Overhead Projector Polarimeter

**Description:** The transmission of polarized light through different liquids depends upon the depth of the liquid and more importantly the contents of the liquid.

**Materials:**
- Light corn syrup
- Tall beakers or crystallizing dishes
- Water
- Overhead projector
- 2 polarizing filters

**Procedure:**

1. Cut out two holes 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. 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.

2. Place polarizing filters on the top and bottom of the beaker. The top filter can be rotated and changes in the emitted light are observed.

**Discussion:** 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 to the left are levorotatory (-). Since water is achiral, no difference is observed with or without the polarizing filter. However, corn syrup is a solution of dextrose, otherwise known as D-glucose. When a D-glucose solution is 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: Materials can be flushed down the drain with water

References:


Video:

http://www.youtube.com/watch?v=QCWJ6PtK1CQ

http://www.youtube.com/watch?v=CJS6CwL2eQU (polarimeter using a laptop/sunglasses)