

Exercise 2: It's in the Bag!

Activity Developed by Nevada Division of Minerals and Nevada Mining Association

Purpose:

Explores various uses of minerals and rocks.

Materials Needed:

Paper sacks for each group of students (4-5 students per group)

Products from the list below in each paper sack

List of rocks and minerals and their uses for each group **

Match-up worksheet for each group **

***Copies of these items for duplication follow.*

Instructions:

Give one bag filled with products to each group of students, along with a copy of the list of rocks and minerals and their uses, and a worksheet. Have the students match each product to the rock or mineral used in its production and fill in the worksheet. Give 10 minutes (maximum) for each group to complete the matching. When all the groups have finished, or time is up, go over the correct answers. A Teacher's Guide List with the correct matches can be found on the next page.

Teacher's Guide List of Products and Corresponding Minerals for "It's in the Bag!"

List of products:	Correct Match of Mineral/Rock to the left that the Product is Made from:
Linoleum	Barite
Aluminum foil	Fluorite
Crayon	Diatomite
Fishing sinkers	Galena
Polyester	Silver ore
Brown paper bag	Gypsum
PVC pipe	Calcite
Steel wool	Magnetite
Wire	Copper ore
Space picture	Gold ore
Ceramic tile	Quartz
Rubber band	Sulfur
Chewing gum	Limestone
Brick	Shale
Concrete	Conglomerate
Sand paper	Sandstone
Fiberglass roofing	Granite
Emery board	Pumice
Road base	Gabbro
Asphalt	Basalt
Graphite/pencil	Schist
Slump stone	Gneiss
Fiberglass insulation	Quartzite
Antacid pill	Marble

“It’s In the Bag” Match-up Worksheet

Directions:

Write down the name of the rock or mineral (listed below) that each product in your bag is made from next to that product (don’t forget the bag itself!).

Rock and Mineral Names:

limestone
basalt
barite
copper ore
fluorite
shale
marble
sulfur
quartz
conglomerate
gneiss
schist
galena
diatomite
gold ore
sandstone
gabbro
calcite
magnetite
silver ore
pumice
gypsum
granite
quartzite

“It’s in the Bag!” Worksheet, Page 2

<i>Products:</i>	<i>Fill in Name of Rock or Mineral:</i>
Antacid pill	
Linoleum	
Rubber band	
Chewing gum	
Brick	
Aluminum foil	
Fiberglass insulation	
Concrete	
Ceramic tile	
Brown paper bag	
Sand paper	
Crayon	
Wire	
PVC pipe	
Emery board	
Steel wool	
Polyester	
Graphite/pencil	
Asphalt	
Space picture	
Road base	
Fishing sinkers	
Slump stone	
Fiberglass roofing	

Minerals and Rocks and Their Uses **(Student Handout for “It’s In the Bag!” Activity)**

Developed by Nevada Division of Minerals and Nevada Mining Association

Minerals and Their Uses — Introduction:

Minerals are the basic ingredient of many every day products. Listed below are just a few to get you started. Don’t forget the human body requires minerals on a daily basis and that our food production requires minerals as soil additives to maintain the level consumed by the world’s population. Their importance in our nation’s economic well-being is not well publicized nor understood.

Barite: Barite is used as the basis for drilling mud in the exploration of oil, gas, water, and minerals. It is also used in bowling balls, televisions, computers, paint, as a weighing ingredient in polyurethane foam backing for floor mats, vinyl flooring or carpets, and a medical solution often called a barium “cocktail.”

Fluorite: Used in the manufacture of aluminum, plastic, and freon. It is the basis for the new safe hydro fluorocarbons used in the cleaning solutions for electronic components, and it is added to drinking water and toothpaste to prevent cavities.

Galena: The United States is the world’s largest producer of galena (lead ore). Lead is used in batteries, gasoline additives, solders, electrical and electronic applications (like computer chips), TV glass and tubes, glass, protective coatings, crystal glass, weights, X-ray and gamma radiation shielding, etc. It is widely used today in power back-up systems. About 60,000 tons of refined lead are recycled at a facility in Missouri every year. Battery paste is desulfurized and mixed with battery acid, then crystallized to produce a high-quality sodium sulfate marketed to the laundry detergent, paper, and glass industries.

