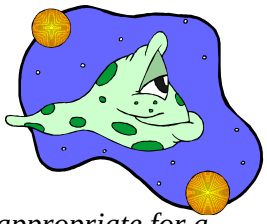
Lab: Oobleck!



**Warning!** *This lab has the potential to get very messy. Do not do anything that is inappropriate for a lab. If you choose to do so, you choose to get a 0 on this lab.*

Background on Non-Newtonian Fluids and Colloids

Many of the materials we use every day, like starch, are made up of molecules called POLYMERS. POLY means many and MER means unit. Because the units in chains are so long, they interfere with the ability of the solution to flow. ***Viscosity is a physical property of liquids that describes how they flow.*** Honey and corn syrup are described as having high viscosities because they flow more slowly than water, which has a low viscosity.

In this lab, it will be useful to know the different types of mixtures. Solutions and **colloids** are mixtures that are uniform throughout the mixture. The particles in a colloid are larger than those found in a solution, but small enough to remain in suspension permanently and be homogeneous, such as fat globules in milk. A suspension, on the other hand, is a type of mixture that contains particles that are heavy enough to settle to the bottom after being stirred up. Usually **suspensions** are opaque or "smoky" looking and do not transmit light. A good example of a suspension is very fine sand in water.

Though there are three states of matter, solids can be further divided into **crystalline solids** and **amorphous solids**. In crystalline solids, the particles are arranged to form a regular, repeating pattern. Salt, sugar, and ice are all examples of crystalline solids. Amorphous solids are solids that are made up of particles that are not arranged in a regular pattern, such as in glass, plastic, and rubber. Amorphous solids, unlike crystalline solids, do not have a distinct melting point, but simply become softer and softer as their temperature increases. Keep these facts in mind while you are observing your Oobleck creation.

Pre-lab Definitions: (+6) Define the terms below before starting your lab.

1. Mixture
2. Colloid
3. Suspension
4. Solution
5. Viscocity
6. Fluid

Purpose: (+ 1) To determine the ***state of matter*** of an unknown substance (Oobleck)

Hypothesis: (+ 2) If we mix cornstarch & water, then the substance's state of matter will be _____. I believe this because…_____
_____.

(Write at least two sentences to explain why you made the hypothesis that you did. Use at least 2 scientific vocabulary words in your explanation)

Materials (+2)

- 1 - 250mL beaker
- 175mL cornstarch
- 100mL water
- 1 bowl
- scupula

Procedure (+1):

1. Measure out 175mL cornstarch into the 250mL beaker *(estimate the amount using the measurements on the side of the beaker)*. Pour the cornstarch into the bowl.
2. Measure out 100mL of water. Add a small amount of water at a time to the cornstarch until the mixture begins to thicken *(somewhat like the consistency of yogurt)*. Stir carefully! Don't fight the viscosity of the Oobleck!!!
3. Follow the "What did I do?" instructions while you play with the Oobleck. Fill in the data table after you have cleaned up.

Data: (14 points)

Write down a minimum of one sentence to describe **"What Happened?"** & **"Which State of Matter**
NOTE: You may not 1) throw the Oobleck 2) put it on someone's clothes or hair 3) eat the Oobleck

Data Table #1: Applying your Vocabulary

Does the Oobleck have a high or low viscocity?	
Do you think the Oobleck is a solution, a colloid or a suspension?	
What are the two substances in this mixture?	
When you mixed the two substances, did a physical or chemical change occur?	

Data Table #2: Which State of Matter?

What Did I Do?	What Happened?	Behaved Like Which State of Matter?
Try to cut Oobleck		
Slap the top of Oobleck in the bowl		
Pour some Oobleck into your hands and roll it into a ball		
Make an Oobleck snake and pull it apart quickly		
Draw in the Oobleck with your scupula		
(Fill in your own experiment)		
(Fill in your own experiment)		

Analysis Questions: (10 points total)

1. How does the viscosity of Oobleck change with force? *(increase or decrease)* Explain what happened. **(2 pts)**
2. Give a two everyday examples of a: suspension, a solution and a colloid. **(3 pts)**
3. Is Oobleck better classified as a solution, a colloid or a suspension? Explain your answer. **(2 pts)**
4. When it behaves like a solid, what type of a solid would you consider it to be and why? **(2 pts)**
5. Water is a Newtonian fluid, meaning that it has a constant viscosity no matter how much force you apply to it. How does the term *Non-Newtonian Colloidal Mixture* apply to Oobleck? Explain by using your understanding of these terms. **(2 pts)**

Conclusion: (12 points) Using your sentence starters, write a thorough conclusion stating whether your hypothesis was correct or incorrect. Explain your answer using all of the following vocabulary words, phrases, and questions to discuss how they relate to Ooblecks state of matter. Underline them as you use them. **(9 pts regular rubric, + 3 pts for below)**

- ✓ **How do molecules behave in a solid?**
- ✓ **How do molecules behave in a liquid?**
- ✓ **Apply the term: Viscosity**
- ✓ **Apply the terms: Mixtures, Solutions & Colloids**
- ✓ **Crystalline and amorphous solid**