

# Packing Peanuts

*Recommended for Chapter(s): 21*

## Demo #039

### Materials NOT in box

1. Safety goggles.

### Procedure

1. (Prep) Fill the 500 mL Erlenmeyer flask with starch based packing peanuts (rougher texture) and fill the 600 mL beaker with polystyrene packing peanuts (smoother texture).
2. Put 150 mL of water into the Erlenmeyer flask with the starch based packing peanuts, cap the flask and shake it.
3. Put 100 mL of acetone into the beaker with the polystyrene packing peanuts.
4. Ask the students what would happen if you put acetone with the starch based peanuts and water with the polystyrene peanuts.
5. In one of the 150 mL beakers put 2 starch peanuts and add acetone. Nothing will happen.
6. In the other 150 mL beaker put 2 polystyrene peanuts and add water. Nothing will happen.

### Safety

1. Wear safety goggles

### Clean Up

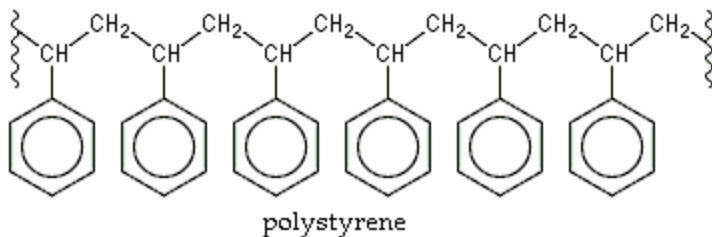
1. Make sure the flask is stoppered.
2. Dump the acetone/polystyrene solution into the waste bottle.
3. Return the materials to the cart in the demonstration library room.

### Stockroom Notes

1. Dump the starch peanuts solution (the solution in the Erlenmeyer flask) down the drain.
2. Empty to acetone/polystyrene waste bottle into an acetone waste bottle in stockroom.
3. Use a paper towel to collect the solid at the bottom of the beaker and throw it into the trash.
4. Replace the glassware with clean glassware.
5. If needed refill any materials that have been used up.
6. Return items to demonstration tub.
7. Return tub to the demonstration library.
  - a. Return the goggles to the goggle box.

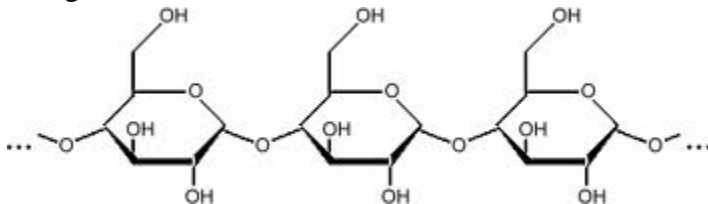
## Discussion

The molecular structure of polystyrene is seen below.



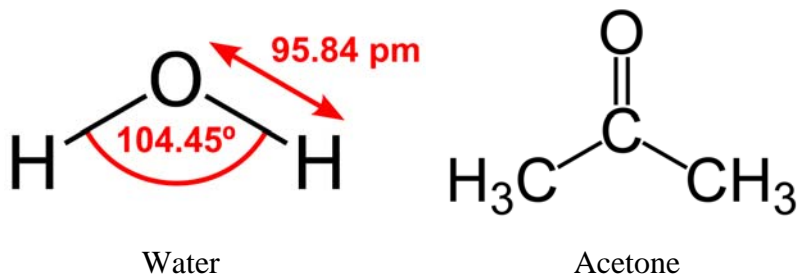
Since polystyrene only contains carbon hydrogen bonds, it is nonpolar and will only dissolve in nonpolar solvents, because like dissolves like.

The general structure of starches is seen below.



Starch contains oxygen carbon and oxygen hydrogen bonds, making it a polar molecule. This will only dissolve in polar solvents.

The two solvent used in this demo are water and acetone (seen below).



While both water and acetone are polar molecules, acetone is only slightly polar (only contains dipole-dipole forces and London forces while water contains H-bonding, dipole-dipole forces, and London forces) and can dissolve non polar substances. This is why the non-polar polystyrene dissolves in acetone but not water and the polar starch molecules dissolve in water but not acetone.

After the demo is done the polystyrene will be in the bottom of the beaker. This can be used to point out that the packing peanuts are made mostly air with only a little polymer which is seen in the bottom of the flask.

*Materials for demo 039*

1. Starch based packing peanuts (eco-peanuts)
2. Polystyrene peanuts
3. Water
4. Acetone
5. 500 mL Erlenmeyer flask with stopper
6. 600 mL Beaker
7. Two 150 mL Beakers
8. Two Glass stirring rods
9. Waste bottle