PROJECT REPORT

Northern Wyoming Community College District / National Science Foundation
Summer Energy Education Program 2012

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TITLE

Which Rare Earth Element will be named "The Element of the Year"?

SUMMARY

The purpose of this lesson is to introduce very basic information about rare earth elements (REE). Students will be put into groups and research a rare earth element in preparation for creating a persuasive PowerPoint. The goal is to try to have their element be named "The Element of the Year". Students will evaluate the presentations to determine the 'winner'.

ENERGY CONTEXT

Rare earth elements are used in a variety of energy sources. They are a key player in the workings of green energy such as hybrid cars and wind turbines. REEs are also found behind the scenes in many of our modern technologies including lasers, batteries, x-ray machines and cell phones.

ANTICIPATED TIME REQUIRED

- Day 1 Introduction Day
  - Review of periodic table organization, view background PowerPoint, look at actual REE samples, receive letter about the "Element of the Year", put into groups and assign element to research
- Day 2 Group Research
- Day 3 Group Research and plan PowerPoint
- Day 4 Create PowerPoint
- Day 5 Student presentations and student voting for the "Element of the Year"

INTENDED STUDENT LEVEL

This activity could be for higher level 6th grade students, 7th or 8th grade students.

ASSUMED PRIOR KNOWLEDGE

This lesson will assume that students have prior knowledge of:

- The basics of atomic structure
- How the Periodic Table of Elements is arranged
- How to work well in a group setting
- How to create a PowerPoint

LEARNING OBJECTIVES

- Comprehend where the rare earth elements are on the Periodic Table of Elements
- Comprehend how the rare earth elements are used (especially in the area of energy)
- Evaluate which of the rare earth elements are the most important in our society

MATERIALS

Each individual or group needs a laptop, internet connection and a chemistry book or periodic table. Samples of rare earth elements are not crucial but nice to have.

INTRODUCTION / MOTIVATION FOR STUDENTS

Using the periodic table of elements in their science book, ask the students to review with their science partner where the following are: metals, nonmetals, metalloids, halogens, noble gases, transition metals, alkaline earth metals, alkali metals, lanthanides and actinides.

Ask students to point to the small spot where the lanthanides and actinides fit into the periodic table.

Ask students to go to *http://www.ptable.com* then click on wide (in the top right of the screen).

Ask the students:

- *What happened to the Periodic Table of Elements when it went to wide? (the 2 rows slid into place after elements 56 and 88)*
- *Why would scientists place the two rows at the bottom instead where they belong on the actual table? (due to space issues)*
- *What are those two bottom rows called?(lanthanides and actinides)*

PROCEDURE

1. Review of periodic table organization.
2. View background PowerPoint titled: 1_Rare_Earth_PowerPoint
3. Look at actual REE samples.
4. Either read or pass out letter about the "Element of the Year", titled: 2_Letter_From_IUPAC
5. Put students into groups of preferably 3 students and hand out one paper titled: 3_Element_Fact_Sheet per group.
6. Have students use the paper titled: 4_Internet_Sites_for_Student_Research to begin their research
7. As a group, students create a persuasive factual PowerPoint promoting their element. Be sure to remind them of your guidelines about PowerPoint presentations.
8. Students present their PowerPoint presentations to the class. While listening to the presentations, students are to fill out the paper titled: 5_Student_Note_Page.
9. The teacher will be evaluating the PowerPoint using the rubric 6_PowerPoint_Rubric
10. When the presentations are complete, students need to look back over their notes. The teacher will hand out ballots that have been cut from the sheet titled: 7_Student_Voting_Ballots.
11. The students will also evaluate their peers so there is both a group grade and an individual grade.
12. The teacher tallies the ballots and decides which the winning element is. You may choose to reward them in some way either by grades, extra credit or a goofy science item.

SAFETY ISSUES

Be sure to follow school corporation internet safety guidelines.

TROUBLESHOOTING TIPS

You may want to avoid the element promethean to research because it is not found naturally on Earth.

Only three of the Actinides are found on Earth, so I avoided that entire row for research.

If each student doesn't have access to a computer, this activity could still be done with fewer computers, but it would take longer.

Depending on your criteria for the PowerPoint, this could take longer than 5 days.

The number of students in a group is flexible.

Different books define REE in different ways. Some include SC and Y and all of the actinides.

ASSESSMENT

Pre-Activity Assessment

- *Informal discussion about what they might know about the rare earth elements. This might include: location on the periodic table, uses of the*

Activity Embedded Assessment

- *Students will be graded on a group PowerPoint they created about the element they researched. There will be a group grade using the rubric and an individual grade based on feedback from their group members and the teacher.*

Post-Activity Assessment

- *Students will listen to group presentations and will evaluate which group supplied the best proposal to be named the "Element of the year".*
- *Students will write a paragraph using the Collins Writing Method (Type 3) with the following Focus Correction Areas*
  1. Where are the REEs located on the Periodic Table?
  2. How are REEs used in industry and in energy?
  3. Explain whether or not you feel the US should continue mining REEs.

SUGGESTED EXTENSIONS

You may want to actually write to someone such as Mei-Hung Chiu who truly is the chairman of the Committee on Chemistry Education (as of June 2012) to let him know what you are doing.

TEACHER RESOURCES

This document may help with background information 8_Teacher Resources