

Polarizing Filters and Limonene

Pure enantiomers rotate plane-polarized light

Chemicals and Equipment Needed

- Limonene Kit – **R4**
 - R-(+)-limonene
 - S-(-)-limonene
 - racemic limonene
 - dedicated beakers
- Polarizing filters – **V1**
 - Two large and two small
- Manilla folder cut-out – **V1**

Preparation

- On delivery, set the cut-out on the overhead projector, and fill the dedicated beakers $\frac{1}{3}$ to $\frac{1}{2}$ full of R- and S-limonene
- **TAKE EXTREME CARE NOT TO MIX THE SUBSTANCES!!**

Presentation

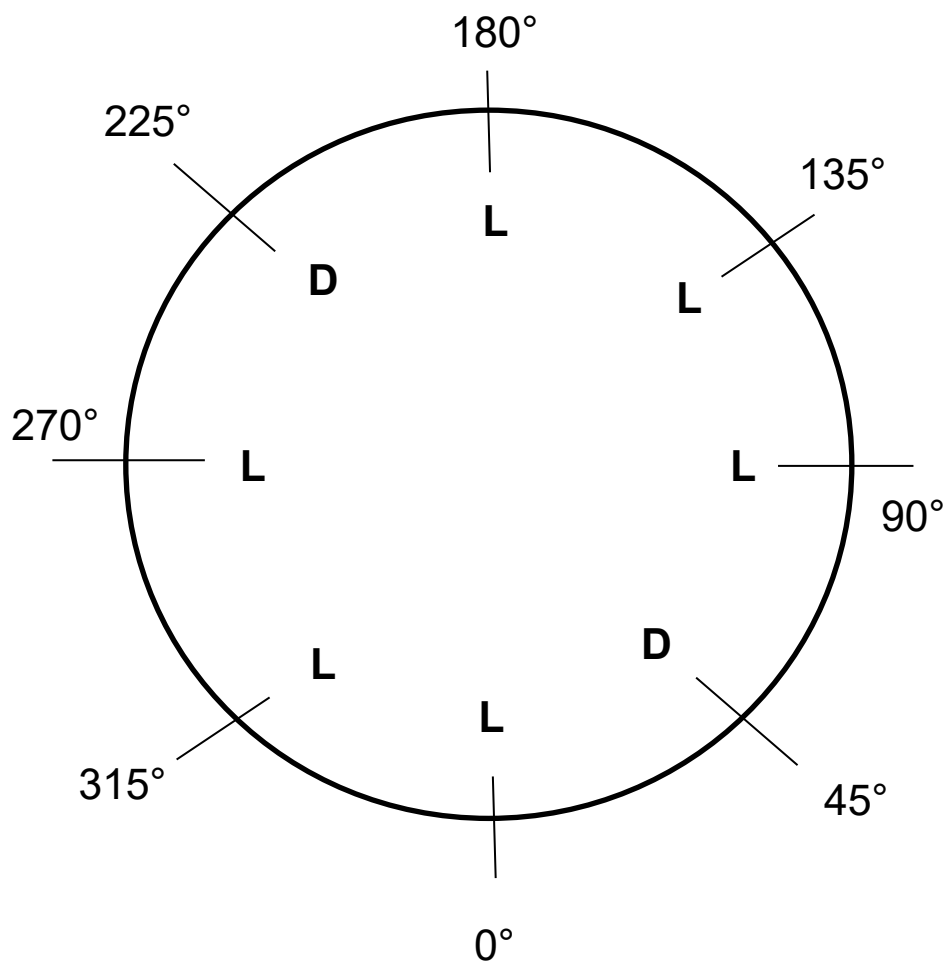
There are three parts to this demonstration

