ABSTRACT

The synthesis of a novel fuctionalised cage surfactant to transport metal ions across synthetic and biological membranes

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This thesis presents the successful synthesis of a novel functionalised cage surfactant which shows ion transporting capabilities across lipid bilayer membranes and biological activity against bacteria and yeast.

This molecule has a low critical micelle concentration of 6.3×10^{-4} M compared to its common C_{12} analogues. The unfunctionalised amphiphilic crown ether shows a cmc value of 2.5×10^{-3} M.

This cage surfactant forms stable monolayers in solution and shows specific interaction with Mg^{2+} in solution.

Surface pressure isotherms with Group I and Group II metal solution subphases indicate increasing interaction of the crown moiety with Ca^{2+}, Na^{+}, K^{+}, Li^{+}/Ba^{2+} and Mg^{2+} ions in that order, with mean molecular areas of the effective head group at the surface ranging from 141 $Å^2$ to 219 $Å^2$.

Wormlike micelles and vesicles are observed with atomic force microscopy after multilayer Langmuir Blodgett film deposition on a glass substrate.

Keywords: Surfactant, sarcophagine, ion channel, supramolecular chemistry, macrocycle.