

A SLIPPERY SLIMY SUBSTANCE

PRE LAB DISCUSSION

Scientists must use exact language to communicate their observations and ideas to other scientists. Many words have different meanings to different people. To avoid miscommunication, scientists often include definitions of the words they use to describe their ideas and observations. For example, there will be phrases in the report such as "*for the purpose of this report _____ will mean...*"

Many words have both a **conceptual** and an **operational** definition. A conceptual definition is an abstract idea that may not be measured or observed. An operational definition is a series of observations and measurements that will determine the existence of something.

In the laboratory you observe chemical and physical phenomena and need to communicate your findings clearly to others. You need to define terms **operationally**. In this lab, if you cannot define the states of matter in operational terms, you cannot communicate or defend your ideas and opinion.

OBJECTIVE: To make and study an unusual polymer

Materials/equipment: Beaker, stirring rod, ring, wire screen, ring stand, Bunsen burner, saturated solution of sodium tetraborate [Borax], Guar gum, food coloring,

[Guar gum can be purchased in most health supplement stores & borax is a natural laundry product]

PROCEDURE:

1. Add 100 ml of water to your beaker. You may use water colored with food coloring for a more colorful experiment.

2. Add 0.7 grams of guar gum to the water.
3. Heat the water while stirring gently to dissolve the guar gum.
4. When the guar gum is completely dissolved, add 7 ml of saturated sodium borate solution. Stir *just* once or twice to mix the two liquids.
5. Allow the newly formed polymer to cool to room temperature. Then pour it out on your table. Move it around and pick it up with your hands.
6. Make and record as many observations as possible.

THINKING SCIENTIFICALLY

Before a scientist uses a term, the scientist must be sure of the meaning of the term. If the term may have slightly different meanings in a different context or to different people, the scientist will define the term for the purpose of this experiment. In this case, you must provide an **operational** definition of the terms *solid* and *liquid*.

What are the properties that define a **solid**?

What are the properties that define a **liquid**?

Conclusion- Is SLIME a solid or a liquid? _____

Defending your Conclusion-Write an essay combining your observations with your definitions to support your conclusion. You may attach it to this report.

THE UNIQUE PROPERTIES OF SLIME

Materials/equipment: Plastic wrap, marker pen, meter stick, timer [watch]

Background

Rheology is the study of the flow and deformation of matter. When dealing with solids, the study of rheology tests the property known as *elasticity*. When dealing with fluids, rheology tests the property known as *viscosity*.

VISCOSITY

Viscosity is defined as the internal resistance to flow shown by a liquid. One way viscosity is measured is to drop a metal ball through a column of liquid and measure the time that it takes to fall through the liquid. However, we will not do this. Measuring the rate of flow of a specific amount of a liquid between two points is less accurate but will suffice at this time because everyone's SLIME is not exactly the same.

Procedure

1. Draw a circle using a small beaker, coin, etc on a plastic sheet [plastic wrap]
2. Draw a larger concentric circle around the first circle using a larger circular object.
3. Roll a ball of SLIME of a size to almost fill the center circle and place it in the center of the smaller circle [determining its mass provides a more accurate experiment].
4. Begin timing the flow of the SLIME when it flows to touch the inner circle and record how long it takes to reach the outer circle. [If the SLIME stops flowing, your circles are too big]

5. Measure the distance between the two circles and calculate the rate of flow of your SLIME in centimeters per minute.

DATA

- Mass of SLIME used [optional] _____
1. Time to flow from inner to outer circle. _____
2. Distance between the circles _____
3. Rate of flow [cm/min] _____

ELASTICITY, ELONGATION, & TENSILE STRENGTH

Tensile strength of a solid substance is its strength under tension. It is the force needed to pull a substance apart.

Elasticity allows a solid to regain its original shape and size after it has been stretched. When the force applied to an elastic substance reaches a certain strength, the substance loses its elasticity and may break. This force is called the elastic limit.

Procedure

1. Place a meter stick on the table.
2. Take 20 grams of slime and roll it into a sausage shape about 2 cm [inch] in diameter.
3. One student will hold the SLIME between two fingers and a thumb. Start at the edge of the yardstick and stretch the SLIME at a uniform rate across the table. The other student will count seconds per cm that the SLIME is stretched.
4. Record the length of the SLIME when it snapped.

5. Repeat this several times and average the results. Try to maintain the same speed each time.

Data

	1st	2nd	3rd	ave
1. Seconds per cm stretched.	_____	_____	_____	_____
2. centimeters stretched	_____	_____	_____	_____