



LAS BIODEGRADATION AND REMOVAL IN SEWAGE TREATMENT

Many studies have been conducted in the U.S. and Europe in recent years on linear alkylbenzene sulfonate (LAS) in sewage treatment. These studies demonstrate that LAS is rapidly biodegraded and extensively removed during biological treatment in municipal wastewater treatment plants and in household septic systems.

Municipal Wastewater Treatment Plants

- Biodegradation of LAS begins in raw sewage before reaching the wastewater treatment plant.⁽¹⁾
- In the US, monitoring in 50 wastewater treatment facilities in 11 states showed average LAS levels in raw sewage ranged from 4.2 to 5.7 mg/L⁽²⁾ while levels in raw sewage from five European countries ranged from 4.0-15.1 mg/L.^(3,4)
- Testing of incoming water (influent), outgoing water (effluent) and solids (sludge) show extensive removal of LAS from wastewater. Indeed, LAS was more efficiently removed than were other biodegradable materials, measured as the biochemical oxygen demand, or BOD.^(2,3)
- Most U.S. STPs are activated sludge units, which typically remove more than 99 percent of the LAS present in sewage. Other systems, such as rotating biological contactors (RBCs) and oxidation ditches, have LAS removal rates ranging from 96 to 99 percent. Less efficient and less widely used trickling filter systems remove 77-83 percent when used alone, but reach more effective removal levels when coupled with methods such as sand filtration.^(2,5)
- Comparison of the performance of activated sludge treatment plants with those from an earlier (1973 through 1986) U.S. monitoring study⁽⁶⁾ shows that LAS removal during sewage treatment has improved over the years, probably due to more efficient treatment plant operation.
- Monitoring data from five European countries showed LAS removal in activated sludge treatment ranged from 98.5-99.9%^(1,3,4,7) and to range from 89.1-99.1 percent removal in trickling filter plants.⁽⁷⁾

- Most of the LAS removal is due to rapid and complete biodegradation during sewage treatment, with only about 20% of LAS removal in the sludge.^(3,8)
- Consequently, LAS concentrations in water and sediments of rivers and streams receiving treated wastewater are very low and pose no risk to the environment. The remaining LAS will continue to rapidly biodegrade (See "LAS Biodegradation and Safety in Rivers and Streams" and "LAS Biodegradation and Safety in Sediments").
- Sludge from sewage treatment is incinerated, put in landfills or applied to land as a soil conditioner or fertilizer. LAS levels in sludge applied to soil (sludge amended soil) are very low and pose no risk to the environment. Remaining LAS continues to rapidly biodegrade (See "LAS Biodegradation and Safety in Sludges and Soils").

Household Septic Systems

- In the U.S., 75% of sewage is treated in municipal treatment plants while 25% is treated in household septic systems, mostly in suburban and rural areas.⁽⁹⁾
- LAS biodegrades rapidly in the soil under the percolation field of a household septic system. Consequently, LAS is efficiently removed in septic systems and poses no risk to groundwater resources.^(10,11)

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