

## SCIENCE LAB PREP WORK

**LAB DATE:** April 9, 2007

**LAB PARTNER:** Audrey

**LAB TITLE:** The Rock Cycle

*Adapted from a web quest by Debbie Kuntz*

*<http://www.lewiston.k12.id.us/dkuntz/WebQuest/HTML/intro.htm>*

### **INTRODUCTION:**

Though much of its surface is covered in water, our home, the Earth, is made primarily of rocks & minerals. It is made up of four layers: the solid inner core, the molten outer core, the lower molten mantle, and the lithosphere (including the upper mantle and the crust). In this lab you will be performing a web quest and then identifying several rock samples.

### **PURPOSE:**

To better understand the history of the Earth by investigating the rock cycle and the processes that drive it.

### **Hypothesis:**

- 1) What is the rock cycle?

I hypothesize that the rock cycle is a process that all of the three types of rocks go through from being formed to being changed into different forms, and in doing so being transported all over the Earth.

- 2) What are the processes that drive the rock cycle?

I hypothesize that the processes that drive the rock cycle are: the process of the rocks sinking into the earth, the process of the ocean forming rocks by mashing together shells and other things rested on the bottom of the ocean. The process of the rocks changing forms from being exposed to different environments.

- 3) How does the rock process affect the history of the Earth?

I hypothesize that as time goes on the different rocks are exposed to different places and in doing so gets samples of what the environment was like when the rock went through the rock process.

## **MATERIALS & EQUIPMENT:**

- ☐ Computer with Internet access
- ☐ Rock samples

## **PROCEDURE:**

### **A. Use the Internet to answer the following five questions:**

1. What is the difference between rocks and minerals?

The difference between rocks and minerals is that all rocks are made of 2 or more minerals, but minerals are not made of rocks.

2. What are the three types of rocks?

The three types of rocks are: Igneous, Metamorphic and Sedimentary.

3. How is each of the three rock types formed?

- a. Sedimentary rock is formed like this: For millions of years rocks have been eroded by water and wind. These little bits of rock flow down stream and settle at the bottom of lake and streams. Over the years more eroded earth is deposited on top of each other. Each deposit of rock presses down harder turning the bottom layers into rock.
- b. Metamorphic rocks are rocks that have changed into different types of rocks. Different rocks change because they are under tons and tons of pressure, this causes heat build up. The heat causes the rock to change.
- c. Igneous rocks can be formed below or above ground. Underground they are caused when magma is trapped in small pockets. As the magma cools it slowly becomes igneous rock. Above ground igneous rock is formed when lava from volcanoes erupts and cools on the ground.

4. How do you identify minerals?

Most common minerals can be identified by inspecting or testing their physical properties. These properties are color, streak, transparency, hardness, fracture, specific gravity, and crystal form.

5. What are the three most common elements in minerals?

- a. The two most common elements in minerals are Oxygen 47% and Silicon 28%. Other common elements are Aluminum 8%, Iron 5%, Calcium 3.5%, Sodium 3%, Potassium 2.5% and Magnesium just 2%.

**B. Find a sample of each of the three types of rocks in the rock sample box. For each sample:**

1. Draw a picture in color
2. Describe its texture
3. Describe the place where this sample may have come from

For our igneous rock we chose Obsidian, it felt very smooth and glossy. And I think it came from some where near a Volcano. Because igneous rocks are formed by the lava of a volcano cooling.

For our sedimentary rock we chose Sandstone, it felt rough like sandpaper and had very fine crystals. I think that it could have come from anywhere that was near a stream or lake. Because the grains that formed it settled on the bottom of the lake or stream and then eventually sank into the Earth and under great pressure the small grains smashed together and then rose back up to the surface.

For our metamorphic rock we chose Gneiss, it felt rough and had a lot of different colors in it. I think that this rock could have been found anywhere that there were igneous or sedimentary rocks were found. Because it could be a mix of igneous or sedimentary rocks.

**DATA ANALYSIS:**

In this lab I researched and described the three types of rocks, Igneous, Metamorphic and Sedimentary. I compared the similarities and differences of each rock in the same group to better understand what process they went through. These measurements helped me to better understand the different rock types. And it helped me better understand how even though rocks are in the same category doesn't mean that they look the same.

