Polarimetric Analysis of Solute Concentration on Optical Rotation of Assorted Chiral Molecules

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This experiment analyzed the effects of solute concentration on the optical rotation of various chiral molecules by building a polarimeter to measure their angle of rotation and comparing the values to standard specific rotations to determine purity. This was done by testing substances composed of common sugars including corn syrup, maltose, maltitol syrup, “Sweet ‘N Low”, palm sugar, and honey. The researcher hypothesized that if the selected substances containing chiral molecules were made into solutions of increasing concentration and tested for optical activity with the constructed polarimeter, then as the concentration increases, the optical activity, measured by anlge of rotation, rises because more chiral molecules are present. In creating the polarimeter, the lids and bottoms of 6 cans were removed and glued onto a glass panel. Cardboard was used to measure angles of rotation and a rotating platform was placed on top of this. A computer screen displaying a monochromatic light was placed on top of the platform and the solution holder laid on top of the scrren. A Vivitar Series 1 circular polarized filter was placed on a camera lens and attached to a tripod fixed downwards. 50 mL solutions of each substance in increasing concentrations (0%, 20%, 40%, 60%, 80%, 100%) were poured into the holders. The platform was slowly rotated while observed through the camera screen and the two points where the screen got the darkest were the axes of rotation. Each individual concentration was then observed and marked where darkest; the difference between this and each axes represented the angle of rotation. The observed specific rotation was obtained for each analyte throught the specific rotation equation, and then compared to the standard specific rotation to get optical purit

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