A Fiery World

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

Teachers' Notes

Objectives:

- Students will be able to identify igneous rocks both in the lab and the field
- Students will be able to demonstrate understanding of igneous rock formation

Standards:

Science as Inquiry

1. Identifies questions and concepts that guide scientific investigations
2. Designs and conducts scientific investigations
4. Formulates and revises scientific explanations and models using logic and evidence
5. Recognizes and analyzes alternative explanations and models
6. 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 igneous rock formation?
2. How do igneous rock formations from the past affect Iowa?

Engage:

**adapted from the Illinois State Museum – Geology Online found at*
http://geologyonline.museum.state.il.us/tools/lessons/12.1/index.html

Materials:
Salol (Phenyl Salicylate)
10 metal teaspoons or 10 GLASS microscope slides
Ice
Magnifiers (hand lenses)
Safety glasses
Heat source such as a candle
Matches

Procedure:

Step 1:

You will need to melt the salol over a candle. Do not hold it over the flame very long because it will get so hot that no crystals will grow for a long time. Slide it over the flame and wait to see how much melts. Continue to do this until almost all of the salol has melted, then set it down on the table and do not disturb it. The crystals should begin forming in just a few seconds. If you melted ALL of it, the crystals will not be able to begin forming since they need something to attach to. You will need to drop some solid grains of salol, called seed crystals, into the melted salol. If these melt, wait a few moments and try again until the crystals begin to grow. Move the solid salol from side to side to let the light show the crystals better. One of the neat things about salol is that it can be melted over and over again to grow new crystals. If you do not like the ones you got the first time, try again.

Step 2:

Now we are going to repeat the experiment, but once you see crystals beginning to form, place the spoon/slide on an ice cube to harden.

Step 3:

You will need to repeat the experiment again, but this time you need to try to create large and small crystals together. Continue to try until you get the needed results, this will not happen the first time you try.

Class Discussion:

As a class, we will discuss what happened with each trial you ran. Which trial created the largest crystals? Which created the smallest? Was it easy to create large and small crystals together? Where would each trial happen in nature? Which will be considered intrusive and extrusive? Could these be found in Iowa? Where and why?

Explore/Elaborate:

In class, the students will be identifying igneous rocks and creating a fictitious volcanic range to demonstrate their knowledge on igneous rock formation and crystal growth.

Step 1:

- Using samples of igneous rocks in the classroom, the students will be examining each type to identify.
    - When identifying, they will be using their testing kits, microscopes, magnify glasses, 1M HCl, florescence light.
    - List all the types of igneous rocks on the board to help them with naming.
    - Provide an igneous rock characteristic sheet for them to use when they are done identifying, to check their answers.
- Find the following:
    - Name
    - Intrusive/Extrusive
    - Chemical make-up
    - Magma type
    - Others types of characteristics

- They will need to illustrate each rock and identify crystal sizes, shapes and mineral names

Step 2:
- Create a volcanic range where ALL of these types would be formed.
- Explain how each rock type would be formed, be specific.
- Include a cross-section illustration(s) of your volcanic range with all sections labeled correctly.
    - This could be hand drawn or computer generated.

Step 3:
- How would their volcanic ranges affect Iowa?
- If there are any igneous rock formations in Iowa, how would they form?

Extension:
- Create a future scenario where Iowa's stratigraphic layers would become completely igneous.
- Include:
    - Type of geologic processes that would have to occur, be specific.
    - What would happen to Iowa's civilizations?
    - What would happen to Iowa's agricultural?
    - Explain if your scenario is actually plausible.

Evaluation:

Igneous Rock Identification:	15pts.
Volcanic Range:	10pts.
Formation Explanation:	15pts.
Iowa Comparison:	10pts.
Total:	50pts.

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Purpose:

You will be identifying different types of igneous rocks. You will be using these rock types to create a fictitious, volcanic mountain range where all types would be created. You will then be connecting the processes involved with igneous rocks to Iowa's geology.

Essential Questions:

1. What are the processes involved with igneous rock formation?
2. How do igneous rock formations from the past affect Iowa?

Explore/Elaborate:

Step 1:

- Using samples of igneous rocks in the classroom, you will be examining each type to identify.
- Find the following:
    - Name
    - Intrusive/Extrusive
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