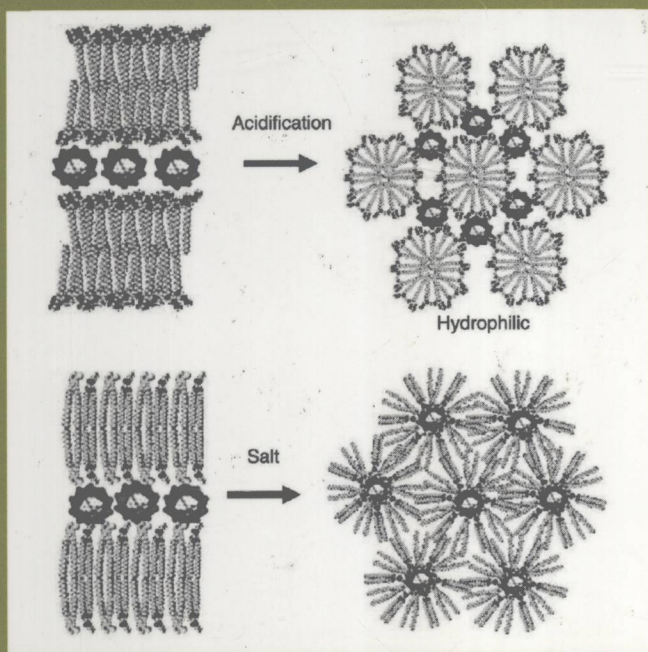


surfactant science series

volume **143**

SUGAR-BASED SURFACTANTS

Fundamentals and Applications



edited by

Cristóbal Carnero Ruiz



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SUGAR-BASED SURFACTANTS

Fundamentals and Applications



Edited by

Cristóbal Carnero Ruiz

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SUGAR-BASED SURFACTANTS

Fundamentals and Applications

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Preface

Sugar-based surfactants are mainly characterized by having hydrophilic groups in their polar moiety. This structural feature, together with the many possibilities for linkage between the hydrophilic sugar head group and the hydrophobic alkyl chain, provides unique physicochemical properties to these surfactants, some of them substantially different from the common nonionic ethoxylated surfactants. Although interest in these amphiphiles was traditionally entirely academic, they have recently become the object of increasing attention for many researchers, thus opening new areas of research in surface and colloidal science from both fundamental and technological perspectives. Among the characteristic properties of these surfactants, a frequently remarked fact is that they can be produced from renewable resources and exhibit excellent ecological behavior. Certainly, there is currently a clear tendency to replace conventional surfactants with more environmentally benign compounds, though it should be recognized that sugar surfactants possess other properties that turn them into very advantageous products in view of their performance, for example, being healthier to consumers and for other technical applications. Therefore, many research groups today are getting involved in studies on the design and development of novel sugar-based surface-active molecules, the characterization of their solution and interfacial behavior, the establishment of structure–property relationships, as well as in the advance of new industrial applications for these materials.

When this book was being planned, we thought about the suitability of a new book on sugar-based surfactants taking into account the existence of related books, for instance, *Nonionic Surfactants: Alkyl Polyglucosides* (edited by Balzer and Lüders) and *Alkyl Polyglycosides: Technology, Properties, and Applications* (edited by Hill, von Rybinsky, and Stoll). However, after evaluating relevant information on different fundamental and applied aspects related to sugar-based surfactants as reported in the recent years, we concluded that the enterprise should be accomplished.

Although information about synthesis, production, chemical properties, and various applications in the fields of cosmetics, detergency, and manufacturing of alkyl polyglycosides, as well as the analytical chemistry of these surfactants and their behavior from ecological, toxicological, and dermatological points of view has been widely revised in the aforementioned volumes, many recent findings on the solution behavior and applications of systems involving these and other sugar-based surfactants remain to be revised. Among them, special attention must be devoted to those related to the adsorption of sugar-based surfactants, in both liquid–air and solid–liquid interfaces, the appearance of new kinds of these surfactants, and their applications in the field of biomembranes or in the preparation

of pharmaceuticals, to mention only a few. Therefore, this book seeks to cover information about these research areas that are currently being developed.

Sugar-Based Surfactants: Fundamentals and Applications consists of 15 chapters. Chapter 1 provides a general perspective of the universe of amphiphiles, including several aspects on synthesis, fields of application, and production. Chapters 2 through 7 deal with the study of diverse physicochemical properties, including solution behavior, self-assembly, adsorption in the air–liquid and liquid–solid interfaces, and rheology, all of which have decisive implications for numerous industrial processes. Chapters 8 through 10 collect recent findings on synthesis, properties, and applications of new kinds of sugar-based surfactants, including gemini, ionic, and isoprenoid-type sugar-based surfactants, whose potential in new medical and biophysical applications is promising. Chapters 11 through 14 are dedicated to complex systems, where a sugar-based surfactant combines with another amphiphilic agent to form mixed micelles, microemulsions, vesicles, or protein–surfactant complexes. Chapter 15 presents remarkable applications of sugar-based surfactants in the solubilization of liposomes and cell membranes.

I would like to thank the collaboration and the effort of all the contributors who have participated in the making of this book, and also many thanks to Patricia Roberson, Taylor & Francis project coordinator, for her assistance.

Cristóbal Carnero Ruiz

Editor

Cristóbal Carnero Ruiz is an associate professor and head of the Department of Applied Physics II at the University of Málaga (Spain). He is a member of the Spanish Group of Colloids and Interfaces and of the editorial boards of the *Journal of Surface Science and Technology* and *Atomic, Molecular & Optical Physics Insights*.

Dr. Carnero Ruiz received his BS and MS in chemistry from the University of Granada (Spain) in 1976. Thirteen years later, he obtained a PhD (with honors) in chemistry from the University of Málaga and in 1998 a PhD (with honors) in physics from the University of Granada. In 1990, he joined the Department of Applied Physics II at the University of Málaga, where he is the leader of the structured fluids and amphiphilic systems research group, whose main interest lies in the field of association colloids. His contributions in this area (as author or coauthor of numerous professional papers) deal with mixed micellization and the effect of additives or cosolvents on micellization of surfactants.

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