

# Geology Laboratory

## Teacher Guide

Grade Levels: 6 — 8

### Program overview

Students experiment with “making” sedimentary, volcanic and metamorphic rocks, identifying rocks and minerals through appropriate observations (hardness, streak), and observing crystal structure, erosion and soil characteristics. Students will visit six stations to investigate these properties of rocks and minerals. The class will conclude with a re-enactment of the rock cycle.

### Objectives/Student Learning Outcomes

After participating in this program, students will be able to

- Understand the importance of the geosphere for human survival.
- Describe volcanic, sedimentary, and metamorphic processes.
- Make and record the specific observations necessary to identify rocks and minerals.
- Explain the rock cycle.

### Background

The rock cycle describes the process through which rocks are formed, changed, broken down, and re-formed. This process involves complex processes, such as plate tectonics, as well as very simple processes, such as erosion.

### At the Museum

While you are visiting the museum, have students evaluate the geological materials used in the building and fixtures. Using the worksheet provided at the end of the Teacher Guide (*Geology at the Sam Noble Oklahoma Museum of Natural History*), have students list the building materials that they can find in the entry area outside the museum, the entrance foyer by the front desk, and the Great Hall. Some of these materials, such as the stone used in the front walkway, are obvious, and some are less obvious. Remember, plastic is a petroleum product and therefore counts.

### P.A.S.S.

#### GRADE 6

Science Process - 1.1, 1.2, 2.2, 3.1, 4.1, 4.3, 5.1  
Earth/Space Science - 5.1

#### GRADE 7

Science Process - 1.1, 1.2, 2.2, 3.1, 4.1, 4.3, 5.1

#### Grade 8

Science Process - 1.1, 1.2, 2.2, 3.1, 4.1, 4.3, 5.1  
Earth/Space Science - 4.1, 4.2

## Supplementary/Enrichment Activities

### Science

#### 1. Chemical Weathering Experiment

Mechanical weathering happens when wind and/or water erodes rocks and minerals. Rocks are also broken down by chemical weathering when the bonds cementing grains of sand are broken and the rocks are dissolved or decomposed. At the end of the Teacher Guide, see an experiment that demonstrates chemical weathering.

#### Materials:

- 3 shallow dishes
- 3 pieces of steel wool without soap
- Salt
- Water

**Directions:** Place each piece of steel wool in a shallow dish (wear gloves because steel wool can give splinters). Pour equal amounts of water over two of the pieces of steel wool. Leave the third piece dry. Sprinkle one of the wet pieces with salt. Observe and compare the pieces every day for one week. Record the changes throughout the week. At the end of the week, put on gloves and roll each piece of steel wool between your hands.

#### Discussion Questions:

1. What happened to each piece of steel wool? Which piece of steel wool was the control?
2. Which piece changed the most?
3. Why do you think the steel wool changed?
4. What is the common word for this type of change?
5. What does this have to do with weathering?

#### Explanation:

Chemical weathering is the process by which rocks are decomposed or dissolved by chemical processes to form residual materials. When the iron got wet, the water acted as an agent to speed up oxidation. In this case, you are speeding up oxygen combining

### VOCABULARY

**Crystal**—the regular arrangement of atoms gives a mineral its crystalline shape

**Erosion**—the wearing away of the earth's surface by wind and water

**Igneous**—rocks formed by volcanic action

**Metamorphic**—sedimentary and/or igneous rocks that have been changed by heat or pressure

**Mineral**—a naturally occurring solid with a crystalline structure and specific chemical composition

**Rock**—an earth material made of one or more minerals.

**Sedimentary**—rocks formed by the cementing of small grains deposited by wind or water.

**Soil**—formed of decomposed rock. Soil supplies nutrients for all plant life.

with iron to form iron oxide or rust. Rust is a weaker material than the original metal and will crumble (erode) under light pressure. When salt is added to the water it speeds up the oxidation of iron. Therefore, the steel wool in water should have changed the most. This same type of chemical weathering affects rocks that contain iron and also cars that drive on salted streets in the winter.

## Additional Resources

Oklahoma Energy Resources Board

<http://www.oerb.com/education/teacher.asp>

*Common Ground: Modern Mining and You Adventures in Earth Science* (2 CD pack),  
Sponsored by Caterpillar Corporation.

The first CD is about mining. The second has an extensive set of activities on physical geology, rocks, and minerals. This is a great resource for classroom activities.

<http://www.cat.com/cda/layout?m=78220&x=7>



## Geology at the Sam Noble Oklahoma Museum of Natural History List of Building Materials

Location at Museum	Description (shape and color)	Rock or Mineral?
Bathrooms	Shiny partitions	Aluminum
Bathrooms	Tile	Clay
Bathrooms	Counter (plastic)	Petroleum
Brochures	Glossy paper	Kaolin clay
Drinking fountain	Water	Water
Drinking fountain	Shiny faucet	Aluminum
Edges of windows, walls	Caulking	Limestone, gypsum
Entry	Statues of past directors	Bronze (copper and tin)
Floor	Hard, various, tile	Limestone
Front desk	Computer	33 minerals including copper, gold, selenium, quartz & zinc
Front desk	Pencils	Graphite
Front of museum	Grey stone blocks	Limestone
Front walkway	Grey stone slabs	Limestone
Hidden	Electrical wire	Copper
Trash cans	Steel	Iron
Walls	Light fixtures	Tungsten (incandescent) Beryllium

Location at Museum	Description (shape and color)	Rock or Mineral?
		(fluorescent)
Walls	Paint	Clays, talc, titanium dioxide (white base)
Walls	Lettering, signs, railings	Aluminum
Walls	Wallboard	Gypsum
Walls	Light fixtures (plastic)	Petroleum
Walls (at base)	Shiny, pink blocks	Osage granite
Windows	Frames	Iron
Windows	Glass	Silica sand