Silver Ore: Silver is one of the earliest metals identified and was widely used in the arts and as a medium of exchange in early ages. Today it is used not only for jewelry, but also in film developing, computers, telephones, some mirrors, wood glue, polyester, dentistry, and as a catalyst in the chemical industry. Fifty percent of the silver today is used for photographic products, twenty percent for electrical and electronic products, ten percent for jewelry, sterling, etc., and the remaining percent for other uses.

Gypsum: A versatile mineral used mainly for well-board and plaster in the construction industry, it is also used in the manufacturing of paper bags, and as an additive to many foods, such as cake mixes, breads, rolls, etc. Gypsum is also an important soil additive.

Calcite: The most common form of carbonate material, calcite is a major component of limestone rock. Calcium is produced from calcite and is used to reduce metal oxides to the metallic state. Calcite is used for toothpaste, antacids, vinyl, chalk, glass, fiberglass, and to coat many chewing gums. Calcium is produced from calcite. Calcium is a very important mineral for our bodies! It helps build strong teeth and bones, healthy muscle tissue, and aids in blood clotting, and in the maintenance of cell membranes. See limestone for other uses.

Magnetite: It is one of the most abundant and widespread of all oxide minerals and occurs in a wide variety of environments. Most magnetite is used as a raw material to produce iron and steel. Like the name implies, it is typically magnetic. The steel is used in construction, automobiles, ships, machinery, tools, cooking utensils, appliances, and in building necessities such as staples, nails, cleaning and polishing pads, etc.

Chalcopyrite: Used in electric cables and wires, switches, plumbing and heating, roofing, and building. Used in making alloys, like bronze and brass. It is increasingly being used in the chemical industry as copper sulfate for agricultural fungicides and color pigments. Copper is also widely used to insulate rooms as it blocks radio waves, as a coating on doorknobs, and in air-conditioning applications due to its biostatic property (bacteria does not grow on its surface).

Gold Ore: Because of three main properties of gold: conductivity, long-wearing, and easy to form (malleability), it is used in computer chips and all electronic applications. Gold has many uses in the space program, like the face shields worn by astronauts and as connectors for critical components. It is also used in dentistry and jewelry.

Quartz: In gemstone quality, quartz can be amethyst, citrine quartz, rose, and smoky. As silica it is a main ingredient in glass making, electronics (the silica chip), fiberglass, vinyl, asphalt roofing shingles, as well as most building materials.

Sulfur: Sulfur has a very distinct color and smell and is used in the manufacturing process for rubber, matches, paper production, and photography. It is also a very important soil additive. It is one of the most important elements used as an industrial raw material for the chemical industry, as a medicine in soaps and detergents, for plastics, and synthetics.

Rocks and Their Uses — Introduction:

Rocks normally consist of several minerals, some essential, some accessory. A rock may be thought of as a “mineral environment.” Each rock type was formed under certain specific conditions, resulting in the formation of a fairly predictable group of minerals. Rocks fall into three great classes according to their origin: *igneous, sedimentary, and metamorphic*.

Limestone: A sedimentary rock, it is used mainly in the manufacture of Portland cement, the production of lime, manufacture of paper, petrochemicals, insecticides, linoleum, fiberglass, glass, carpet backing, and as the coating on many types of chewing gum.

Shale: A sedimentary rock. It can be a component of bricks and cement.

Conglomerate: A sedimentary rock. Used in the construction industry.

Sandstone: A sedimentary rock. Used principally for construction, it is easy to work. The red-brown sandstone of the Triassic Age, better known as “brownstone,” has been used for construction in many eastern cities.

Granite: An igneous-plutonic rock. It is widely used for architectural construction, ornamental stone, and monuments.

Pumice: An igneous-volcanic rock. It is a porous, brittle variety of rhyolite and is light enough to float. It is used as an abrasive material in hand soaps, emery boards, etc.

Gabbro: An igneous-plutonic rock. It is widely used as crushed stone for concrete aggregate, road metal, railroad ballast, etc. Smaller quantities are cut and polished for dimension stone (called black granite).

Basalt: An igneous-volcanic rock. Can be used in aggregate and for roadbeds.

Schist: A metamorphic rock. Some schist has graphite, and some are used as building stones.

Gneiss: (Pronounced “nice”) A metamorphic rock. Used as building stones and for other structural purposes.

Quartzite: A metamorphic or sedimentary rock. Same uses as sandstone.

