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Spectroscopic Analysis of the Kinetics of Host-Guest Chemistry Abstract

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Spectroscopic Analysis of the Kinetics of Host-Guest Chemistry Abstract

Host-guest chemistry refers to the chemistry in which a host and a guest molecule come together to form an inclusion complex. These complexes are utilized in numerous fields, including pharmaceuticals, agriculture, and cosmetics. This study focuses on the kinetic and thermodynamic behavior of a guest molecule, Brooker's merocyanine, in β -cyclodextrin and its different derivatives (the hosts) at a fundamental level in an attempt to increase stability of the complexes. UV-Vis spectroscopy was used to study the kinetic stability of Brooker's merocyanine's unique, energy dependent isomerization pathway inside the cavity of the host molecule and in solution. It was found that when the guest molecule is in acidic conditions, it will isomerize more quickly from the trans form to the cis form when inside the cavity compared to solution; also, the cyclodextrin derivatives showed minimal differences on the rate of isomerization. Under basic conditions, it is well known that the guest molecule will isomerize from the cis form to the trans form with a required input of energy while in solution; however, we found that no additional UV energy is needed for isomerization in complex. Fluorescence spectroscopy was used to study the thermodynamic stability of this system to determine how well the Brooker's merocyanine interacts with different cyclodextrin derivatives.

Bio:

Charles Sayger is a senior chemistry, biology, and psychology triple major with minors in mathematics and applied statistics, and he is planning on attending graduate school to pursue a doctorate in neuroscience. The implications this project could have on drug delivery is what

drew him to this project. Charles is also involved in a neurophysiology project in the psychology department, and is a part of VU Science Olympiad and VU club tennis.