

The Characterisation of a Novel Family of Metallosurfactants

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Abstract

We report the synthesis, characterization and preliminary synthetic-membrane activity of a series of differing chain length amphiphilic derivatives of the hexaminecobalt cage ligand known for short as Co[diAMsar], (1,8-diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]icosane).¹

The aggregation behaviour of the amphiphiles was characterised using surface tension and conductivity measurements of critical micelle concentration at different temperatures. The C12 compound had a critical micelle value of 6.3×10^{-4} M while the C18 showed a value of 3.5×10^{-4} M. Mean molecular areas were determined by the Langmuir Blodgett technique with different electrolytic substrates. The compounds all formed stable Langmuir monolayers and the mean molecular area was determined to be 153.5 Å and 159 Å for the C12 and C18 on pure water and 218 Å and 175 Å on a Mg subphase.

Planar lipid bilayer studies in DPhPC membranes, under voltage clamp conditions, were performed with the C12 surfactant in 1M solution of KCl, MgCl₂ and CaCl₂. The resulting traces for each electrolyte show irregular current fluxes which indicate that the C12 permeabilizes the membrane via a detergent – like mode of action.

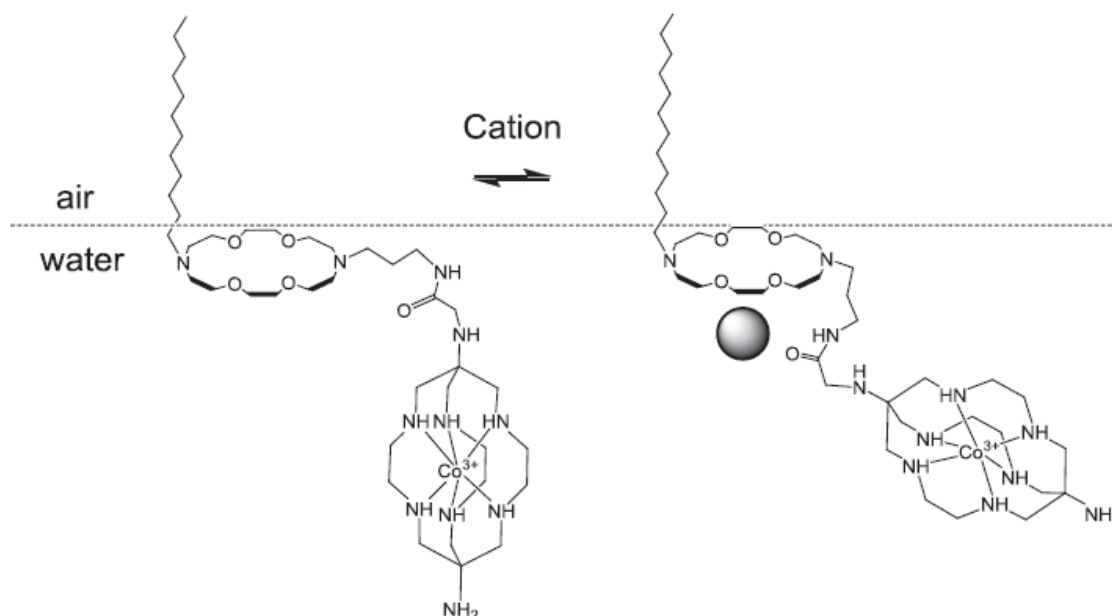


Figure 1. Langmuir monolayer orientation in pure water and electrolyte solution.