Educational Innovations, Inc.®

MER-100

Polymer Bead Demo

Polyethylene oxide (PolyOX) forms a solution that can be used to demonstrate a tubeless siphon. When a beaker filled with this solution is slightly tipped, the liquid starts to fall into a lower beaker. Even when the top beaker is returned to the upright position, all of the liquid continues to siphon up and over the edge into the bottom beaker. The chains of polymer become tangled and act as a single strand. Gravity exerts a force on the falling strand and the top beaker slowly empties.

The Polymer Bead Demonstration allows one to model the tubeless siphon phenomena.

Procedure:

1. Carefully feed the 15-meter (50 ft.) length of beaded chain into the large mug beaker so that the chain does not tangle.

2. To start the demonstration, hold the beaker by its handle, pull the end of the chain out over the rim of the beaker and release. The weight of the beads will pull the rest of the continuous chain out. This is analogous to how the long polymer (PolyOX) is able to self-siphon out of a beaker.

Notes:

As the speed picks up, the string rises above the rim of the container due to the inertia of the moving beads. This is a very rapid demonstration and must be observed quickly to see all the action.

Although it is difficult, with practice it is possible to pour the string back and forth between two containers. Holding the container of beads as high as possible, gives the falling beads a chance to gain speed as they accelerate in free fall. This causes the chain to climb even higher above the edge of the container and is seen as a "discrepant event."

If the beaded chain should break, simply use a torch or lighter to melt the two end beads and push them back together.

The Tubeless Siphon Demonstration, referred to above, is found in Volume III, page 333 of Chemical Demonstrations, by Bassam Z. Shakhashiri, Both the book and polyox can be ordered from Educational Innovations, Inc.: demonstration book, #BZS-300; pound (454 g) of polyethylene oxide, #GB-100B.

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