

the science of slime

There is so much science in slime! Let's talk about some of the scientific concepts on display when you mix up your next batch!

Chemistry

Chemistry studies matter and how different substances interact, combine, and change to form new substances. At a molecular level, when you make slime, the protein molecules of the glue and borate ions in the activator crosslink forming the new substance we know as slime.

Polymers

Glue is a polymer. **A polymer is a substance made up of a long chain of molecules that repeat.** These chains are able to slide past each other making the glue flow. Common slime "activators" such as borax, liquid starch, and saline solution contain sodium tetraborate. When mixed with glue, the borate ions in the sodium tetraborate crosslink with the glue's protein molecules, making them larger molecules that can no longer easily slide past each other.

Viscosity and Temperature

Viscosity is the measure of friction in a liquid and determines how fast or slow a liquid flows. Water has a low viscosity and flows quickly while liquids like slime, corn syrup, and molasses have a high viscosity and move slowly. Viscosity is affected by temperature. The warmer a liquid is, the more apt it is to flow quickly, cool it down and it

flows very slowly or even stops. This is one of the reasons why the warmer your slime is the more stretchy it becomes! This is really apparent when you make clear slime which is less stretchy than slime made with white glue.

Non-Newtonian Fluids and Shear Thickening

Slime is a non-Newtonian fluid, a liquid whose viscosity changes depending on pressure. You can form slime into a shape but let it rest and it becomes a blob. Non-Newtonian fluids behave differently under stress. Shear thickening describes a behavior where a fluid's viscosity changes when a stress is applied. A shear thickening fluid acts differently depending on how you handle it: Pull on it quickly and it breaks apart, pull on it very slowly and it stretches. Clear slime also exhibits this behavior in a demonstrable way.



clear slime

materials

- Clear glue
- Water
- Contact lens solution
- Baking Soda
- Measuring cup, bowl & spoon

instructions

- **Step One** Combine 4 oz. of glue, 2 oz. of cool water, and 1 tablespoon of contact lens solution in a mixing bowl. Mix very slowly for about a minute.
- **Step Two** In a separate cup, mix 4 oz. of warm water with 1 teaspoon of baking soda. Stir until baking soda is completely dissolved.
- **Step Three** Carefully pour the baking soda mix into glue mixture. Stir very gently for about a minute trying to avoid making bubbles.
- **Step Four** Let sit undisturbed for 5-10 minutes.
- **Step Five** Pull out of the container. It will be sticky! Gently knead it briefly to continue activating the slime.
- **Step Six** If it is still very watery add a few more drops of contact lens solution to help activate the slime a little more.

note: Too much stirring will cause air bubbles to form and the slime will appear milky for a few days.

slime storage

- Most slime will last for several weeks if kept in an airtight container.
- Slime may get stickier as it sits over the course of a few days. Knead it to return it to its original texture. You may need to add additional activator to harden the slime up again.

stretchy slime

materials

- Liquid starch
- White glue
- Food coloring (optional)
- Measuring cup, bowl & spoon

instructions

- **Step One** Combine 4 oz. of glue with 2 oz. of liquid starch in a mixing bowl.
- **Step Two** Add food coloring if desired.
- **Step Three** Stir to combine. Once the mixture starts to pull away from the sides of the bowl, begin to knead it with your hands. It is ready when it no longer sticks to your hands.

fine tune it

- If your slime is too liquidy add more glue 1-2 Tbsp at a time.
- If your slime is too sticky add more starch 1 Tbsp at a time.

for more slime recipes visit:
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