Reclamation Success Stories

Annual Mineral Consumption Data

Careers in Mining



If the Question is:
Why do we mine?

The Answer is ...

***Every Year* — 38,212 pounds of
new minerals must be provided for
every person in the United States
to make the things we use
every day!**

Consumer Products

Aggregate, cement, clay, dimension stone, industrial sand, lime, perlite, pumice, asbestos, vermiculite

Rare earths, silicon, lithium carbonate, arsenic, mica

Bromine, barite, clay, diatomite, mica, talc, titanium minerals

Construction
Infrastructure, buildings

Electronics
High-tech applications

Cosmetics
Pharmaceuticals

Limestone, lime, clay

Clays, limestone, titanium minerals, talc, industrial sand, iron oxide, gypsum, barite

Fillers / Pigments
Paper, plastic, paint, etc.

Environmental
Waste, flue gas, water treatment, etc.

Limestone, fluorite, feldspar, graphite, silicon, lithium carbonate, bismuth, manganese

Potash, phosphate rock, limestone, gypsum, perlite, pumice, manganese, vermiculite

Agriculture
Horticulture

Metallurgical
Iron, steel, aluminum, etc

Chemicals

Glassmaking
Containers, flat glass, fiberglass

Industrial sand, limestone, soda ash, feldspar, boron, kyanite

Fluorspar, limestone, magnesium compounds, iodine, soda ash, salt, sulfur

Ceramics
Refractories

Wallboard
Stucco, Plaster

Gypsum, mica, limestone

Clays, limestone, talc, boron, magnesium compounds, bauxite, lithium carbonate, bismuth, feldspar, kyanite, zirconium

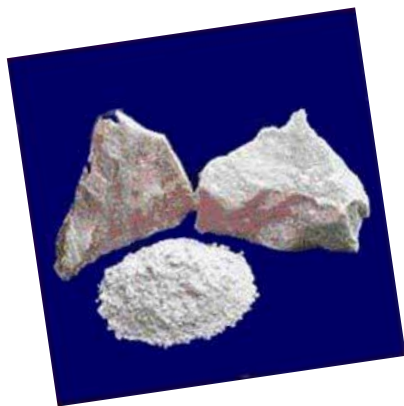


Products people use daily are manufactured directly from minerals, or use components that were made from minerals. In this activity we look at one product we use every day – toothpaste.



Calcium Carbonate

A white or colorless crystalline compound occurring naturally in chalk, limestone, and marble and in the minerals calcite and aragonite. It is used to make toothpaste, white paint and cleaning powders.



Sodium Bicarbonate

Also called baking soda. A white crystalline soluble compound used in effervescent drinks, baking powders, fire extinguishers, as a disinfectant, and in medicine as an antacid.

Materials Needed

Calcium carbonate (CaCO_3), food grade

Sodium bicarbonate (NaHCO_3) (baking soda)

Water

Small plastic cups

Plastic spoons

Sticks for stirring

Assorted food colors and flavorings

Eye droppers

Optional items:

- Hydrogen peroxide, (H_2O_2) (3%)
- Fluoride
- Sweetener (not sugar)
- Diatomite, food grade

Have some commercial toothpaste samples available.

Procedure

- 1) Basic recipe for toothpaste is:
 - a) 1/2 teaspoon calcium carbonate.
 - b) 1/4 teaspoon sodium bicarbonate.
 - c) Mix together in a small plastic cup.
 - d) Add just enough water (with eye dropper) to make a paste.
- 2) Have the students taste the basic recipe and discuss possible improvements.
 - a) Divide the class into groups of 4 and let them come up with some solutions to make the basic recipe more appealing to others.
 - i) Remember, the purpose is to produce the most “marketable” toothpaste.
 - b) Each group is responsible for one recipe.
 - i) As the samples are quite small, only small amounts of color and flavoring are needed.
 - c) Each group will keep a record of their recipe and submit it with the sample for judging.
 - i) The judges (another class, parents, etc.) will determine the winner.
 - ii) Have a prize for the winning sample.

