

Polymers

Recommended for Chapter(s): 21

Demo #043

Materials NOT in box

1. Safety goggles.

Procedure

Part 1 (polyethylene oxide)

1. (Prep) Swirl water around the sides of the two 600 mL beakers.
2. (Prep) Pour the polyethylene oxide into one of the beakers.
3. Start pouring the polymer into the other beaker and then straighten out the original polymer beaker. You should be able to have the beaker straight up and down and have the syphoning continue. The greater the distance between the two beakers the better the syphon will be.

Part 2 (polymer beads)

1. (Prep) Make sure that the beads have been coiled into the cup. The end of the bead chain should be sitting on the top of the cup
2. Drop the end of the bead chain over the side of the cup and watch as the beads syphon out of the cup.

Safety

1. Wear safety goggles.

Clean Up

1. Return the materials to the cart in the demonstration library room.

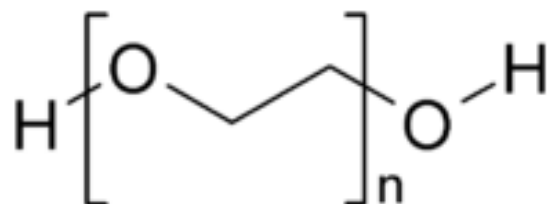
Stockroom Notes

1. Pour the polyethylene oxide back into the bottle
 - a. If the polyethylene oxide is getting too dry to syphon or molding, pour it into the trash and make a new solution.
2. To make a new solution:
 - a. Mix 20 mL of ethanol with 3 g of polyethylene oxide (the dry polyethylene oxide is in the demonstration box) in a 600 ml beaker.
 - b. Swirl the mixture to make sure well mixed.

- c. Add 350 mL of water into the solution in one pour and stir until the resin has gelled completely.
3. Before you rinse out the beakers, wipe the beakers out with a paper towel and throw the towel in the trash.
4. Coil the beads back into the cup by putting one end of the beads in the cup and slowly feeding the chain of beads into the cup so that the beads do not tangle. Put the cup and beads back into their box.
5. Return items to demonstration tub.
6. Return tub to the demonstration library.
 - a. Return goggles to the goggle box.

Discussion

Polyethylene oxide (also known as polyethylene glycol when the molar mass of the polymer is less than $20,000 \frac{g}{mol}$) forms the following polymer structure.



Polyethylene oxide can be formed with multiple numbers of monomer units. In this demonstration the polymers have 100,000 monomer units. Polyethylene glycol is used as lubricants (in items like toothpaste) and laxative. When used for these applications the polymer chain length is usually less than 100.

The polymer bead demonstration can be used to show what happens when a part of a long string is poured out of the beaker. Even when the beaker is stood back up the bead/polymer continue to syphon out.

Materials for demo 043

1. Two 600 mL beakers
2. Bottle with DI water
3. Bottle with polyethylene oxide made up
4. Polymer bead set up
5. Extra polyethylene oxide (dry) Education Inovations