



BIODEGRADATION OF ALKYL ETHER SULFATES

Applicable to these current Stepan products:

ALPHA FOAMER®	CEDEPAL® FA-403	CEDEPAL® FA-406
CEDEPAL® TD-403 MFLD	CEDEPAL® TD-403 MKLD	CEDEPAL® TD-407
POLYSTEP® B-11	POLYSTEP® B-12	STEOL® 23-2S.70
STEOL® 23-2S.70 CP	STEOL® 4N	STEOL® CA-230
STEOL® CA-330	STEOL® CS-130	STEOL® CS-130 DMDM K
STEOL® CS-130 HP	STEOL® CS-170	STEOL® CS-170-X
STEOL® CS-170 UB	STEOL® CS-230	STEOL® CS-230-KE
STEOL® CS-230 HP MZ	STEOL® CS-230 K PLUS	STEOL® CS-230 PC HP
STEOL® CS-230 PCK	STEOL® CS-230 PCK PLUS	STEOL® CS-230V-X
STEOL® CS-270	STEOL® CS-270-X	STEOL® CS-270-X/MB
STEOL® CS-270 C	STEOL® CS-270 PLUS	STEOL® CS-270 SU
STEOL® CS-270 ULTRA	STEOL® CS-330	STEOL® CS-330-X
STEOL® CS-360	STEOL® CS-370	STEOL® CS-370-X
STEOL® CS-370 ULTRA	STEOL® CS-460	STEOL® CS-460 PLUS
STEOL® CS-460 ULTRA	STEOL® FA-403	STEOL® FS-406
STEOL® OS-170 UB	STEOL® OS-170 ULTRA	STEOL® OS-270
STEOL® OS-330	STEOL® OS-370 PLUS	STEOL® OS-370 ULTRA
STEOL® TD-403-65	STEPOSOL® CA-207	STEPOSOL® CA-406H
STEOL® CA-370 STEOL® CA-460	STEOL® CS-230-K	STEOL® OS-230 2.0
STEOL® TD-403 MFLD	STEOL® CS-270 LDX	STEOL® CS-370E
STEOL® CS-270 LDX HP	STEOL® DES-32IS	STEOL® CS-370 L6 CP
		STEOL® 25-3S/70 FC
		STEOL® 25-3S.70 CP
		STEOL® 25-3S/60
		STEOL® CS 270 CIT
		STEOL® CS-170 BR
		STEOL® CS-170 L6 CP
		STEOL® CS-230 L6 CP
		STEOL® 23 2S 30 CP-F
		STEOL® 23 2S 30 CP
		STEOL® CS-270 L6 CP
		STEOL® CS1-370 HA
		STEOL® CS-230 L6 HA
		STEOL® CS-170-X/MB
		STEOL® CS-230 HP-X
		STEOL® CS-230 LDX-X
		STEOL® CS-230-X

		STEOL® CS-330 HP-X STEOL® CS-330 HP-X/MB STEOL® OS-330 28%
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Applicable to these inactive Stepan products:

CEDEPAL® TD-403 POLYSTEP® B-20 STEOL® CA-230-D STEOL® CS-230-E STEPOSOL® CA-319 STEOL CS-270-2.2	CEDEPAL® TDS-484LD POLYSTEP® B-22 STEOL® CA-230-K STEOL® CS-230 PCF STEOL CA-370-25 STEOL OS-170	PETROSTEP® ES-65A STEOL® CA-130 STEOL® CA-370-E STEOL® TD-403-70 STEOL CA-360
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Biodegradation Information:

Alkyl ether sulfates (AES) are frequently used in liquid detergent products such as dishwashing, hair shampoo, bubble bath and shower/bath type products. It has been reported that over 500 million pounds of AES are produced and used annually in the United States.

Numerous laboratory studies have shown that the linear forms of AES, found in the Stepan surfactants identified above, biodegrade quite readily under both aerobic and anaerobic conditions. Primary biodegradation of C12 ether sulfates in river die-away studies has been found to reach 90- 100% within 1 to 5 days. The biodegradation of AES surfactants using Sturm CO2 evolution method (OECD 301B) as well as the Closed Bottle test (OECD 301D) show Alcohol Ethoxy Sulfates to be readily biodegradable (>60 or 70% biodegradation in 28 days). Therefore, the Stepan AES products identified above would also be considered as readily biodegradable by OECD standard methods such as 301B and 301D.

Field studies have shown that removal of AES compounds during routine sewage treatment processes is extensive. AES removal rates of 98-100% have been reported.

References:

*Environmental Risk Assessment of Alcohol Ethoxysulfates (AES), HERA June 15, 2004

* Arthur D. Little, Inc., "Environmental and Human Safety of Major Surfactants, Volume 1. Anionic Surfactants, Part 2. Alcohol Ethoxy Sulfates, Final Report to the Soap and Detergent Association, February, 1991.

* Painter, H.A., "Alkyl Ether Sulfates", The Handbook of Environmental Chemistry, Vol. 3, Part F: Anthropogenic Compounds, 1992, pp. 58-68.

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