

SHRINKY DINKS®

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Shrinky Dinks® consist of sheets of plastic, usually with pictures of cartoon characters, dolls, or designs printed on them. They have also been available in 8 inch by 10 inch blank sheets. Colored pencils or permanent markers are used to color the preprinted pictures or to draw pictures or diagrams on the blank sheets and then the pictures can be cut out or cut into any desired shape. The material is placed in a 163°C (325°F) oven and within 4 minutes will shrink to about 1/3 its size with all dimensions in the same ratio as the unshrunk piece.

Shrinky Dinks® was originally discovered by this author by running an infrared spectrum of Shrinky Dinks® and comparing it to a reference standard of polystyrene (See Figure 1), and later confirmed by the manufacturer. The representative explained that Shrinky Dinks® is a bioriented polystyrene film that has been extruded under stress. Upon heating to 163°C (325°F), the film exhibits what is called a “memory effect”, softening and shrinking to its original pre-stressed size. The material will shrink to 1/3 its size and will become about 9 times thicker.

Shrinky Dinks® sheets are available in both frosted and clear sheets. Both are composed of the same material. Frosting is accomplished by rubbing the sheet with fine sandpaper. This makes the surface suitable for writing or drawing on it with colored pencils. The newest version of Shrinky Dinks® comes with its own oven for shrinking the plastic sheet.

Other versions of shrinking plastic sheets now includes a shrinking sheet that can go through an InkJet printer. This material is sold by Flinn Scientific.

Many plastic items that have been softened and stretched or blown into other shapes also exhibit a memory effect. Some examples are 2-Liter plastic soda bottles, clear plastic food containers, and some plastic lids used on containers for deli-style foods in the markets. (Look for the polystyrene recycling logo on the bottom of the container. Note: Not all polystyrene containers will shrink. Also, the clear plastic bottles used for water and soft drinks are polyethylene terephthalate [PETE], not polystyrene.)



NOTE: There are special sheets of shrinking plastic that can be put through an InkJet printer. Do not use any other types of shrinking plastic in a laser printer, as the heat from the printer may cause the plastic to shrink and do considerable damage to the device.

Experimenting with Shrinky Dinks® or similar materials

Materials needed:

- Shrinky Dinks®, water or soft drink bottles, or any polystyrene containers. (Note: you can try other plastics to see what will work.)
- Permanent colored markers (Washable markers will not dry color fast.)
- Fine sandpaper (to roughen surface for colored pencils.)
- Colored pencils
- Scissors

Ruler
Baking sheets
Aluminum foil
Oven (you can use a small toaster oven)
Oven mitts or pot holders

