Physical Changes

Summary

The Law of Conservation of Mass states that mass is conserved during physical and chemical changes. Students explore this concept by taking initial masses, making predictions, and finding final masses of physical changes. Students observe that the mass of aluminum foil in a sheet is the same as the mass of that piece of Aluminum foil formed into a small ball. Students will use a balance and begin to learn terms such as mass and grams.

Time Frame

1 class periods of 60 minutes each

Group Size

Small Groups

Materials

one balance per group with gram mass cubes (Gram mass cubes can be ordered from enasco.com TB16755M Set of 500 for $12.50.) or scale.
ice
Ziploc bags
3" ball of clay per group
aluminum foil
paper
2 pipe cleaners per group
scissors
1 tsp. of salt in a very small container or Ziploc bag
small container to mix salt and water in, needs to fit on the balance and not be too heavy
graduated cylinder
paper clips

- Physical Changes Data Table handout

Background for Teachers

Matter is anything that takes up space and has mass. Matter is composed of atoms and molecules and is always changing its form by either physical or chemical changes. The Law of Conservation of Mass states that mass is neither created nor destroyed during any physical or chemical changes.
A physical change occurs when the appearance of a substance changes but its chemistry remains the same. No new substance is formed in a physical change; water moving between states of matter, a Popsicle melting, and a paper crumbled are examples of physical changes.
A chemical change occurs when bonds are broken between atoms and rearranged into new, entirely different substances such as burning a log and frying an egg.

Intended Learning Outcomes

Framing questions. Designing investigations. Conducting investigations. Collecting data. Drawing conclusions.
Connecting ideas with reasons. Using multiple methods of communicating reasons/evidence. Ideas are supported by reasons. There are limits to ideas in science. Differences in conclusions are best settled through additional observations and investigations.

Instructional Procedures

Pre-lab Discussion:

Write the words physical change and chemical change on the board in two columns. Ask several students what they ate for breakfast that morning. As they tell you, place the different items in the appropriate column being sure you use a verb each time. For example, for physical changes they might have poured milk, mixed milk and dry cereal, squeezed a gogurt, or buttered plain bread. For chemical changes they might have toasted bread, cooked an egg, fried bacon, or cooked a pancake. Explain to them the difference between physical and chemical changes. Tell the students they are focusing on physical changes today and want to determine if the mass of an object changes when it undergoes a physical change.

Instructional Procedure:

I. Using the balance - The students are going to find the mass of an object on the balance. They will physically change the form or shape of the object and see if the mass changes.

- Take the mass of an object and write it down on the data table. Be sure the gram cubes are counted accurately and the mass is taken as precisely as possible.
- Physically change the object as instructed. Discuss why this is a physical change. Can I get my material back to its approximate original form?
- Predict if the mass will be different when the object is changed.
- Take the mass of the object again. Compare the two masses.
- When they have finished all the changes, have the students look at their data. Discuss how matter cannot be created nor destroyed when you physically change it.

** Be careful to not lose any of the object along the way or else the two masses won't be equal!!

II. Physical changes - Be sure and make predictions about the change in mass before each final mass reading is taken.

- Put a piece of ice in a Ziploc bag. Find its mass. At the end of the class mass the Ziploc bag, that now contains water, again.
- Find the mass of 5 paper clips unattached and then attached.
- Form a piece of clay into a snake-shape and find its mass. Then form the snake into a ball and mass it again. Try and manipulate the clay as little as possible because you will lose some along the way and that will affect your mass.
- Use an Aluminum foil sheet that is about 9" x 9". Fold it into a large square that doesn't hang too much over the side of the pan on the balance. Find its mass. Form the sheet into as small of a ball as possible and find its mass again.
- Use a piece of paper that is also about 9" x 9". Fold it into a large square that doesn't hang too much over the side of the pan on the balance. Find its mass. Cut the paper into about 10 pieces and find its mass again.
- Fold two pipe cleaners in half and find the mass. Then form them into a ball and find the mass again.
- Put 20 ml of water into the small container for mixing. Find the mass of the salt, its container, and the container that contains 20 ml of water. Add the salt to the water and very carefully stir it being careful not to lose any water. Find the mass again after it is mixed. Be sure and include all the containers when you do the final mixture.

Bibliography

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