THE COMPLEX FORMATION OF LARGE-RING CYCLODEXTRINS WITH SURFACTANTS

Chikako Urakami[1],Yoshinobu Terada[2], Takeshi Takaha[2] , and Shinichi Kitamura*[1,3]

[1]*Graduate School of Agriculture and Biological Sciences, Osaka Prefecture University, Sakai, Osaka 599-8531, Japan*
[2]*Ezaki Glico Co., Ltd., Nishiyodogawa-ku, Osaka, 555-8502, Japan*
[3]*Graduate School of Life and Enviromental Sciences, Osaka Prefecture University, Sakai, Osaka 599-8531, Japan*
skita@bioinfo.osakafu-u.ac.jp

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It is well-known that α-, β- and γ-cyclodextrins (CDs) contain a hydrophobic central cavity, into which, various organic compounds can be incorporated, to form inclusion complexes. In contrast to these small CDs, the complex forming properties of large-ring CDs with a degree of polymerization (DP) larger than 20 are not well understood [1]. In this paper, when the individual CD is shown, the term CD_n is used, where n represents the degree of polymerization. We reported complex formations of large-ring cyclodextrins with iodine [2] ,sodium dedecyl sulfate and sodium myristoyl sulfate [3,4]. The objective of this study was to clarify the characteristics of complex formation of large-ring CD with a series of surfactants, namely, 3-(*N,N*-dimethylmyristylammonio)propane sulfonate (SB3-14), 3-(*N,N*-dimethylpalmitylammonio)propanesulfonate (SB3-16), and hexadecyltrimethyl ammonium bromide (CTAB). The above surfactants were added to an aqueous solution of a large-ring CD (CD_{22} to CD_{120}), to give precipitates. The DPs of the precipitated, large-ring CDs were determined by high-performance anion exchange chromatography with a pulsed amperometric detector. The findings show that SB3-14, SB3-16, and CTAB interacts strongly with CD_{50}, CD_{62}, and CD_{62}, respectively to form the precipitated complexes. Powder X-ray diffraction patterns indicates that these complexes consist of crystallines containing 6_1 helix structures. The thermal stability of the complexes was determined by differential scanning calorimetry. SB3-14, SB3-16, and CTAB dissociate from the complexes at temperatures of around 70, 95, 85 ºC, respectively. These results clearly show that the molecular recognition of large-ring CDs with surfactants is determined by the length of the hydrocarbon chains of the surfactant and the DP of the large-ring CD. Possible 3-D structures of the complexes of large-ring CDs with these surfactants will be presented.

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