Understanding Properties of Matter

Deb Semmler St. Joseph's High School

dsemmler@saintjoehigh,com

This year, we will be adding two new freshman level courses- Physical Science and Life Science. I was particularly interested in finding some new labs that I could use with these new courses. I am very pleased with this kit that I chose.

The Kit

The kit I ordered was from Carolina Biological Supply. The kit (Understanding Properties of Matter) sells for xxxx and contains enough materials for a class of 30 working in groups. The kit comes with a lot of the materials needed but does require some materials to be provided by the teacher. The focus of the hands-on, inquiry based lab activities is to allow the students to explore the properties of matter by comparing intensive and extensive properties, observe physical and chemical changes and use inquiry techniques to identify the relationships between various properties.

Learning Goals

Students will be able to

1. **Investigate intensive and extensive properties**
2. **Explore differences between chemical and physical changes**
3. **Develop skills to design and perform experiments**

What materials students will be working with

Students will have a lot of materials that they will be testing and observing. Some of the materials include:

Copper shot	**Sugar**
Iron filings	**Granite chips**
Salt	**Brass washers**
Sand	**Steel bolts**
Aluminum foil	

Activity 1

1. **Students collect the materials.**
2. **Review the Properties of Matter cards as a group to familiarize themselves with the materials.**
3. **Brainstorm together and come up with a logical system of organizing the materials using the information on the cards, the physical characteristics of the materials and any other means they can think of to group the materials.**

Activity 2

1. **Students select five materials from the list and determine the following eight properties for each:**
    - **Mass (using balance beams or eletronic balances)**
    - **Volume (using graduated cylinders or metric rulers)**
    - **Density**

- **Magnetism (using magnets)**
- **Appearance(color, texture, features, etc)**
- **Reactivity with acid**
- **State at room temperature**
- **Conductivity (using battery operated circuits)**

2. **They record their results in a Properties of Matter Data Table**

<u>Activity 3</u>

1. **Students will individually conduct the following experiments, filling out the data table and deciding whether it represented a chemical or physical change:**

   a. yeast and hydrogen peroxide- add 5 drops of hydrogen peroxide to the yeast in the evaporating dish. Record observations.

   b. filter paper and marker- using a black marker, make a black line 3 cm from the bottom of the filter paper. Fold the paper so that it will fit into a beaker with 150 mL of water, keeping the line above the water mark. Allow water to filter through the paper until it is 1 cm from the top. Remove the paper, allow it to air dry and record observations and results.

   c. silver nitrate and copper- put copper into a test tube and add 1 mL of silver nitrate to it. Observe and record the results.

   d. sugar and water solution- note the properties of sugar and water separately. Pour the water into the sugar and mix. Observe and record the results.

   e. sodium bicarbonate and acetic acid- add 5 drops of acetic acid (vinegar) into the evaporating dish containing the sodium bicarbonate. Observe and record the results.

   f. zinc and hydrochloric acid- add 5 drops of hydrochloric acid to the evaporating dish containing the zinc pieces. Observe and record the results.

   g. Chalk – place chalk in the mortar. Using the pestle, grind the chalk thoroughly. Observe and record the result.

   h. Iron and copper sulfate- add 1 mL of copper sulfate solution to the evaporating dish containing the iron filings. Wait for 3 to 5 minutes noting any changes that you observe during that time. Observe and record the results.

<u>Evaluation:</u>

This lab is exactly what I was looking for. This lab introduces students to the differences in matter and includes very good worksheets that instruct students in the proper methods of measurement. These can be kept for future refence. The extension activity provides another opportunity to check their retension and could also be used as a lab skills formative assessment. I am looking forward to using this lab with my new classes.