**843/E2**

## Biodegradability of Linear alkylbenzene sulfonates; a fast moving anionic surfactant in the market

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The most widely used synthetic anionic surfactant for laundering is linear alkylbenzene sulfonates (LABS), because of its excellent economical and cleaning characteristics. Nevertheless synthetic surfactant products show some adverse impacts to the environment, due to their low biodegradability and other chemical & physical properties. The existence of surfactant residues in natural waters causes many adverse effects on living beings further to foaming and eutrophication. Ingredients of the detergent that contribute to foaming and eutrophication are LABS and phosphates, respectively. This research study was focused on the understanding of the biodegradability of synthetic anionic detergent powder (LABS), available in Sri Lankan market, and the effect of phosphates (Sodiumtripolyphosphates) on the biodegradability. Biodegradability of detergents is a demanding area of research with respect to both manufacturer and consumer point of view.

Six types of commonly available detergent powders were randomly collected. LABS contents of the selected products were measured by using a titrimetric method (ASTM: D3049-89), and samples for the biodegradation were prepared based on the LABS contents in each product. ASTM: D2667-08 was used to degrade the surfactants, by using a laboratory culture and basal media. Biodegradability was measured as the reduction percentage of amount of LABS at a given period of time. In this regard, the methylene blue spectrophotometric method (ASTM: D2330-02) was adopted and the results were observed as the absorbance of methylene blue active substances, against known LABS content. The study was further extended to understand impact of phosphate content (SLS: 760, 1986).

The results showed that the biodegradability of LABS in detergent powder in the range of 24 % to 78 %. Regression analysis carried out by means of Minitab 14 demonstrated statistical correlation of the respective parameter. Thus the impact due to phosphate on biodegradability was statistically understood as 93 % ($p = 0.005$). While with respect to pH at specified range (pH 9 to 11) it was only about 52 % ($p = 0.066$). The research findings revealed that retardation of biodegradability increases with the raise of phosphate content. Further, biodegradability is favorable at selected higher pH. As per ASTM: D 2667-08, the product is biodegradable only if degradability of the product within a period of 8 days is equal or greater than 90 % due to microbial action. Accordingly, none of the investigated LABS based commercial detergent products is adequately biodegradable.

Key words: Linear alkylbenzene sulfonates, Biodegradability, eutrophication, detergent
Laboratory facilities provided by Industrial Technology Institute is acknowledged

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