

Yuck Science – Non-Newtonian Fluid Grades JK-8

A fluid that can be both a liquid and a solid? This is an excellent inquiry activity that lets students get messy, while learning about an incredible physics principle.

**Materials**

* Cornstarch
* Water
* Mixing bowls
* Pie plates
* Spoons
* Cups
* Food colouring (optional)

**Background Info:**

This goo is an example of what’s called a non-Newtonian fluid – a fluid that ignores Sir Isaac Newton’s Law of Viscosity. All fluids have a property known as viscosity which is the measurable “gooeyness” of the fluid or its resistance to flowing. Honey and ketchup are liquids that have a high viscosity or resistance to flowing. Water has a low viscosity.

Newton stated that the viscosity of a fluid can be changed only by altering the fluid’s temperature. For example, honey flows easily (low viscosity) when you warm it but becomes very thick (highly viscous) when it gets cold. A non-Newtonian fluid doesn’t have the same dependence on temperature because its viscosity changes when stress or a force, not heat, is applied. When you squeeze a handful of the glop you made, the particles of cornstarch come closer together and trap the water between them. Its viscosity increases and it acts like a solid… for a split second. When you release the pressure, water fills the spaces between cornstarch particles again and the glop behaves like a liquid.

**Action**

1. Give each student, or pair of students, a pie plate or bowl to mix their corn starch and water in.
2. This is fully an experiment, where they can try adding more or less corn starch to see what happens.
3. When they have the correct consistency, their mixture will run when picked up and allowed to ooze between their fingers, but will behave as a solid when pressure is applied.

**Conclusion/Wrap up**

If the students want they can add some food colouring to their non-Newtonian fluid to make it more fun!