6.5 The Effects of Bar Soap Constituents on Product Mildness

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The effect of variation of the surfactant systems and additives on the mildness of personal cleansing bars is reported. An objective clinical testing methodology based on the controlled application of fully formulated products to the forearms, coupled with expert tactile and visual evaluations of softness/smoothness, erythema and dryness is disclosed. Instrumental means of assessing skin condition, including measurement of trans-epidermal water loss, surface conductivity, sonic transmission and surface replicate molding, also establish differences between formulations and correlate with dermatologists' evaluations. The testing regimens confirm a clinical benefit for the addition of glycerin at the 8–12% level to soap bars and establishing a ranking of surfactant system mildness wherein coconut soap < tallow soap < alkyl glyceryl ether sulfonate.

Session VII: Formulation Technology—Builder Systems in Detergent Products

7.1 Phosphates as Detergent Builders

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Sodium tripolyphosphate (STPP) is recognized by detergent manufacturers as the most cost-effective builder so far discovered for washing and cleaning agents. In the absence of legally imposed limitations or bans on the use of STPP, there is no case where STPP has been replaced permanently by other builders, though this has been attempted. World consumption of phosphates in detergents has remained relatively constant for the past several years, despite the imposition of limits on its use in some countries. Among the many valuable properties of STPP are its excellent safety record, its ability to sequester water hardness ions, its soil-dispersing power and its synergism with surfactants in the wash liquor. Phosphate manufacturers have made several positive contributions to the eutrophication/phosphate debate, including (a) extensive support for research into improved methods for the removal of phosphate from domestic wastewater by both chemical and biological processes (allied to this is support for the study of beneficial uses for sewage sludges); (b) the development of special grades of phosphates that, by minimizing hydrolysis to di- and orthophosphates during the preparation of detergents, optimize the performance of the finished products; these include grades which undergo extremely rapid hydration during detergent slurry preparation and others for dry blending operations which combine a low bulk density with good physical stability; and (c) improvements in the economics of phosphate manufacture by the widespread introduction of the so-called wet process for the manufacture of phosphoric acid, the starting point for STPP and of decisive importance to its price. Wet processes for phosphoric acid require less primary energy than the alternative thermal processes. This combination of improved processes for advanced sewage treatment, including phosphate removal, with further enhanced cost performance of STPP should safeguard the long-term future of phosphate as *the* detergent builder.

7.2 Organic Polymers in Detergent Formulations

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For many years detergents and cleaners have been in the main arena of discussion concerning the environment. One pressing problem has been the question of eutrophication by phosphates. Numerous effluent treatment plants have been erected to eliminate phosphates from wastewater, and these have been accompanied by legal restrictions on phosphate content in detergents. The extraordinarily wide range of effects that phosphates display as builders in detergent formulations cannot be matched by any other ingredient alone; a combination of various substances is required to give optimum performance. Organic polymers have proved themselves to be extremely useful in this respect. The recently developed polymers, alongside such classic ingredients as CMC, help to improve both the primary and secondary washing power, as well as achieving improved performance in other areas. The most commonly used polymers are those containing carboxyl groups. The various methods of application are explained, and their performance is assessed with the aid of experimental data. The basis for these experiments was laundry detergents formulated to meet widely varying requirements in European, American and Far Eastern markets. The toxicological data of the polymers and their impact on the environment are discussed. Organic polymers show great potential for improving the performance of detergents in the future.