Film Casting

TRADITIONAL METHOD

MATERIALS:

- Styrofoam Cup
- Large Test Tube
- Chloroform or Toluene
- Large Glass Plate
- Doctor's Knife

PROCEDURE:

1. Place 1 gram of a styrofoam cup which has been broken into small pieces into a large test tube. Add enough solvent (chloroform or toluene) to prepare a 20% solution (by weight, use 4 to 5 ml). Stir the mixture until the styrofoam is completely dissolved.
2. To cast a film, pour the viscous solution near the edge of a glass plate, spread out and smooth with a doctor's knife (just one time through), and allow to dry slowly (usually the film is allowed to dry under a large watch glass). Complete drying may take several hours (e.g. overnight).
3. Remove the resultant film by applying pressure with a spatula or razorblade at the edges of the film. Mount the film in a cardboard holder and use it as a polystyrene standard for IR.

CASTING ON WATER

This method is applicable to microscale samples and is a very quick and convenient method to evaluate polymer films.

MATERIALS:

- Polystyrene Sample (e.g., foamed polystyrene cup)
- 40:60 Dichloromethane: diethyl ether solution
- Disposable Dropping Pipette
- Watch Glass
- Paper Towels

PROCEDURE:

1. Dissolve about 10 mg of a polystyrene sample in 1 mL of a 40:60 mixture of dichloromethane: diethyl ether. Allow the polystyrene to completely dissolve.
2. Add a small amount of water to a clean watch glass to make a puddle approximately 5 cm in diameter.
3. Add the polystyrene solution dropwise to the top of the water. Observe the surface carefully - a film will begin to form almost immediately. After several minutes, poke the

film with a stir rod or pipette. If the film is cohesive, gently remove the film from the surface and place it on a paper towel to dry for ten minutes.

4. This film makes a good standard for IR spectroscopy. Mount the film in an IR holder or cut a hole in the center of a business card and mount the film, using tape to hold it in place, over the hole. Place the holder or business card into the IR and record the spectrum. NOTE: Additives may have been added to the polystyrene which will cause additional peaks to appear in the spectrum.

DEMONSTRATION

This general technique also may be used as an interesting demonstration.

MATERIALS:

- Acetone
- Foamed Polystyrene "Peanuts"
- Large Beaker

PROCEDURE:

1. Place a small amount of acetone in the bottom of a large beaker.
2. Add handfuls of polystyrene "peanuts" quickly.
3. The acetone will collapse the foam (without truly dissolving it).

There are many interesting lead-ins and follow-up discussions - **be creative**. One example would be a discussion of waste volume considerations (the collapsed foam certainly occupies much less space than the original foam!) Young students especially like to try to solve the problem of how to get a large box full of "peanuts" into a 600 mL beaker. The solution, of course, is to use about 40 mL of acetone.