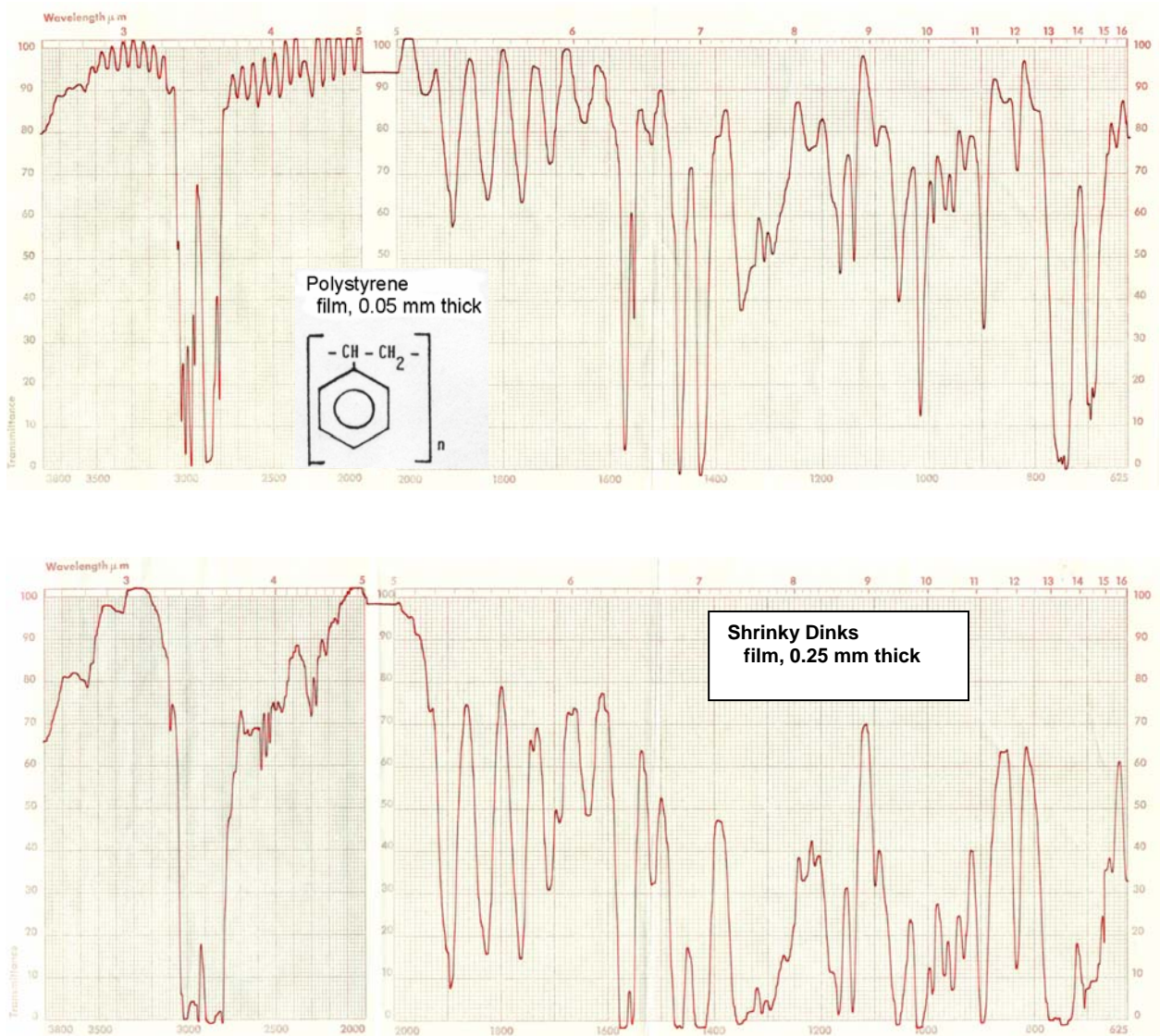


Figure 1. The infrared spectrum of polystyrene film (top). The infrared spectrum of Shrinky Dinks® (bottom). All infrared spectra were run on a Pye Unicam SP1000 Infrared Spectrophotometer.

Safety Precautions

There are no chemical hazards from the materials used in this experiment.

Baking pans, plastic, etc., will get hot in the oven. Use pot holders or insulated gloves to handle any heated materials.

Procedure

Preheat an oven or toaster oven to 165°C or 325°F. Avoid too high a temperature or the plastic will melt and stick to the baking sheets.

Will it shrink?

Try different types of plastic containers such as plastic bottles or pieces of plastic food containers. You can use a whole soft drink bottle, or cut small squares of the plastics.

Place a piece of aluminum foil on a baking sheet (to protect the sheet if the plastic melts), then place the plastic on the sheet. Bake for approximately 5 minutes. Observe the plastic during the process.

Removed the baking sheet and plastic from the oven. Allow everything to cool before handling.

Did the plastic shrink?

Describe what happened as the plastic “baked”.

How much did it shrink?

Using plastic materials that were observed to shrink, cut some measured squares. A suggested size is 5 cm x 5 cm (approximately 2 inches square).

Size of plastic square(s): _____

Place a piece of aluminum foil on a baking sheet (to protect the sheet if the plastic melts), then place the plastic on the sheet. Bake for approximately 5 minutes.

Removed the baking sheet and plastic from the oven. If the plastic has curled, make sure you have insulated gloves on, flatten the hot piece of plastic.

Allow everything to cool before handling.

Measure the plastic square(s): _____

How much did the plastic square(s) shrink?

Did the plastic square(s) shrink equally in all directions?

A bioriented polystyrene film has been stretched equally in all directions and allowed to cool. Blow molded containers, such as water or soft drink bottles may not have been stretched equally in all directions. When it is heated, it softens and shrinks to its original pre-stressed size.

Drawing or Writing on Shrinking Plastic

Cut squares, circles, or other desired shapes of the shrinking plastic. Write or draw on them using permanent markers. If you want to use colored pencils, use a piece of sandpaper to roughen the surface of the plastic – be aware that the plastic will be a translucent white when it shrinks. If you are making a key chain or pendent, make a hole in the plastic using a paper punch. (The hole will shrink in size with the plastic.)

Place a piece of aluminum foil on a baking sheet (to protect the sheet if the plastic melts), then place the plastic pieces on the sheet. Bake for approximately 5 minutes.

Removed the baking sheet and plastic from the oven. If the plastic has curled, make sure you have insulated gloves on, flatten the hot piece of plastic.

Allow everything to cool before handling.