

Abstract

Cyclodextrins are a class of organic molecules consisting of a cyclic system of $\alpha(1\rightarrow4)$ linked glucose units. These compounds possess a range of interesting properties and can be derivatised to suit various industrial and scientific purposes. Among their derivatives are so-called multiply charged cyclodextrins, the development and application of which is an essential part of our group's research interest. These cyclodextrin derivatives are capable of binding electrostatically to different solid sorbents, such as silicagel or alumina. This electrostatic interaction is mediated by an array of permanently positively charged moieties which are covalently attached to the primary rim of a cyclodextrin unit. The free secondary rim then offers the possibility of further derivatisation and functionalisation of this system. The resultant cyclodextrin derivative represents a modular scaffold which can be used to immobilise different functional components.

This project focuses on the application of this system to the immobilisation of a Hayashi-Jørgensen-type catalyst for the purposes of heterogeneous catalysis. The work includes the assembly of the of the chosen catalytic system from its precursors and also the synthesis thereof. Furthermore, the resulting supramolecular system is tested for its catalytic properties using a conjugate addition of diethyl fluoromalonate to cinnamaldehyde as a model system. Lastly, sorption of the catalytic system onto three different sorbents is also attempted.

Keywords: supramolecular chemistry, cyclodextrins, heterogeneous catalysis, organocatalysis, Hayashi-Jørgensen catalyst