Corn Syrup Polarimeter

Purpose:

To demonstrate the transmission of polarized light through different liquids showing that it depends upon the depth and the contents of the liquid.

Materials:

Light corn syrup	Tall beakers or crystallizing dishes
Water	Overhead projector
2 polarizing filters	Poster board

Procedure:

1) Cut a hole slightly smaller than the diameter of the beaker (or dish) on a piece of poster board (or manila folder). Cover the surface of the overhead projector with this.
2) Fill one beaker with water and the other with corn syrup. Place these on the overhead projector, turn the light on and observe how white light transmits through each liquid.
3) Starting with the water beaker, place polarizing filters on the top and bottom of the beaker and place over the hole. Rotate the top filter and note how the only changes to the projection are the dimming and brightening of the light.
4) Do the same for the corn syrup beaker and note the changes in color that occur as the top filter is rotated.

Additional Information:

Ordinary light is unpolarized, meaning it vibrates randomly in numerous planes. A polarizing filter selectively transmits light in only one plane giving what is known as plane-

polarized light. When two filters are used the amount of light transmitted depends upon the alignment of the axes of the filters relative to one another. If the axes are parallel, then almost all of the light, which passes through the first filter, also passes through the second filter. However, if the axes of the filters are perpendicular, no light is transmitted through the second filter.

Certain molecules can also cause plane polarized light to rotate and they are referred to as optically active. Molecules, which are chiral, possess this ability and are said to be optically active. Compounds that rotate the plane of polarized light to the right are dextrorotatory (+) and those which rotate the plane of polarized are levorotatory (-). Since water is achiral, no difference is observed with or without the polarizing filter. However, corn syrup is a solution placed in between two polarizing filters; the light passing through the solution is rotated and slowed by the solution. This is observed by the appearance of different colors. This effect can be changed by diluting the solution. This not only changes the concentration of glucose but also increases the path length for light to travel through.

Disposal:

Corn syrup can be reused

References:

https://projects.ncsu.edu/project/chemistrydemos/Organic/Polarimeter.pdf

Shakhashiri, B. Z. *In Chemical Demonstrations: A Handbook for Teachers of Chemistry;* The University of Wisconsin Press: 1989; Vol. 3, p 386-389