

Light

Optical sets using gelatine

(Poland)

Background

Gelatine is a translucent, colourless, flavourless food ingredient, derived from collagen. It's great for illustrating some basic optical principles such as refraction. Students can use the gelatine to create lenses or other transparent shapes. Using lasers, students can model the path of a refracted ray.

You will need:

- ✓ Knox Unflavoured Gelatine
- ✓ Water
- ✓ Casserole dish
- ✓ Saucepan
- ✓ Knife
- ✓ Lasers/A flashlight and a sheet of cardboard
- ✓ Refrigerator

Follow these steps:

1. Add one pouch gelatine into 550 ml hot water. (Read the gelatine package for specific recipe)
2. Stir constantly until granules are completely dissolved.
3. Slowly pour the solution into a clean, flat bottomed glass tray to form a layer about 10-15 mm thick.
4. Scoop away any bubbles on the surface.
5. Place the solution on a level surface in the refrigerator until set.



6. Remove the gel from the tray.
7. Cut the transparent gelatine into different shapes such as the shape of a convex and concave lens/prism/long strips. Make cuts with very smooth edges; rough edges will strongly scatter light.
8. Shine a laser pointer through the different shapes to demonstrate refraction of light.
9. Direct a number of parallel rays onto the convex lens. Observe what happens.
10. Direct a number of parallel rays onto the concave lens. Observe what happens.

Tip:

- ✓ The Gelatine should be prepared the day before use.
- ✓ The Gelatine needs to be firm enough so that the shapes can be handled without falling apart.

So what happened?

As the laser light entered the gelatine, the change in medium caused a change in the speed of the light. This change in speed caused the direction of the beam to refract, or bend. Lenses, depending on their shape, refracted light in different ways.

What next?

- Demonstrate how short-sightedness/myopic can be corrected with a concave lens.
- Demonstrate how farsightedness/hyperopia can be corrected with a convex lens.

