

# Ooblick 4<sup>th</sup> Grade

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## References:

- Well-known from lots of places

## Benchmarks:

SLC/GLI #: PS-1

## Objectives:

The objective of this lesson is to further teach physical changes, but Ooblick is special in that it's not a normal type of mixture; it's a "Non-Newtonian" fluid, so you can use this lesson to teach the idea of departures from clear cut definitions of solids and liquids.

## Materials:

- cornstarch
- water
- containers for mixing

## Initial Demonstration:

There isn't really an initial demonstration for this lesson, just a discussion of the states of matter of each of the ingredients.

## Target Observations:

- Students should notice what the initial states of matter of the individual components (i.e. the cornstarch and water) so they can compare them to what they get after they mix them.

## Procedure:

Simply mix the cornstarch and water until the consistency is right so that you can play with the ooblick in your hands. I don't use a recipe, although I'm sure you can find one online somewhere. We just randomly added things together. Then let the students play with it and make observations about how it acts: like a solid or a liquid, depending on what they do with it.

An add-on to this procedure is that you can make stress balls by pouring the mixture into balloons and then tying them closed.

After the students have made observations of what happens with this strange mixture and how it's not really a liquid, but not a solid either. Explain to them how non-Newtonian fluids work. The basic idea is that instead of a material that follows Newtonian force laws, such as  $F =$

ma, where the more force one applies, the more acceleration you see. On the other hand, in non-Newtonian fluids, as the students surely noticed with the ooblick, the more force they use pressing on it, the less it moves. This is a characteristic of these types of fluids where the viscosity (or thickness or resistance to pouring) of the fluid changes with the force applied.

**Target Observations:**

- Students should notice the Non-Newtonian fluid characteristics of Ooblick
- Students should observe that sometimes the question of whether a substance is a liquid or a solid is not well defined.

**Target Revised Model:**

- Students should understand that with Non-Newtonian fluids, the more force they apply to them, the more viscous and like a solid they are, while if they act on the substance with little force, it will act more like a fluid, with less viscosity.

**Summary:**

The objective of this lesson was to teach the idea of Non-Newtonian fluids with Ooblick, which is simply a combination of cornstarch and water, and is fun to play with. This lesson also teaches students that the line between liquids and solids is not always clear-cut. They were able to make Ooblick themselves and play with it to discover its somewhat odd, Non-Newtonian characteristics.