

Density and Density Columns

Katie Cofrin

Grade level: 6th grade

Area: Matter-Density

Time allotment: 45 minutes

OVERVIEW

The focus of the lesson was to introduce the students to the concept of density and discuss density as an intrinsic property.

PURPOSE

This lesson is important because density is a very important property in science. To understand density and be able to make conclusions based on this knowledge will benefit the students in other areas aside from chemistry.

OBJECTIVES & STANDARDS MET

Students will be able to determine position of various liquids in a container (column) based on their densities. They will also be able to discuss the property of density and its specificity to elements and substances. Students should be able to determine a mass, volume, or density given two values in the density equation: $\text{density} = \text{mass}/\text{volume}$.

Standards: 1.1, 2.2

BACKGROUND INFORMATION & REFERENCES

Students should have exposure to chemistry and chemical properties. Students should also have an understanding of intrinsic and extrinsic properties.

Mr. Wallace (Lead Teacher) prepared the materials and quiz.

VOCABULARY, MATERIALS, PREPARATION, SAFETY

Vocabulary: density, extrinsic property, intrinsic property, density column, mass, volume

Materials required: Graduated cylinder. Liquids: Karo syrup, vegetable oil, glycerin, and food coloring. Solids: rubber band, wax, toothpick, paper clip.

The materials were gathered and the experiment was done as a demonstration during class.

No safety concerns.

Density and Density Columns

Katie Cofrin

Grade level: 6th grade

Area: Matter-Density

Time allotment: 45 minutes

METHOD: 5 E'S MODEL

Describe the step-by-step procedures for each E of the 5 E's model:

[Engage]Students were gathered to the front of the room and asked to inspect each of the substances and items: Karo syrup, vegetable oil, glycerin, and food coloring. Solids: rubber band, wax, toothpick, paper clip.

[Explore]Students were asked what position the new substance would lay in once added to the column. They were also asked where they thought the items would settle within the four layers.

[Explain]A discussion was conducted comparing the various densities of the liquids and solids that were added to the column. Students were taught about how the density of the substance corresponded to its position in the column. Sample questions:

- 1) Which substance will settle lower in the column? A liquid with a density of 0.8g/mL or 1.1 g/mL?
- 2) If we know that the density of the bottom layer is 1.0 g/mL, where would a substance of 0.95 g/mL come to rest?
- 3) What happens to two liquids when their densities are exact?

The goal of this discussion was to illustrate the relationship between liquids in a column solely based on their densities. Also, to teach them how to determine whether a substance will sink or float based on density.

[Elaborate]Students were asked to predict where various other items would settle given their densities.

[Evaluate]Students were evaluated with an end-of-unit quiz on density.

ADAPTATIONS OR DIFFERENTIATED LEARNING

EXTENSIONS & CONNECTIONS

A real-life example of density is when you get a shot at the doctor's office. The shot is delivered by volume, but the amount of the active ingredient is what counts. So, the density of the active ingredient is being used, since the amount (or mass) has a specific volume "assigned" to it.

<http://www.newton.dep.anl.gov/askasci/eng99/eng99161.htm>

HANDOUTS & PRESENTATIONS

See below.

PEER REVIEW COMMENTS

Density and Density Columns

Katie Cofrin

Grade level: 6th grade

Area: Matter-Density

Time allotment: 45 minutes

REFLECTIONS (COMPLETED AFTER LESSON IS IMPLEMENTED)

This lesson did not integrate my research into the curriculum.

The lesson was very straightforward; there are no suggestions that I believe would enhance it a whole lot.

The students stayed involved throughout and asked great questions. They also were fighting to answer my questions.

I learned that students are capable of having an extended attention span and are interested if you let them be.

This specific lesson didn't have a huge impact on my future profession, but it was a great first experience in front of the classroom teaching the class.

STUDENT WORK EXAMPLES (COMPLETED AFTER LESSON IS IMPLEMENTED)

Name _____

Date _____

Density Quiz

1. A scientist is brought a bar of metal that is gold in color. It is 15cm long, 6 cm wide, and 2cm thick. He uses a balance and finds that the sample's mass is 3,474 grams. The scientist knows that the density of pyrite (fool's gold) is 5.01g/cm and the density of real gold is 19.3 g/cm. Help the scientist calculate which he has.

Volume of Bar _____ Mass of Bar _____ Density of Bar _____

Is it gold or pyrite?

2. A piece of wood measuring 10cm by 10cm by 7 cm had a mass of 910 grams. What would be the density of the wood? Would this type of wood float on water?

Extra Credit- If the density of uranium is 18.95g/cm, what would be the mass of a cube of uranium 20cm on a side?