developed, depending upon the manner of life and the environmental conditions of each country. This paper presents the recent situation of laundry detergents and the detergent industry in the Far East in relation to the washing conditions in each country. Specifically, the development of phosphate-free, heavy-duty detergents is discussed from the viewpoint of the relationship between the formulations and their performances in reference to the selected surfactants and zeolite builders. Possible future trends of laundry detergents are discussed.

5.4 Surfactants in Non-Soap Detergent Bars and Pastes

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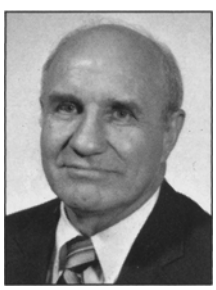
During the past 15 years, in many developing nations, particularly India and those of southeast Asia, a new product type has emerged that complements non-soap detergent (NSD) powders and laundry soaps. The product is a direct-application one typified by NSD bars and pastes. Although the performance of individual actives and their accompanying builders is important, other factors can be just as influential in gaining consumer acceptance. As well as accounting for consumer habits and mode of use, it is necessary to ensure that the physical characteristics of the product are adequate. Factors such as hardness, rate wear and feel are important for bars, while phase stability and feel are essential for pastes. Lately, some interest has been shown in surfactants derived from natural products such as coconut oil. The properties and problems posed by the incorporation of coconut alcohol sulfate and α-sulfomethyl cocoate into bars and pastes have been investigated. The commercial use of such surfactants depends on political and ecological as well as financial considerations.

5.5 Surfactants for Laundry Liquids



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Although the acceptance of laundry liquids varies dramatically among U.S., European and Japanese markets, most products worldwide still contain two or more of the following four surfactant types: (a) linear alkylbenzene sulfonates, (b) alcohol ethoxylates, (c) alcohol ether sulfates and (d) fatty acid soaps. Advances in surfactant technology have concentrated on reoptimizing various blends of these surfactants to achieve maximum performance of other solution components (enzymes, softeners, etc.). The ability of each surfactant to meet various performance criteria under U.S., European and Japanese wash conditions, as well as their compatibility with other solution components, is discussed in relation to past, current and projected surfactant usage data.

Session VI—Formulation Technology: Surfactants in Non-laundry Products

6.1 Dishwashing Products—U.S. Decade Review

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Overall, the U.S. dishwashing detergent category can be described as a competitive, mature market that has exhibited a sustained, modest growth pattern through the