Marble: A metamorphic rock. Depending upon its purity, texture, color, and marbled pattern it is quarried for use as dimension stone for statuary, architectural, and ornamental purposes. Dolomite rich marble may be a source for magnesium and is used as an ingredient in the manufacture of refracting materials.

Diatomite: A major component in filtering systems for water, swimming pools, juices, wines, beers, cooking oils, and syrups. A mild abrasive in cleansers and polishing agents. Used to make “kitty litter,” as an anti-caking agent in fertilizers and insecticides, and as filler for flat finish in paints, paper, and numerous other products.

Minerals and Rocks and Their Uses
(Teacher's Guide — More Advanced Handout Version
for "It's in the Bag!" Activity)
Nevada Division of Minerals and Nevada Mining Association

Minerals and Their Uses — Introduction:

Minerals are the basic ingredient of many every day products. Listed below are just a few to get you started. Don't forget the human body requires minerals on a daily basis and that our food production requires minerals as soil additives to maintain the level of food consumed by the world's population. Their importance in our nation's economic well-being is not well publicized nor understood.

Barite: (Barium Sulfate, a non-metallic mineral) The barium atom is the largest atom in the Periodic Chart of the Elements. This gives barite its heavy weight relative to other non-metallic minerals. Uses for barite are:

- < As a weighting agent in drilling mud in the exploration of oil, gas, water, minerals, and geothermal wells.
- < As a filler in light bodied paints. It gives them body and helps them flow evenly.
- < In the manufacture of rubber tires, glass, and plastics. It makes bowling balls heavy.
- < Barium carbonate is used in televisions and computers. It makes the green color in fireworks. It is also used in optical glass and in medicine as a solution called a barium "cocktail" for a GI series (a form of medical test).
- < In polyurethane foam backing for floor mats, vinyl flooring, and carpets.

Fluorite: (Calcium Fluoride, a non-metallic mineral) Uses for fluorite are:

- < Approximately 70% of the fluorite produced goes into the production of Hydrofluoric Acid (HF) which is very important to the manufacture of aluminum and is used to produce plastic, chemicals, and fluorocarbons. Fluorocarbons are used in refrigerants (freon) for refrigerators, freezers, and air conditioners. HF is used in resins, solvents, and pharmaceuticals (medicines).
- < Approximately 25% of the fluorite produced is used as a fluxing agent added to molten iron ore in blast furnaces to help ingredients mix together better and absorb impurities in the manufacture of iron and steel.
- < Used in decorative tiles and brick, opaque enamel for appliances, and optical glass.
- < Added to toothpaste and drinking water in the form of sodium fluoride, which can reduce tooth decay by 60%.
- < Used in cleaning solvents for electronic components.
- < Used in insecticides, nylon, and teflon.

Galena: (Lead sulfide, a metallic mineral) The U.S. is the world's largest producer of galena (lead ore). Uses include:

- < In car batteries, solder, ammunition, fishing weights, tire balancing weights, gasoline additives, electrical and electronic applications (like computer chips), TV glass and tubes, glass, protective coatings, crystal glass, weights, X-ray and gamma radiation shielding.
- < Widely used today in power back-up systems.
- < Lead is recycled and reused. Battery paste is desulfurized and mixed with battery acid, then crystallized to produce a high-quality sodium sulfate marketed to the laundry detergent, paper, and glass industries.

Silver Ore: (Silver sulfide, Argentite, a metallic mineral) Argentite is found as microscopic grains in rhyolite, an extrusive igneous rock. Native silver has a bright, shiny, metallic luster and tarnishes to black when exposed to air. Silver is a heavy, soft, ductile, and malleable metal. Silver is the best known conductor of heat and electricity. Silver is one of the earliest metals identified and was widely used in the arts and as a medium of exchange in early ages. Uses today include:

- < In jewelry, film developing, computers, telephones, reflective surfaces on some mirrors, wood glue, polyester, dentistry, and as a catalyst in the chemical industry. It is also used as silver iodide for cloud seeding. Fifty percent of the silver today is used for photographic products, twenty percent for electrical and electronic products, ten percent for jewelry, sterling, etc., and the remaining percent for other uses.

Gypsum: (Hydrous calcium sulfate, a non-metallic mineral) Gypsum is a versatile mineral and uses include:

- < Major uses include manufacture of wall-board and plaster-of-paris, hardening retarder in cement, and as a soil conditioner.
- < As an additive to many foods, such as cake mixes, breads, rolls, icing, etc.
- < As an additive in mortar, putty, and building plaster.
- < In manufacturing paper bags, glass, in the brewing industry, and in molded pottery.
- < As an important soil additive.