- **Part One – Demonstrate the polarizing filters**
 - Place the large filter on the overhead with the arrow pointing towards the students. Hold the second filter above the first, with the arrow facing the same way.
 - Slowly rotate the filter clockwise 90° to show the students that when the filters are perpendicular, all the light is blocked, then continue through the rotation until the light is transmitted again.
- **Part Two – Demonstrate opposite rotations**
 - Place one large filter on the overhead with the arrow pointing towards the students.
 - Place the beakers of R- and S-limonene on the filter. Remove lids. Place the small filters on the beakers, with the arrows pointing towards the students. Slowly rotate the filters in opposite directions, taking care to rotate them at the same speed.
 - At some point during the 180° rotation, the light outside the beakers will be blocked while there will be light transmitted through the beaker due to the rotation of plane-polarized light by the R- and S-limonene.
- **Part Three – Demonstrate Same Rotations**
 - Return the filters to their original positions. This time rotate both filters clockwise at the same speed. Now the incidence of light transmission will occur at different points of the 180° rotation for each beaker.

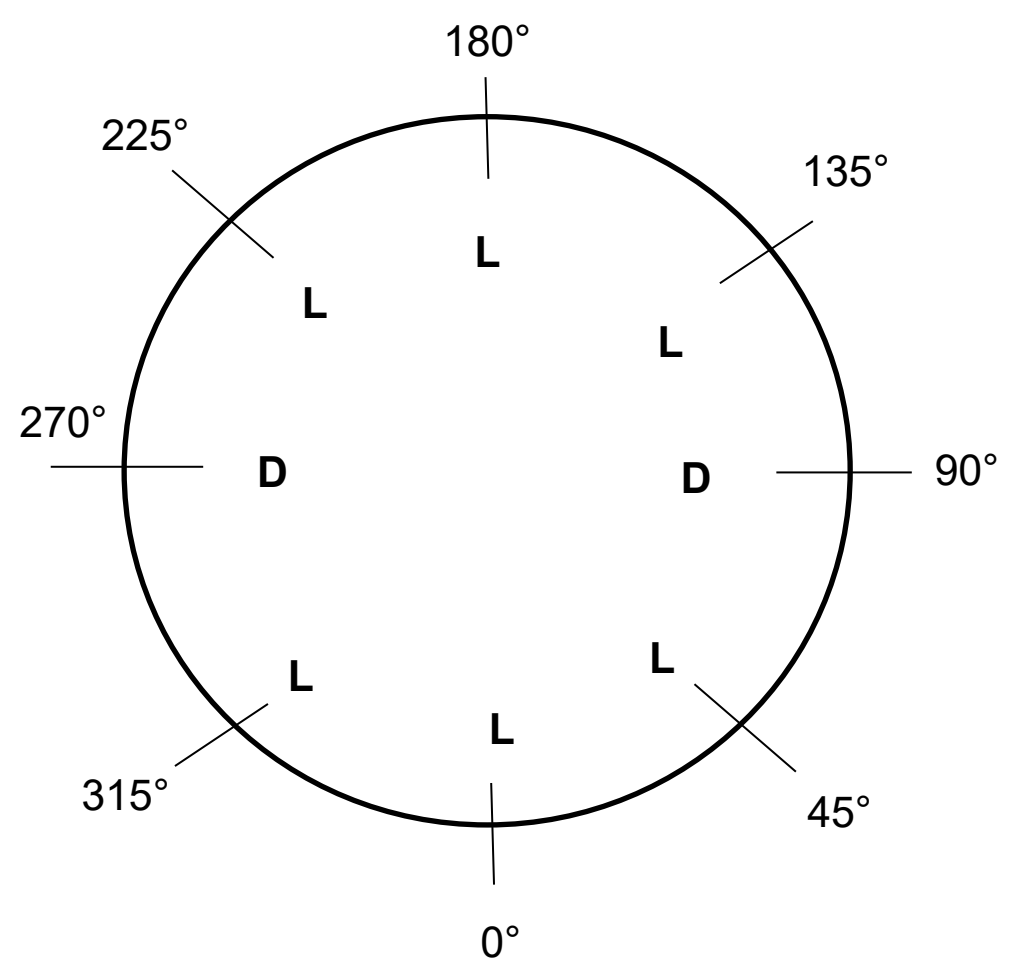
Clean-Up

- Return the liquids to the proper bottles.

R-(+)-limonene



S-(-)-limonene



L = Light passes through beaker

D = Dark inside beaker