

## Studying Slime

### Objective:

To make slime and observe its "non-Newtonian fluid" properties. The slime made in this experiment is similar to a product that used to be sold by the Mattel Toy Corporation called Slime. The main component of Slime was a non-toxic vegetable gum called Guar gum. Guar gum is used to thicken items such as ice cream, cheese, and toothpaste. In this experiment, Guar gum is substituted with a polymer called polyvinyl alcohol (pva). When the pva is combined with sodium tetraborate decahydrate solution the polymer becomes cross-linked to form the slime. The pva is supplied in the form of water soluble bags. The bags are often used by hospitals to wash soiled laundry.

### Materials:

- sodium tetraborate decahydrate (borax)
- spoon
- pva water soluble bags\*
- measuring scale
- latex gloves (1 pr. per person)
- 2 jars
- shallow glass bowl
- measuring spoons
- plastic bag for waste
- felt-tip pens

### Procedure:

1. Weigh about 0.1 g sodium tetraborate decahydrate and add it to 2.5 mL water
2. Stir the solution until all solid has dissolved. If it hasn't dissolved after 15 minutes allow it to settle and use the clear solution.
3. Place a 10 x 2 cm double thickness portion of the pva water soluble bag in 10 mL of water and stir well. (If the bag does not dissolve try using warm water).
4. Add the sodium tetraborate decahydrate solution to the pva/water mixture and stir for at least 10 minutes.
5. When the mixture has become stiff put on a pair of latex gloves and knead by hand. Keep the slime away from clothing as it may cause permanent stains.
6. Write your name in felt pen on the shallow glass bowl. Place the slime on your name. What happens. Try different types of pen inks.
7. What happens if you pull the slime slowly? What happens if you pull the slime hard?
8. What happens if you roll a piece of the slime into a ball and drop it?

The slime will go mouldy after a few days. Place the slime into the plastic garbage bag and put it in the garbage. The hands can be cleaned by vigorously rubbing until the slime becomes more solid and falls off. Try not to wash the slime down the drain or the sink will clog.

\*The cold water polyvinyl alcohol bags, sold under the name of Melt-A-Way (order #1-342), are distributed by MD industries Inc., P.O. Box 1355, 3100 Dundee Rd. Suite 308, North Brook III. 60065-1355 (phone number (800) 421-8370). The bags can be ordered through V.W.R. Scientific, P.O. Box 626, Bridgeport, N.J. 08014. If the bags can't be obtained from these companies, try your local hospital. (Adapted from Katz, D.A. J. *Chem. Ed.*, 1994, 71, 891.)