



Non-Newtonian Fluids



OBJECTIVE:

Understanding Non-Newtonian fluids and fluid mechanics.

MATERIALS:

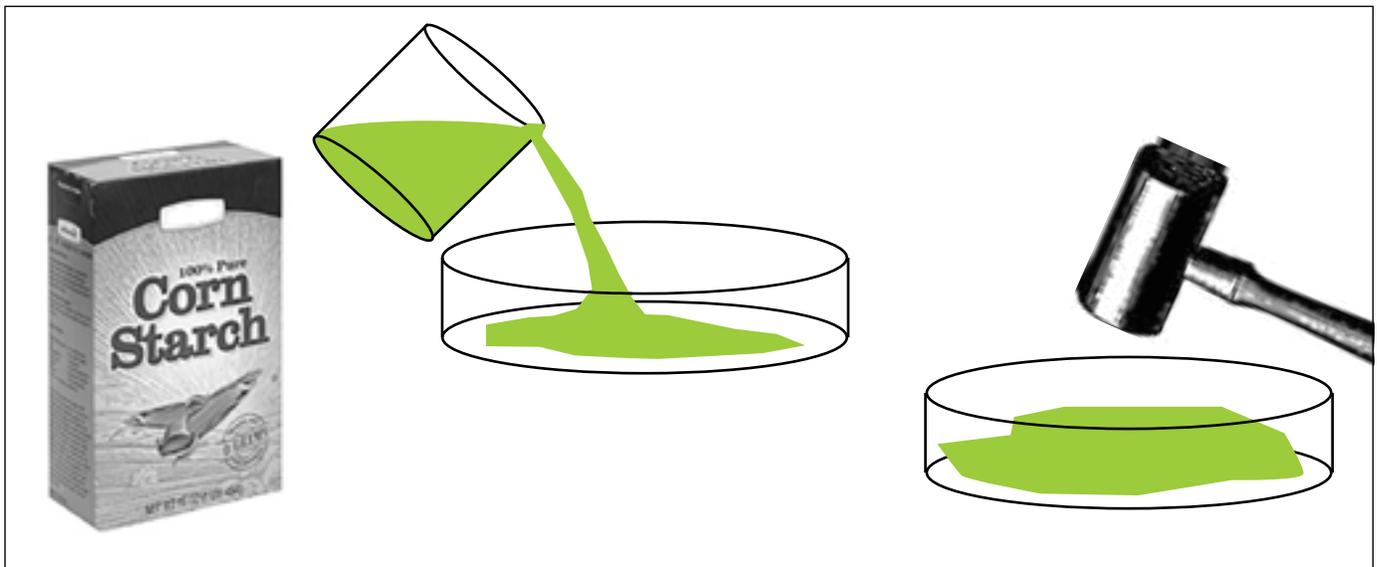
Corn starch, water, flat container, mallet or hammer

BACKGROUND INFORMATION:

Non-Newtonian fluids describe the state a fluid will maintain when different forces are applied.

WORD BANK:

fluid mechanics, Newton, malleable, force, viscosity



PROCEDURE:

1. Mix corn starch with a little water until it is gooey but firm on impact.
2. Pour into flat, unbreakable container.
3. Hit with a hammer, mallet, or your hand.



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KEY UNDERSTANDINGS

DISCUSSION:

Think about the cornstarch and water experiment you just did. When the only force acting on the water and cornstarch is gravity, the solution is in a liquid form. When you take a mallet and apply a force greater than gravity the liquid becomes a solid. Why does this happen?

While the solution is in a liquid form, gravity is the only force acting upon the molecules of this solution. When another force acts upon the molecules (i.e. a mallet, your hand, etc.) the solution instantaneously shifts the molecular structure into a combined state which makes them a solid. Even though the solid is malleable like a sponge, it will maintain its shape until that additional force ceases to act upon the corn starch and water.

EXTENSIONS:

Non-Newtonian fluids are everywhere!

Some of them you have in your house: ketchup, toothpaste, shampoo and paint.

Now, don't go around smashing shampoo and ketchup bottles because their molecular make-up will inhibit them from solidifying. What makes them a Non-Newtonian fluid is their viscosity (the thickness of a fluid) which technically classifies them as Non-Newtonian Fluids.