

# A Sandy Beach...or Not?

*\* Created by Kyle N. Hoffman, Geology, Linn-Mar High School, Marion Iowa. 2009*

## Teachers' Notes

### Objectives:

- Students will be able to identify sedimentary rocks both in the lab and the field
- Students will be able to demonstrate understanding of the processes involved with sedimentary rock formation

### Standards:

#### Science as Inquiry

1. Identifies questions and concepts that guide scientific investigations
2. Designs and conducts scientific investigations
5. Formulates and revises scientific explanations and models using logic and evidence
6. Recognizes and analyzes alternative explanations and models
7. Communicates and defends a scientific argument

#### Earth and Space

1. Understands and applies knowledge of energy in the earth system
2. Understands and applies knowledge of Geochemical cycles

#### Physical Science

3. Understands and applies knowledge of chemical reactions

### Essential Questions:

1. What are the processes involved with sedimentary rock formation?
2. What connections can be made with Iowa's geology and sedimentary rock formation?
3. What major geological processes occurred in the past to make Iowa's geology?

### Engage:

#### Materials:

- 800 mL glass canning jars or plastic jars (peanut butter or mayonnaise)
- Lids
- Mixture of rough sand, fine sand, gravel (pebbles) and silt/mud
- Tap Water

#### Procedure:

- In a group (2 students), fill your jar about half full of the sediment mixture.
- Add water to where your jar starts to curve inward (the neck).
- Screw on the lid tightly.

- Write your prediction about what will happen after shaking your jar for 30 seconds.
  - o Make predictions for 1 minute, 3 minutes, 6 minutes, 9 minutes, 30 minutes, 60 minutes and 80 minutes after you shake the jar.
- Quickly shake your jar for 30 seconds.
  - o Make sure to hold your jar tightly.
- Set the jar down on your table and do not disturb.
- Write observations of what is occurring in your jar for every 90 seconds for a total time of 9 minutes.
  - o 6 total observations
  - o One partner needs to write down the observations and the other needs to illustrate the observations.
  - o Share your observations with your partner when all done.
- Compare your first predictions (1 minute, 3 minutes, 6 minutes and 9 minutes) with your observations. Be ready to share with the class.
- There will be a class discussion on the following:
  - o How does this create sedimentary rocks?
  - o What would occur if you dropped the water level at the end of class to only 5 cm in depth?

### **Explore/Elaborate:**

Students will be identifying sedimentary rocks in the class. Then they will be creating a scenario where all the sedimentary rock is layered together and comparing this to what has occurred in Iowa's geological past.

#### **Step 1:**

- The students will start by examining each type of sedimentary rock in the class.
  - o Use the examining skills that they already know to discover the type of rock
  - o When identifying, they will be using their testing kits, microscopes, magnify glasses, 1M HCL, florescence light.
  - o List all the types of igneous rocks on the board to help them with naming.
  - o Provide an igneous rock characteristic sheet for them to use when they are done identifying, to check their answers.
- Find the following:
  - o Name
  - o Type of sedimentary (clastic, chemical, organic)
  - o Chemical make-up
  - o Granular size
  - o Granular type
  - o Other types of characteristics
- They will need to illustrate each rock and identify granular sizes and shapes
- After you figure out what the rock type is, describe how it formed and where it would have formed.

#### **Step 2:**

- Create a timeline that includes each rock type.
- Explain what happened for each layer to form the way it did.

- Where can they find this stratigraphic column today?

**Step 3:**

- Imagine that this happened in Iowa.
  - o Have them change their explanation from earlier to make it work for Iowa.
  - o How different would Iowa be today if this did happen here? Explain the whole process, step by step. What occurred, how it occurred and why it occurred?

**Extension:**

- Using different types of sediments (sand, silt, pebbles); they will create different types of sedimentary rock.
- Student groups will need to determine a method to create these rocks.
  - o In class, bring the material needed (check with me first) and they will have one day to create these rocks.
  - o The next day, another group will test their rocks to try to identify.

**Evaluation:**

|                           |                |
|---------------------------|----------------|
| Rock Type Identification: | 15 pts.        |
| Description of Formation: | 15 pts.        |
| Timeline:                 | 5 pts.         |
| Stratigraphic Column:     | 5 pts.         |
| Iowa's Geology:           | <u>10 pts.</u> |
| Total:                    | 50 pts.        |

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## **Purpose:**

You will be experimenting with different types of sedimentary rock and identifying the processes that would have to occur for these rocks to form. You will also be discovering where these rocks would form and how that helps us figure out what happened in the past.

## **Essential Questions:**

1. What are the processes involved with sedimentary rock formation?
2. What connections can be made with Iowa's geology and sedimentary rock formation?
3. What major geological processes occurred in the past to make Iowa's geology?

## **Explore/Elaborate:**

### **Step 1:**

- You will start by examining each type of sedimentary rock in the class.
- Find the following:
  - o Name
  - o Type of sedimentary (clastic, chemical, organic)
  - o Chemical make-up
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  - o Other types of characteristics
- You will need to illustrate each rock and identify granular sizes and shapes
- After you figure out what the rock type is, describe how it formed and where it would have formed.

### **Step 2:**

- Create a timeline that includes each rock type.
- Explain what happened for each layer to form the way it did.
- Where could you find this stratigraphic column today?

### **Step 3:**

- Imagine that this happened in Iowa.
  - o Change your explanation from earlier to make it work for Iowa.
  - o How different would Iowa be today if this did happen here? Explain the whole process, step by step. What occurred, how it occurred and why it occurred?

## **Extension:**

- Using different types of sediments (sand, silt, pebbles); create different types of sedimentary rock.
- You and your partner will need to determine a method to create these rocks.
  - o In class, bring the material needed (check with me first) and you will have one day to create these rocks.
  - o The next day, another group will test your rocks to try to identify.

**Evaluation:**

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