Determination of Nonylphenol and Nonylphenol Ethoxylates in Environmental Water

Nonylphenol ethoxylate (NPE) is commercially used as a non-ionic surfactant in the detergent formulation. The nine-mole ethoxylate is the most prevalent isomer used. NPE readily biodegrades to form lower ethoxylates, predominantly one, two and three ethoxylate units, and p-nonylphenol (NP). NP has been labeled as a weak endocrine disrupter and therefore as been the source of numerous studies.

There have numerous published journal articles regarding the determination of NP and NPE. The results are far ranging and difficult to compare due to variability in sample handling, analysis and detection limits. Use of a single methodology would allow for valid data comparison. The need for this comparison is important given that regulation of these compounds is being considered by the USEPA. Methods found in the literature used for the determination of these compounds are very diverse. SPE, SFE, CLLE, LC-fluorescence, LC-MS, and GC-MS have been reported. While many of these methods involve exotic and expensive analytical techniques, this method provides a cost effective, rugged and sensitive means of analysis using equipment that is readily found in most contract laboratories. The method is very sensitive and is capable of determining NP and NPE to 0.5ppb. The method closely resembles the EPA Methods 3520 and 8270, which determine trace quantities of organic pollutants. The method uses a Hershberg-Wolfe continuous liquid-liquid extraction (CLLE) followed by concentration and GC-MS analysis. The method is also suitable for monitoring waste treatment plant effluent.

Data from a diverse sampling of river water in North America should be available by March 2003 using this method.

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