My observational data explains that the Igneous rock, Obsidian was very smooth and glossy. This is because Obsidian is an Extrusive rock. Extrusive means that the magma cooled when it was on the surface of the Earth. And when the magma is exposed to the open air it cools a lot quicker than if it did not reach the surface, and when it does reach the surface there is little time for the growth of crystals. And because of Obsidians

lack of crystal structure there is no large collections of the lava that formed it. Thus being very smooth. And according to Wikipedia (and conformed on another web site) obsidian blade edges can reach almost molecular thinness. Extrusive means that the Igneous rock formed on the inside of the Earth.

My observational data also explains that the sedimentary rock Sandstone felt rough like sandpaper and had very fine crystals. Sandstone is composed mainly of sand-size mineral or rock grains. Sandstone is formed from cemented grains. And is one of the three types of sedimentary rocks there are. Sandstone is Clastic, Clastic is a sedimentary rock that are rocks formed from fragments of pre-existing rock Another type is Organic, Organic sedimentary rock is formed from other animals and shells cemented together. And finally there's Chemical. Chemical sedimentary rocks are formed from the minerals dissolved in the water.

My observational data also explains that the Metamorphic rock, Gneiss had a lot of different colors in it. This is because it was formed by either igneous or sedimentary rocks. (I'm not quite sure if I'm explaining this right) I am not certain of the types of Metamorphism but I do know that one is when the magma comes very close to the surrounding solid rock, which is called Contact Metamorphism. And there's another form of Contact Metamorphism, which is the magma actually comes in contact with the rock and the changes of the rock are greater. The other form of Metamorphism. Is when there is very great change in the rock, and the high temperatures and pressures in the depths of the Earth are the cause of the changes. That form is called Regional metamorphism.

I was very surprised to discover the rock cycle and how easy it was after you understood the basics. It would be interesting to conduct further research to find out if my explanation of the different forms of Metamorphism were correct.

## **QUESTIONS TO CONSIDER:**

Use the information gathered during the web quest (and any other sources) to describe the terms and processes in the diagram below:

(Most of these stages take hundreds if not thousands of years). First lava is drawn from the volcano and flows to the lower areas of the terrain until it cools to form igneous rock. This process is called Crystallization. Note: Quick cooling of the lava can result in many very small crystals. If any gases are bubbling out of the lava they will form small holes in the rock. When it rains this erodes the solid rock and produces sediment. Eventually

streams are formed and transport the sediment to a lake or ocean. This process is called transportation. Eventually the stream deposits the sediment and that settles on the bottom of the lake or ocean. Then the sediment that is rested on the bottom of lake or ocean compresses and the seawater that carries dissolved minerals get trapped in between the grains and cement them together, (this is the exact way sandstone is formed). This process is also known as Lithification. Then the igneous and sedimentary rocks that have formed are forced down more into the Earth and are exposed to extremely high pressures and temperatures and compress even more. And the reason the Metamorphic rocks look like they have different lines is because the igneous or sedimentary rock that went through metamorphism might have had different colored dots and when a rock goes through metamorphism its compressed as tight as it can get and those dots turn into little lines. And then the metamorphic rocks get dragged down even further and eventually they slide into the same Magma chamber they once came from and melt to form more magma.

## **CONCLUSIONS:**

In this lab I researched and described the three types of rocks, Igneous, Metamorphic and Sedimentary. I compared the similarities and differences of each rock in the same group to better understand what process they went through. These measurements helped me to better understand the different rock types. And it helped me better understand how even though rocks are in the same category doesn't mean that they look the same. I learned what the rock cycle was. I learned how the rock cycle works. I learned how many different types of rocks are. I learned almost all of the different ways that a rock can go through its formation process. And finally I learned what all the different rocks were made of and where they came from and where they were formed.

I was very surprised to discover the rock cycle and how easy it was after you understood the basics. I found this lab very effective.

**WEB LINKS:**

<http://rocksforkids.com/>

<http://www.fi.edu/fellows/payton/rocks/create/index.html>

<http://www.sdnhm.org/kids/minerals/index.html>

<http://pubs.usgs.gov/gip/collect1/collectgip.html>

<http://www.casdn.neu.edu/%7Egeology/department/staff/colgan/iceland/rocks.htm>

[http://www.classzone.com/books/earth\\_science/terc/content/investigations/es0602/es0602page02.cfm](http://www.classzone.com/books/earth_science/terc/content/investigations/es0602/es0602page02.cfm)