



## 13. The optical activity of sucrose

### Topic

Optical activity/optical isomerism.

### Timing

About 5 min.

### Description

The ability of a concentrated sucrose (table sugar) solution to rotate the plane of polarisation of polarised light is shown.

### Apparatus

- ▼ A pair of polaroid sunglasses (or two polaroid filters).
- ▼ One 400 cm<sup>3</sup> beaker.
- ▼ Overhead projector.

### Chemicals

The quantity given is for one demonstration.

- ▼ About 250 g of *D*-sucrose (table sugar).

### Method

#### Before the demonstration

Dissolve about 250 g of sugar in about 250 cm<sup>3</sup> of warm water. This will take some time. Decant the syrupy solution off any remaining solid sugar and transfer it to a 400 cm<sup>3</sup> beaker. Remove one of the lenses from a pair of polaroid sunglasses (this can usually be replaced quite easily).

#### The demonstration

Place the polaroid lens in the centre of the stage of an overhead projector (OHP). Using the frame of the glasses as a handle, rotate the second lens above the first until a position of minimum transmitted light is found (*see Fig*). Mark on the OHP where this position is. The second lens will be at right angles to the first. Now support the beaker of sugar solution above the first polaroid – a couple of thin strips of wood will do. Hold the second polaroid above the beaker and again rotate it to find the minimum light position and mark this on the OHP. This will be about 30° clockwise from the first position.

### Visual tips

With practice, the frame of the glasses can be used as a handle, and as a pointer to mark the position of the lens.

### Teaching tips

It may be worth showing that pure water has no effect confirming that it is the sugar that is optically active.

A more professional apparatus can be produced using polaroid filters and a

protractor, but the appeal of the experiment as described is demonstrating the effect using simple everyday items.

## Theory

*D*-sucrose rotates the plane of polarisation clockwise as seen by an observer looking along the light beam towards the source. This clockwise rotation is denoted (+).

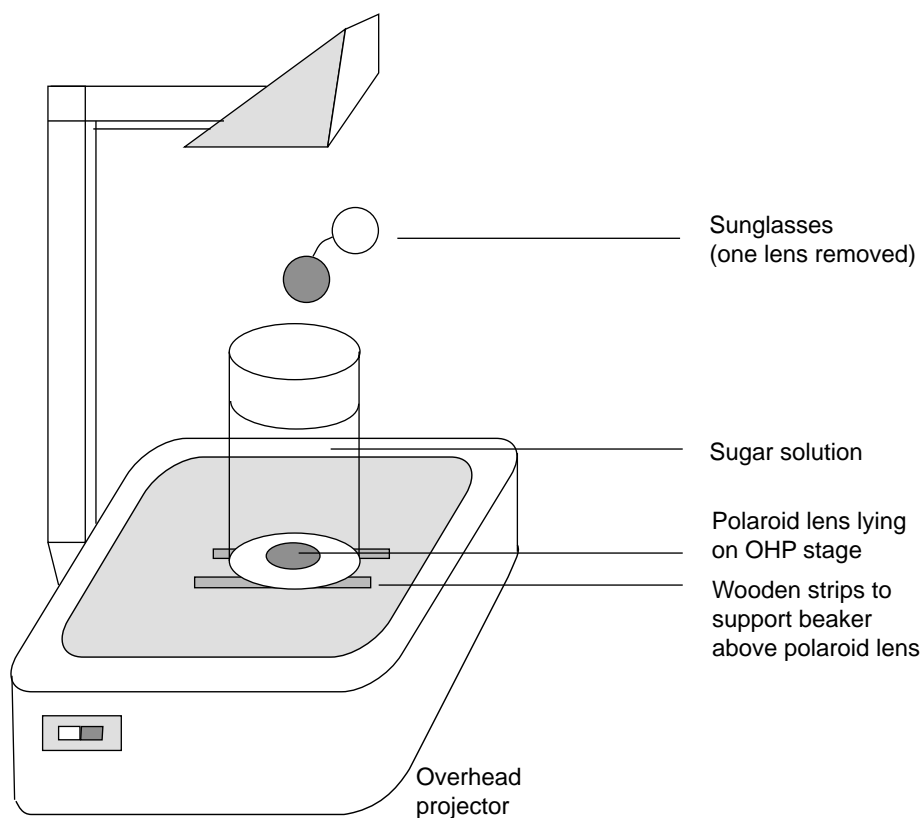
## Extensions

It is possible to show semi-quantitatively that the rotation depends on sample concentration and optical path length.

## Safety

Wear eye protection.

It is the responsibility of teachers doing this demonstration to carry out an appropriate risk assessment.



### Finding the optical activity of sucrose