

GLOWSLIME

GLOW-IN-THE-DARK POLYVINYL ALCOHOL SLIME

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Slime, a product of the Mattel Toy Corporation, was marketed during the time period from 1976 to about 1979, then later, in the 1980's, as Masters of the Universe Slime, and, again, as Nickelodeon Green Slime. Slime-type materials continue to be available in many different names and can be found in many toy stores.

The original Slime was described by Dr. Maki Papavasiliou, of the Mattel Materials Laboratory, as a reversible cross-linking gel made from Guar gum, a vegetable gum used as a protective colloid, stabilizer, and thickening agent for foods, cosmetics, and lotions. The cross-linking is accomplished by the addition of borax, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (sodium tetraborate).

For more information on Slime and its properties, see investigations by this author on Guar Gum Slime or Polyvinyl alcohol Slime.

This investigation uses a substance called polyvinyl alcohol in place of guar gum since solutions can be prepared in advance and weighing of materials is not required. The procedure will also work with guar gum Slime.

This procedure produces a glow-in-the-dark Slime, called GlowSlime by the addition of phosphorescent zinc sulfide.

PROCEDURE

1. Materials needed:

paper cup, 5 oz
stirring rod
Polyvinyl alcohol, 4% solution in water.
zinc sulfide, ZnS , phosphorescent powder (Flinn Scientific, catalog no. Z0015)
Borax (sodium tetraborate decahydrate), $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, 4% solution, weight in water.
Food color to color the GlowSlime (optional)
Plastic bag to store the GlowSlime (zip-lock type or bag with twist tie)
Felt-tip pen
Paper

2. Safety Precautions:

Wear safety goggles or glasses at all times in the laboratory.

There are no hazards associated with the polyvinyl alcohol.

Sodium borate (borax) is toxic by ingestion. Take care that this material is not placed in the mouth.

Zinc sulfide is not toxic. In contact with acids, zinc sulfide will produce hydrogen sulfide, a toxic gas.

Take care to keep the chemicals and the GlowSlime away from your clothes or cloth covered furniture as they may produce permanent stains.

The GlowSlime will get dirty from handling and may become moldy after several days. When this occurs, the GlowSlime should be discarded

3. Disposal:

Store the Slime in an air-tight container, such as a zip-lock bag or plastic bag with a twist-tie. Dip the slime in some water before storing it to keep it from drying out.

Dispose of any GlowSlime in the trash. Do not put it down the drain as it will clog the drain.

4. Experimental Procedure:

Obtain 20 mL of 4% polyvinyl alcohol solution in a paper cup and a stirring rod. Examine the solution. Does it have any odor? Is it sticky?

Add 0.5 g of phosphorescent zinc sulfide. Stir.

If desired, one or two drops of food color can be added to the polyvinyl alcohol solution. Stir the mixture. **Note:** Food color tends to mask the phosphorescent glow of the zinc sulfide. If more than 3 drops of food color is used, increase the zinc sulfide to 1 g.

Measure 5 mL of 4% borax solution. Pour the borax solution into the cup of polyvinyl alcohol and stir well. Describe what happens.

Remove the material from the cup and knead it in your hand. The material will become firm and lose some of its stickiness. Test the properties of the "slime".

a) Can you stretch it if you pull the GlowSlime slowly?

b) What happens when you pull the GlowSlime hard?

- c) Roll a piece of GlowSlime into a ball and drop it. What happens?

- d) Place a small piece of GlowSlime on the table top. Hit it with your hand. What happens?

- e) Write your name on a piece of paper with a felt-tip pen. Place the GlowSlime on your name, then lift it up. Did anything happen? Can you explain why?

- f) Expose the GlowSlime to a bright light, then take it into a dark room. What do you observe?

This investigation using polyvinyl alcohol is based on Weill, David R. III, "Colloids, GlowSlime and Some Non-Newtonian Fluids: Some Demonstrations", Sixth International Conference on Chemical Education, University of Maryland, August, 1981. (Current address: Shady Side Academy, 423 Fox Chapel Road, Pittsburgh, PA 15238.)