**RESEARCH - BACKGROUND:**

* **Matter**
* **States of matter**
  + Solid
  + Liquid
  + Gas
* **property**
* **Physical properties**

Physical properties can be described in two ways.

* **Qualitative (sensory)Observation** – observation made using *senses* to describe the properties

*Examples:*

* **Quantitative (measured) Observation** – observation made using *measurements* to describe the properties.

*Examples:*

* **Chemical Properties**

**TWIZZLERS LAB:**

**Objective/Goal:** The student will describe the physical properties of a Twizzler, be measured using qualitative and quantitative observations?

**Experiment:**

**Materials:**

One Twizzler

Ruler

Balance

Clean tissues

**Procedure:**

1. Identify the ***color*** of the Twizzler. Record the information on the data table.
2. What ***shape*** is the Twizzler? Record the information on the data table.
3. What does the Twizzler ***smell*** like? Record the information on the data table.
4. Texture is how something feels. What is the ***texture*** of the Twizzler? Record the information on the data table.
5. Use the ruler and measure the ***length*** of the Twizzler. Record the information on the data table.
6. Diameter is the distance from one side to another across the middle. Use the ruler and measure the ***diameter*** of the Twizzler. Record the information on the data table.
7. Use the balance and measure the ***mass*** of the Twizzler. Record the information on the data table.
8. ***Ductility*** is the ability of an object to stretch without breaking. How ductile is the Twizzler? How far can you stretch your Twizzler?
9. Find the ***mass*** of the Twizzler.
10. Record the information on the data table.
11. Cut the Twizzler in half. Repeat the observations.
12. Cut the Twizzler in half one more time. Repeat the observations for the ¼ of the Twizzler.

|  |  |  |  |
| --- | --- | --- | --- |
| Property | Observation | | |
|  | Whole Twizzler | ½ Twizzler | ¼ Twizzler |
| color |  |  |  |
| shape |  |  |  |
| smell |  |  |  |
| texture |  |  |  |
| Length |  |  |  |
| diameter |  |  |  |
| ductility |  |  |  |
| mass |  |  |  |

**Analyze Data**:

1. Identify all ***qualitative*** properties from the data table.
2. Identify all ***quantitative*** properties from the data table.
3. Which properties stayed the same after cutting?

1. Are the properties you just observed about the Twizzler physical or chemical properties? How do you know?
2. Would qualitative or quantitative properties be more useful to scientists?
3. What are the properties of a solid?

**CLASSIFYING SOLIDS, LIQUIDS AND GASES**

**Objective/Goal:** The student will use their prior knowledge to classify materials

**Materials:**

Set of materials

6 different materials in small lidded containers

Marbles

Steel shot

Table salt

Fine grained sand

Colored water

Corn syrup

3 syringes- filled with sand, colored water, air

**PROCEDURES/ACTIVITIES**

Explore #1: Observe the contents of each tube. Record your observations

|  |  |
| --- | --- |
| 1: marbles |  |
| 2: steel shot |  |
| 3: table salt |  |
| 4: sand |  |
| 5: water |  |
| 6. corn syrup |  |

* Which of the containers would you classify as containing a solid? Why?
* Which of the containers would classify as containing a liquid? Why?
* What do you notice as the individual particles get smaller?
* Are your original ideas of solid, liquid and gas consistent with ***all*** your observations?

**Explore #2:** Each syringe contains a solid, a liquid or a gas.

Plugging the end of the syringe with a cap and holding it tightly, push down the plunger. What happens to each?

|  |  |
| --- | --- |
| Solid |  |
| Liquid |  |
| Gas |  |

* Write a general statement of behavior for the materials in the syringes.
  + Solid:
  + Liquid:
  + Gas:
* What makes the gas compressible but the liquids and solids not?

**Explain:** Can you draw a model that can be used to explain the differences among a solid, liquid and gas?

*What are the major differences?*

Matter is made of particles that are too small to be seen, even with a powerful microscope. How can this model of matter be used to explain the state of matter?

**Experiment:**

Using the balls and glue dots, can you build a model of matter consistent with the observed physical properties?

**THE THREE STATES OF MATTER LAB**

**Objective/Goal:** The student will observe that different temperatures can cause various materials to change states of matter.

**Materials**

Hot plate

beaker

thermometer

ice cubes

baggies with one ice cube in each bag

**Procedures/Activities**

1. The mission is to melt the ice cube in three minutes. Discuss in your group how you will melt the ice.
2. The teacher sets timer for about three minutes. Groups carry out plans to melt the ice cube.

**Analysis**

* What was needed to melt the ice?
* What happens to the particles as the ice is melted? What evidence do you have?
* How can a liquid be changed back into a solid?

**MODELING CHEMICAL CHANGE:**

**Objectives/Goals:** The student will be able to model a chemical changes based upon changes in observable properties.

**Experiments:**

Materials Needed:

Ping pong balls

Small plastic balls

Glue dots

Sticky tac

Rubber cement

Plastic mesh bag

Plastic cup

Duct tape

Hair dryer (2 speeds)

Procedure:

1. Place 9 ping pong balls in basket.
2. Describe what they do.
3. Shake the basket gently. What happens to the balls?