Surfactants in Consumer Products

Theory, Technology and Application

Edited by J. Falbe

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Preface

In today's market, custom formulated surfactants are offered for a wide range of applications. The need for surfactants in detergents, cleaning agents, cosmetics & toiletries is second only to an expanding demand in industrial applications. But even within the non-industrial areas the demands have undergone significant changes in recent years. For example, washing and cleaning temperatures have substantially decreased with increased energy conservation attitudes, and more stringent regulatory requirements in the area of ecology and toxicology are leading to new product profiles. New manufacturing technologies and an increased utilization of natural raw materials also factor into this continuing evolution.

These changes and trends have been described in numerous publications. However, a summary and survey of these developments is currently missing. The book presented here

“Surfactants in Consumer Products”

is intended to close this gap.

The editor and authors dedicate this work to

Dr. Dr. h.c. Konrad Henkel

on the occasion of his 70th birthday.

Dr. Henkel, himself a scientist and industrialist, contributed significantly to developments in the surfactant field. In the nineteen-fifties, he initiated the change from soap based detergents to synthetic detergents within Henkel. At the same time, dishwashing detergents utilizing various synthetic surfactants were also developed, and became the basis for modern manual and mechanical dishwashing.

Particularly noteworthy are Dr. Henkel's achievements in the promotion of the chemistry of fats – a continuously growing source of surfactant raw materials – and his initiatives in the systematic development of phosphate substitutes. In the nineteen-seventies, these latter endeavors were successfully crowned by the development of the ion exchanger, sodium aluminum silicate (zeolite A), which is now utilized world-wide.

The editor offers his appreciation to the many contributing authors from Henkel KGaA (Federal Republic of Germany), Clorox (USA), Degussa AG (Federal Republic of Germany) and Hans Schwarzkopf GmbH (Federal Republic of Germany), who made this book possible. I thank the Lion Corporation (Japan) for many valuable comments and contributions on several topics in this manuscript.

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Thanks goes to the publishers for the cooperation in the planning and the smooth completion of this book.

Düsseldorf, October 1986

J. Falbe

Introduction

Since the development of the first synthetic surfactants in the 1930's, this product group has experienced extraordinary expansion in terms of the total volumes of product manufactured, the variety of chemical structures encompassed, and the number of areas of application.

The total world-wide output of surfactants in 1984 was about 14 million tons. The production of synthetic surfactants amounted to 5.3 million tons and that of soaps to 8.7 million tons. The areas of applications include industrial products and consumer products, such as, laundry detergents, dishwashing detergents, cleaning agents and cosmetic & toiletries. In 1982, approximately 57% of all surfactants produced in the United States of America, Japan and Western Europe were employed in the manufacture of consumer products, thus strongly demonstrating the importance of this area of application. The world production of soaps, detergents and cleaning agents in 1984 was about 32 million tons, corresponding to a product value of more than 65 billion German Marks. The world cosmetics market had a total sales values in 1984 of more than 100 billion German Marks.

Within the last couple of years, the surfactant market has experienced increasingly frequent changes. This is due to variations in the raw material base (crude oil or natural oils/fats) and production technologies as well as changes in the requirements of the consumers and the legislators. This book, "Surfactant in Consumer Products", addresses these developments and the important areas of application.

In this book the physical-chemical principles of action of the surfactants, their production and their application in laundry detergents, dishwashing detergents and cleaning agents as well as in cosmetics & toiletries are discussed. The technological aspects of application and formulation along with those of production and manufacturing processes are illustrated. Ecological and toxicological questions are probed in depth. Finally, important economic data concerning this branch of industry as well as an attempt to provide a perspective with regard to the future of the surfactant market round out the picture.

Our focus was not on a detailed rendering of all the historical developments in this field but rather on emphasizing the state-of-the-art of specific developments. While the aim of this book was not to completely record the total secondary literature the book will furnish the reader with a rather comprehensive compendium covering almost 1,400 literature citations.

The book is primarily aimed at the experts in industry and in the universities. It will also, however, provide suggestions and references to those interested in general questions relating to surfactant chemistry, laundry detergents, cleaning agents, and cosmetics & toiletries.

Due to the world-wide importance of the product groups addressed here, we strove to develop a truly international picture through cooperation of the staffs from Henkel KGaA (FRG), Degussa AG (FRG), and Hans Schwarzkopf GmbH (FRG) with those of The Clorox Company (USA), Lion Corporation (Japan) and Henkel Corporation (USA).

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