

TESI 5: Lesson Plan

Comparing the Density of Iron

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Objectives:

1. Students will use scientific measuring tools.
2. Students will collect and use scientific data.
3. Students will determine the density of 4 different objects.
4. Students will use their data to explain why objects have similar/different densities even though they are both made of iron.
5. Students will use technology to answer questions.

Length of Lesson: 2-3 days

Prior Knowledge:

This is a unit designed to use early in the year, not only to discuss the composition of iron and taconite, but most importantly to have students practice taking measurements and using data to answer questions. Students will need to know how to use displacement to get the volume of an irregular solid. Students will also need to be familiar with the density formula. In addition, students will need access to a computer for a short time to answer a few basic research questions.

Materials:

1. At least 2 different samples of taconite and iron ore per group.
2. Balance
3. Graduated cylinder
4. 250-500 ml beaker
5. Calculator

Procedure:

1. Hand out samples (2 taconite and 2 iron ore) to each student group. Preferably of different shapes and sizes.
2. Have students label each of their samples

3. Have students mass each of their samples and record their results in their lab sheet (see attached).
4. Have students determine the volume of each sample using displacement and record their results (see attached).
5. Have students go to the computer web sites to determine the make-up of each of their samples and record the information they find in their lab sheet (see attached). www.cleveland-cliffs.com/products/ and <http://webmineral.com/data/hematite.shtml>
6. Have students answer the critical thinking questions in their lab sheets (see attached).

Assessment:

Students will be assessed based primarily on the lab sheet they turn in at the end of the lesson. In addition, participation, lab safety, and computer etiquette will be used to determine on overall participation grade worth no more than 25%.

State Standards: High School Science

II.1.1 – Justify plans or explanations on a theoretical or empirical basis.

II.1.2 – Describe some general limitations of scientific knowledge.

II.1.3 – Show how common themes of science, mathematics, and technology apply in real-world contexts.

IV.1.3.1 – Explain how elements differ in terms of the structural parts and electrical charges of atoms.

V.1.3.1 – Explain how common objects are made from earth materials and why earth materials are conserved and recycled.

I.1.2.2 – Design and conduct scientific investigations.

Applied Science: Comparing the Density of Iron Lab

Objective:

To accurately measure the density of several objects and then use that data to answer questions about its composition.

Materials:

4 samples (2 round) and 2 (irregular)

Balance

Graduated Cylinder

Beaker

Calculator

Masking tape

Procedure:

1. Label each of your 4 specimens using a small piece of masking tape (#1, 2, 3, and 4).
2. List the physical observations (at least five) of each sample. Record your observations below.

Sample #1:

1. _____
2. _____
3. _____
4. _____
5. _____

Sample #2:

1. _____
2. _____
3. _____
4. _____
5. _____

Sample #3:

1. _____
2. _____
3. _____
4. _____
5. _____

Sample #4:

1. _____
2. _____
3. _____
4. _____
5. _____

3. Answer the following question: What are the similarities and differences in these 4 samples?

4. Mass each sample and record your findings (Remember to label correctly!!).

Sample #1: _____

Sample #2: _____

Sample #3: _____

Sample #4: _____

5. Find the volume of each sample using displacement and record your findings below (Remember to label correctly!!).

Sample #1: _____

Sample #2: _____

Sample #3: _____

Sample #4: _____

6. Find the density of each sample using the formula: $d=m/v$ and record your findings below (Remember to label correctly!!).

Sample #1: _____

Sample #2: _____

Sample #3: _____

Sample #4: _____

7. Go to the computer and look up the following web sites:

<http://webmineral.com/data/Hematite.shtml> and www.cleveland-cliffs.com/products/ Find the composition of each sample (Round samples are Taconite and the irregular samples are Hematite). Record your findings below:

Taconite: _____

Hematite: _____

