

Popular abstract

Supramolecular chemistry focuses on the forces between molecules and how molecules interact to form complex systems of molecules. Supramolecular systems can be designed for specific purposes, such as transporting specific molecules or speeding up a particular chemical reaction. One molecule that has shown exciting properties within this field is Tröger's Base (TB). This molecule has a V-shaped structure, resulting in a cavity in which hydrophobic molecules can interact. TB also possesses a rigid structure and therefore does not tend to alter its shape, making this molecule an excellent building block for making supramolecular systems.

In this project, called the Tröger's Base project, the goal is to synthesize a large analogue of TB consisting of seven TB bridges, a heptakis Tröger's Base analogue. This molecule is envisioned to function as a host molecule, in other words, to bind to smaller molecules reversibly. This could be useful in medicinal applications, like drug delivery. By synthesizing this molecule, the supramolecular properties and the potential applications of the molecule could be discovered.

As a part of this project, the focus of this work has been to form a TB analogue needed as a building block for the heptakis TB analogue. The procedure for obtaining this TB analogue can be described as doing multiple reactions; starting with a simple molecule on which new pieces are added under specific conditions until the final structure is formed. In addition, much work has been done to separate the diastereomers of this TB analogue which are formed in the final reaction step. Diastereomers of a compound can be described as molecules that differ in molecular configuration; in other words, having different arrangement of atoms but are made of the same set of atoms. In many cases, it is desirable to have the diastereomers separated, this because they have different chemical and physiological properties. Therefore, a method called chromatography has been used to investigate if these diastereomers can be separated. Chromatography is a separation method in which a column is packed with a stationary (solid) phase together with the product and rinsed with a mobile (liquid) phase. Due to diastereomers having differences in the affinity to the stationary and the mobile phase, the diastereomers will elute from the column at different times and can therefore be collected separately.

As a result, six synthesis steps have been completed, and one of the two diastereomers has been separated from the mix of diastereomers. The outcome from these results is that it has been shown possible to make this TB analogue with the implemented method. Also, the result from the chromatography shows that the mix of TB diastereomers is separable by using dry column vacuum chromatography. These findings are valuable for further TB research. In addition, this work has resulted in useful TB analogues that can be used as building blocks for obtaining the heptakis TB analogue in the future.