Calcite: (Calcium carbonate, a non-metallic mineral) Calcite is the most common form of carbonate material and is a major component of limestone rock. Calcium is produced from calcite. Calcite and limestone are very abundant and are among the most widely used materials in industry. Calcium is the fifth most abundant element in the earth's crust. Some uses include:

- < Calcium is used to reduce metal oxides to the metallic state and as an agent in alloying.
- < It is also used for toothpaste, antacids, aspirin, in bakery items, taco shells, porcelain, vinyl, chalk, glass, fiberglass, and as a coating on chewing gum. Calcium helps build strong teeth and bones. As a dietary supplement it helps form healthy muscle tissue, aids in blood clotting, and in the maintenance of cell membranes. It is a very important mineral to our bodies!

Magnetite: (Ferrous and ferric iron oxide, iron ore, a metallic mineral) It is the second most common metal on earth, is found in a wide variety of environments, and is typically magnetic. Its uses include:

- < As a raw material to produce iron and steel. The steel is used in automobiles, ships, machinery, tools, cooking utensils, appliances, buildings, bridges, staples, nails, cleaning and polishing pads, and in stainless steel appliances. Over 80% of iron ore is used to produce steel on which modern societies and economies are based.
- < Iron is an essential human nutrient that is a carrier of oxygen in the body. It is contained in hemoglobin in the blood and in myoglobin in the muscles.

Chalcopyrite: (Copper ore, copper iron sulfide, a metallic mineral) Uses include:

- < In electric cables and wires, switches, plumbing and heating, roofing, building, power lines, telephones, telephone lines, pipe, coins, cooking utensils, ammunition, sterling silver, and blue pigment.
- < In making alloys, like bronze and brass (a combination of copper and tin).
- < In the chemical industry as copper sulfate for agriculture fungicides and color pigments.
- < Copper is also widely used to insulate rooms as it blocks radio waves, as a coating on doorknobs, and in air-conditioning applications due to its biostatic property. Bacteria do not grow on its surface.
- < Copper is necessary for the formation of hemoglobin and helps keep bones, blood vessels, and nerves healthy.

Gold: (Occurs as microscopic particles in sulfide host rock, a metallic mineral) Three main properties of gold are: conductivity, long-wearing, and easy to form (malleability). It combines with few other elements so it never tarnishes, rusts, stains, or corrodes. It is also a good conductor of electricity. Uses include:

- < In jewelry and dentistry.
- < In computer chips, electronics, and scanning electron microscopy.
- < As micro-thin coatings on equipment, visors, windows.
- < Gold reflects up to 98% of the sun's rays. It has many uses in the space program, like the face shields worn by astronauts and as connectors for critical components.
- < In medicines.

Quartz: (a non-metallic mineral) It is the most common mineral in the continental crust, is very durable, is soluble, and is resistant to fusion. Quartz is most often commercially mined in the form of silica sand, sandstone, or quartzite. Uses include:

- < In gemstone quality quartz can be amethyst, citrine quartz, rose, and smoky. These gems are used in jewelry.
- < As silica it is a main ingredient in glass making, electronics (the silica chip), fiberglass, optical fibers for communication, porcelain, tiles (including heat resistant tiles used on space shuttles), vinyl, asphalt roofing shingles, as well as most building materials.
- < In making silicon carbide, an abrasive used for sand blasting, grinding glass, sawing, and polishing dimension stone.
- < In the manufacture of sodium silicate (liquid glass) used in laundry detergents, coatings on hazardous waste containers, and in toothpaste.
- < Refractory uses such as foundry molds for the electrical, aerospace, and automotive industries, acid liners in steel furnaces, and in the manufacture of acid refractory products.
- < Metallurgical uses as a component in the preparation of silicon alloys and as a flux in preparation of elemental phosphorous.

