

Characterization of β -cyclodextrins and isosorbide diesters self-assemblies: Towards new renewable surfactants

Fouzia Mouria-Bellabdelli^{a,b,d,e}, Jonathan Potier^{b,d,e}, Mohamed Bouterfas^{a,b,d,e}, Jean-Paul Cavrot^{b,c,e}, Adlane Sayede^{b,d,e}, Stéphane Manuel^{b,d,e}, Eric Monflier^{b,d,e}, Cécile Machut-Binkowski^{b,c,e,*}

^a L2MSM, Faculté des Sciences, Université Djilali Liabès, 22000 Sidi Bel-Abbès, Algeria

^b Univ. Lille Nord de France, F-59000, Lille, France

^c UArtois, UCCS IUT de Béthune, 1230 route de l'université BP 819 62408 Béthune Cedex, France

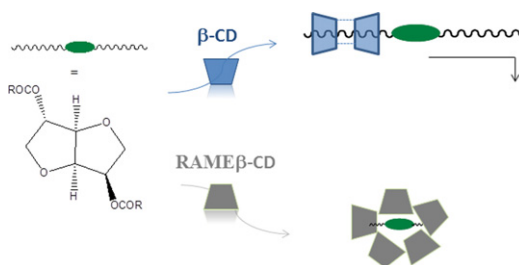
^d UArtois, UCCS, Faculté des Sciences Jean Perrin, 62300 Lens, France

^e CNRS, UMR 8181, France

HIGHLIGHTS

- ▶ Inclusion complexes between β -cyclodextrins and isosorbide diesters were studied.
- ▶ The native cyclodextrin can form stable inclusion complex with the diesters with long alkyl chain (>10 carbons).
- ▶ A model of these complexes are proposed based experimental and theoretical studies.
- ▶ The methylated cyclodextrin could solubilize short diesters in aqueous phase.
- ▶ The mixture of short isosorbide diester and randomly methylated cyclodextrin exhibited a surfactant behavior.

GRAPHICAL ABSTRACT



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ABSTRACT

A series of isosorbide diesters and cyclodextrins were attempted to create host-guest surfactants. The interaction between these host and guest molecules was investigated by NMR, DSC and optical microscopy. Only the isosorbide esters with alkyl chains ranging from **C10** to **C18** form stables inclusion complexes with the native β -cyclodextrin. Molecular dynamics calculations were also made to better understand the nature of the supramolecular edifices formed and hydrogen bonds between several native cyclodextrins are thought to be involved in the stability of the inclusion complexes. With the randomly methylated cyclodextrin (RAME- β -CD), the results were clearly different. Due the methylation of the hydroxyl groups, the RAME- β -CD could not form stable inclusion complex with the longer diesters. However, when short isosorbide diesters were mixed with an aqueous solution of RAME- β -CD, a solubilization of the esters was observed and a decrease of surface tension was noticed.

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1. Introduction

Classic surfactants or amphiphiles are composed of hydrophilic and hydrophobic moieties [1]. These compounds are able to self-assemble in water to form various well-defined molecular

* Corresponding author at: UCCS Artois IUT de Béthune, Département Chimie, 1230 route de l'Université, BP 819, 62408 Béthune, France. Tel.: +33 3 21 63 23 20; fax: +33 3 21 63 02 94.

E-mail address: cecile.machut@univ-artois.fr (C. Machut-Binkowski).