

# THE SURFACTANT PROFILE OF MUNICIPAL WASTEWATER: INFLUENTS AND EFFLUENTS

U. Zoller

*Division of Chemical Studies, Haifa University-Oranim,  
P.O. Kiryat Tivon, 36 910, Israel*

Alongside the anionic LABS, "hard" (nonbiodegradable) nonionic surfactants are currently the most commonly used detergents in Israel. These surfactants constitute a significant factor in the physico-chemical profile of municipal wastewaters, which in turn affects the efficiency of sewage treatment of all kinds, as well as the quality of the reused, reclaimed wastewaters and receiving surface and ground waters. A study determining the current concentrations of both anionic and nonionic surfactants in Israel municipal wastewater influents and effluents under realistic ("in vivo") conditions - on sites of sewage treatment - has been undertaken. The classical MBAS and our modified SDA - CTAS methods were used to determine the anionic and nonionic surfactants respectively.

The initial concentrations of anionic and nonionic surfactants in the wastewater influents were found to be within the range of 9.5 - 11 and 1 - 2.5 mg/liter respectively. These lower concentrations compared with the past are in accord with the current world trend in detergent consumption and use, but somewhat unexpected in view of the unique situation in Israel with respect to the preferred consumption of hard nonionic surfactants. The ratio between biodegradable and nonbiodegradable-nonionic surfactants was found to be about 30:70.

## Anionic / Nonionic Detergent Ratio in Israel Raw Wastewater Influent

Location of Sewage	Volume of Wastewaters(b)	Surfactant Anionic	Concentration(a) Nonionic	Ratio %
Tel-Aviv (north)	150,000	11.0	2.1	84:16
Dan Region	80,000	10.0	2.1	83:17
Haifa	60,000	10.0	1.8	85:15
Rishon Le-zion	17,000	9.7	1.5	87:13
Hadera	7,500	11.5	1.3	90:10
Tiberias (lower)	3,500	10.6	1.3	89:11
Average (c)		10.5	1.7	86:14

(a) Figures are mg/liter.

(b) Figures are cubic meters per 24 hours.

(c) Not weighted in accordance with the population size served by each sewer.

The initial concentrations of anionic and nonionic surfactants in the effluents are within the range of 4 - 5 and 0.4 - 0.5 in brief primary treatment sites; and 0.3 - 1.3, and 0.25 - 0.45 mg/liter respectively after primary - secondary treatment. It is concluded that although the concentrations of both anionic and nonionic surfactants in municipal wastewaters in Israel are decreasing, still about 20% of all anionic; and 30% of all nonionic surfactants used (or their metabolites) are discharged into receiving waters.

This process has its long-term environmental trade-offs as a result of cumulative processes of past and present man-made operations.

In view of the increased need in Israel for the reuse of available water resources of almost any quality for a variety of purposes (irrigation, industry, aquifer recharge, etc.), the residuals of detergents, particularly the nonbiodegradable nonionic surfactants constitute a serious problem with all the environmental consequences involved.