



BIODEGRADATION OF LINEAR ALKYL BENZENE SULFONATES

Applicable to these current Stepan products:

BIO-SOFT® D-40	BIO-SOFT® N-300	BIO-SOFT® N-411
BIO-SOFT® S-101	BIO-SOFT® S-101 LS	BIO-SOFT® S-111 H
BIO-SOFT® S-118	BIO-SOFT® S-120	NACCONOL® 40G
NACCONOL® 90G	POLYSTEP® A-15	POLYSTEP® A-15-30K
STEPWET® DF-90	STEPANTAN® DT-60	BIO-SOFT® D-62 LT
BIO-SOFT® L2P-123	POLYSTEP® A-15F	

Applicable to these inactive Stepan products:

BIO-SOFT® D-53	BIO-SOFT® S-100	BIO-SOFT® S-130
POLYSTEP® A-13	POLYSTEP® A-4	POLYSTEP® A-7
STEPANTAN® DS-40		

Biodegradation Information:

Since their introduction in 1965, linear alkylbenzene sulfonates (LAS) have been used throughout the world as the main anionic surfactant in both household and industrial detergent products. As a result of their wide spread use, the biodegradation characteristics of LAS have been studied thoroughly under both laboratory and environmental conditions.

Laboratory tests typically show that LAS will undergo rapid primary and ultimate biodegradation. Due to its favorable biodegradation characteristics, LAS is presently listed as a recommended control substance in the OECD "Readily Biodegradability: Closed Bottle Test". OECD Modified Sturm testing of a LAS product, BIO-SOFT® S-100, showed this product to be readily biodegradable. Primary biodegradation, which can reach 100% in 3 days, involves oxidation of the carbon atoms at the alkyl side chain to form transient, low toxicity sulfophenyl carboxylate intermediates. This is followed by complete breakdown characterized by cleavage of the aromatic ring and total mineralization to carbon dioxide, water and inorganic sulfonates.

Although laboratory studies have shown that LAS is only minimally biodegraded under anaerobic conditions, this characteristic has not been proven to be significant in predicting the environmental acceptability of this surfactant. Environmental monitoring studies have provided evidence that LAS will not accumulate in the environment. Typical measured concentrations of this surfactant in effluents from activated sludge waste treatments plants have been found to range between 0.1 mg/l to low part-per-billion levels. At these concentrations, no adverse acute or chronic

effects on aquatic and terrestrial life have been observed.

References:

- * Arthur D. Little, Inc., "Environmental and Human Safety of Major Surfactants, Volume 1. Anionic Surfactants, Part 1. Linear Alkylbenzene Sulfonates", Final Report to the Soap and Detergent Association, February, 1991.
- * OECD Guidelines for Testing of Chemicals, 1981, ISBN 92-64-12221-4
- * Stepan Study 93-007A.
- * Birch, R.R., Gledhill, W.E., Larson, R.J. and Nielsen, A.M., "Role of Anaerobic Biodegradability in the Environmental Acceptability of Detergent Materials", pp. 26-33, Proceedings of the 3rd CESIO International Surfactants Congress & Exhibition - A World Market, Barbican Centre, City of London, 1992.

BIO-SOFT® ; NACCONOL® ; POLYSTEP® ; STEPWET® ; STEPANTAN® are registered trademarks of Stepan Company.

Last Update: [10.13.11](#)

Revision reference: [BI002.12](#)

Nothing contained herein grants or extends a license, express or implied, in connection with patents, issued or pending, of the manufacturer or others. The information contained herein is based on the manufacturer's own study and the works of others. The manufacturer makes no warranties, expressed or implied, as to the accuracy, completeness, or adequacy of the information contained herein. The manufacturer shall not be liable (regardless of fault) to the vendee's employees, or anyone for any direct, special or consequential damages arising out of or in connection with the accuracy, completeness, adequacy or furnishing of such information.