Sulfur: (a non-metallic mineral) Sulfur has a very distinct color and smell (rotten egg smell). It melts easily and is very important in the chemical industries. Uses include:

- < Almost 90% of the sulfur consumed in the United States goes into the manufacture of sulfuric acid. A large portion of the sulfuric acid produced is used for agricultural chemicals, nitrogen, and phosphatic fertilizers.
- < In the manufacturing process for rubber, matches, paper production, and photography.
- < Sulfur and sulfuric acid is essential in the manufacture of paper and steel, and in treating copper and other ores. It is also used in the manufacture of storage batteries, photographs, rayon and synthetic fibers, explosives, manufacturing plastics, vulcanization of rubber tires, matches, petroleum and coal products, water treatment compounds, soaps, detergents, pigments, and paints.
- < It is one of the most important elements used as an industrial raw material for the chemical industry, as a medicine, in soaps and detergents, for plastics, and synthetics.

Rocks and Their Uses — Introduction:

Rocks normally consist of several minerals, some essential, some accessory. A rock may be thought of as a “mineral environment.” Each rock type was formed under certain specific conditions, resulting in the formation of a fairly predictable group of minerals. Rocks fall into three classes according to their origin: *Igneous, Sedimentary, and Metamorphic.*

Limestone: A sedimentary rock, it is used mainly in the manufacture of Portland cement, the production of agricultural lime, manufacture of paper, petrochemicals, insecticides, linoleum, fiberglass, glass, carpet backing, and as the coating on many types of chewing gum. Limestone also has many environmental uses, including:

- < *Air Quality:* neutralizing sulfur oxides from industrial stock gases to improve air quality.
- < *Hazardous Waste Disposal:* PCB sludge solidification and neutralization.
- < *Solid Waste Disposal:* stabilize sludge from sewage and desulfurization plants.
- < *Waste Water Treatment:* Removes phosphorous and nitrogen, odor control, kills bacteria, aids in clarification.
- < *Water Treatment:* potable water softening and clarification, acid rain and acid drainage neutralization.

Shale: A sedimentary rock well stratified in thin beds. It can be a component of bricks and cement.

Conglomerate: A sedimentary rock consisting of rounded or angular rock or mineral fragments cemented by silica, lime, iron oxide, etc. Used in the construction industry.

Sandstone: A sedimentary rock. Used principally for construction, it is easy to work. The red-brown sandstone of the Triassic age, better known as “brownstone,” has been used for construction in many eastern cities. It is also used in water conservation as a groundcover for xeriscaping (low water use) landscaping.

Granite: An igneous-plutonic rock, high in silica, potassium, sodium, and quartz. It is widely used for architectural construction, ornamental stone, and monuments.

Pumice: An igneous-volcanic rock. It is a porous, brittle variety of rhyolite and is light enough to float. It is used as an abrasive material in hand soaps, emery boards, etc.

Gabbro: An igneous-plutonic rock. It is widely used as crushed stone for concrete aggregate, road metal, railroad ballast, etc. Smaller quantities are cut and polished for dimension stone (called black granite).

Basalt: An igneous-volcanic rock that is dark gray to black. It can be used in aggregate and for road beds.

Schist: A metamorphic rock. Some schists have graphite, and some are used as building stones.

Gneiss: A metamorphic rock. It is used as building stones and for other structural purposes.

Quartzite: A metamorphic or sedimentary rock consisting of rounded quartz grains. Same uses as sandstone, mainly in construction.

Marble: A metamorphic rock. Depending on its purity, texture, color, and marbled pattern it is quarried for use as dimension stone for statuary, architectural, and ornamental purposes. It is also used for landscaping, as a construction aggregate, and as an ingredient in the manufacture of refracting materials. Dolomite rich marble may be used as a source for magnesium.

Diatomite: A sedimentary rock composed of the silica rich remains of algae. Diatoms absorb silica from the water in which they live and secrete it to form their shells. They accumulate in great numbers to form deposits of diatomaceous earth or diatomite. Because of their irregular shapes the diatom shells do not pack closely together and the rock remains porous. More than half of the diatomite produced is used as a filtering agent for water treatment systems and in swimming pool filters. It's also used as a clarifying (filtering) agent in the manufacture of beverages, wine, cooking oils, sugar, syrups, antibiotics (medicines), and solvents. It's used in kitty litter, matches, composition roofs, as an oil and grease absorbent, as a mild abrasive, as a conditioning agent to prevent caking in fertilizers and insecticides, as a filler in brick and cement mixtures, paper, plastics, and rubber. It's used in paint to add bulk, absorb oil, and give a "flat" (not shiny) finish (the angular particles of diatomite diffuse light).