Worksheet

Group No. _____

Product Name _____

Basic Recipe:

1/2 tsp. calcium carbonate, 1/4 tsp. sodium bicarbonate, water to form paste.

ADDED:

Ingredient(s): _____

Flavoring(s): _____

Color(s): _____

AD CAMPAIGN:

Slogan (if any) _____

15 second advertisement:

Correlation to National Science Education Standards

Standard Concept	General standard	Specific standard	General standard	Specific standard	General standard	Specific standard
Grade Level		K-4		5-8		9-12
Science as Inquiry (A)	Abilities ... to do ... inquiry	A.1.4.1				
Earth and Space Science (D)	Properties of Earth materials	D.1.4.1				
Science and Technology (E)	Abilities of technological design	E.1.4.1	Abilities of technological design	E.1.8.1		E.1.12.1
		E.1.4.2		E.1.8.2		E.1.12.2
		E.1.4.3		E.1.8.3		E.1.12.3
		E.1.4.4		E.1.8.4		E.1.12.4
		E.1.4.5		E.1.8.5		E.1.12.5
	Understanding about science and technology	E.2.4.2			Understanding about science and technology	E.2.12.3
	Distinguish between natural and human-made objects	E.3.4.1				
		E.3.4.2				
Science in Personal and Social Perspectives (F)	Personal health	F.1.4.2				
	Types of resources	F.3.4.1				

Evaluation

- 1) How did the homemade toothpaste compare to commercial products?
- 2) What mineral is added to toothpaste to fight cavities?
- 3) How many of the commercial toothpastes had minerals in them?
- 4) Have the students compare the prices of commercial toothpaste in relation to the number of mineral ingredients.
 - a) Which were more expensive?
- 5) Have the class develop an advertising campaign for the winning toothpaste.
 - a) This can be a slogan, jingle, drawing, rap or a song that will help sell their toothpaste.
 - b) Have a prize for the winning ad campaign.

Resources

Calcium Carbonate from Amazon:

- <http://www.amazon.com/>

Women In Mining (WIM):

<http://www.womeninmining.org/default.asp>

- Classroom Activities Listed Alphabetically
- Classroom Activities Listed By Standard
- Mining Schools
- Outreach Workshops
- Other Resources

Minerals Education Coalition (MEC):

<http://www.mineralseducationcoalition.org/>

- K-12 Activities
- Mineral Photos and Database
- Careers in Mining
- Reclamation Success Stories
- Plate Tectonics Activity

Society for Mining, Metallurgy & Exploration Inc. (SME):

<http://www.smenet.org/>

- Visit The Convention Center Booth #432: Minerals Are Life

Other Resources

American Coal Foundation: <http://teachcoal.org/>
American Coalition for Clean Coal Electricity: <http://www.cleancoalusa.org/>
American Geological Institute: <http://www.agiweb.org/>
ASARCO Mineral Discovery Center: <http://www.agiweb.org/>
The Copper Development Page: <http://www.copper.org/>
Energy Information Administration: <http://www.eia.gov/>
Florida Institute of Phosphate Research: <http://www.fipr.state.fl.us/>
Frank Potter's Science GEMS: <http://www.sciencegems.com/>
Geological Society of America: <http://www.geosociety.org/>
NASA Wavelength: <http://nasawavelength.org/>
National Earth Science Teachers Association: <http://www.nestanet.org/>
National Energy Foundation: <http://nef1.org/>
National Mining Association: <http://www.nma.org/>
National Science Teachers Association: <http://www.nsta.org/>
Smithsonian Museum-Nat'l History; Mineral Sci: <http://mineralsciences.si.edu/>
Steve Spangler Science Experiments: <http://www.stevespanglerscience.com/>
The Silver Institute: <https://www.silverinstitute.org/site/>
The Gold Institute: <http://goldinstitute.net/>
United States Geological Survey: <http://education.usgs.gov/>

Be Sure To Visit Convention Center Booth #432: Minerals Are Life

