Slime

2 recipes:

Liquid Starch slime

½ cup of pva glue

½ cup water

¼ cup of liquid starch

Optional: Food coloring, sand, glitter

- Mix the glue and water.
- Add the coloring and any other decorative element
- Add the starch and mix vigorously for at least 30 seconds
- You will need to knead the slime to get it to the right consistency

Baking soda slime

1/2 cup **clear glue** we like to use Elmer's glue

1/2 teaspoon **baking soda**

2 1/4 teaspoons **contact lens solution**

pink **food coloring** or color of your choice

2 tablespoons water more if needed

- Place 1/2 cup of glue into a bowl, then add 1/2 teaspoon of baking soda and stir until combined.
- Next, into the same bowl pour in 2 1/4 teaspoons of contact lens solution and couple drops of food coloring, then stir until everything is combined.
- **After**, knead or mix with a spoon for about 5-10 minutes until it turns into a slime (patience is the key). While kneading or mixing with a spoon, gradually add about 2 tablespoons of water (use more water if needed). Enjoy your homemade slime.

Is slime a solid or a liquid?

Slime is neither a solid nor a liquid! Slime is a non-Newtonian fluid, meaning it does not follow Newton's law of viscosity. Newtonian fluids, like water, can only change from a liquid to a solid by affecting its temperature.

Viscosity is how fast or slow fluid flows. Non-Newtonian fluids become more liquid or more solid when under force. Slime becomes more solid when you squeeze or stir it. The less runny your slime is, the more viscosity it has.

There are two kinds of Non-Newtonian fluids. Shear-thinning fluids, like ketchup, glue, and honey, decrease in viscosity when shear stress is applied. Shear-thickening fluids, like quicksand and slime, increase in viscosity when shear stress is applied. This is why struggling and moving around in quicksand actually makes it more difficult to escape!

The key to slime's consistency is polymers. A polymer is a long chain of molecules containing many repeated parts. Silk, wool, and DNA are all examples of polymers. In slime, the glue is a polymer. The glue is made up of long chains of polyvinyl acetate molecules. Glue flows because these chains slide past each other somewhat easily.

Whether you use liquid starch, borax, laundry detergent or contact lens solution, the same basic chemical reaction occurs when making slime. Adding borax solution or sodium tetraborate decahydrate dissolved in water creates borate ions. These ions help link the polymer molecules from the glue in a process called cross-linking. The cross-linking process results in the polymer molecules no longer being able to move as easily, resulting in a thicker substance—slime!

Cross-linking does not create a solid because the borate ions connect the polymers together using weak ionic bonds. The bonds are strong enough to hold the slime together, but weak enough to make the slime easily moldable and not solid. These bonds break easily under pressure, giving slime its stretch. However, the bonds reform easily, allowing slime to be reshaped and molded.

Slime becomes more solid when squeezed or stirred because of the cross-linking process. When you aren't touching the slime, the particles coil up and the coils can easily slide over each other. But when you create pressure on the particles by squeezing or stirring slime, some of the coils unwind and get tangled—making it harder for the slime to flow. This is why slime rips when you try to pull it apart quickly.

You've probably noticed that slime feels cool to the touch when you are making it. This is a sign of the chemical reaction taking place! When the polyvinyl acetate in glue combines with the borate ions from the activator (liquid starch, Borax, laundry detergent or contact solution), the chemical reaction absorbs heat energy. This is called an endothermic reaction.

Information from [The Science Behind Slime | SIG (giftedstudy.org)]