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## Hollow-Fiber Microporous Membrane Liquid-Liquid Extraction for Determination of Polybrominated Diphenyl Ethers at Trace Levels in Sewage Sludge with Gas Chromatography-Electron Capture Detection

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### ABSTRACT

A two-phase hollow-fiber (HF) liquid-phase microextraction (LPME) method followed by gas chromatography was developed for quantification of 8 major polybrominated diphenyl ethers at trace level in sewage sludge. In this method the porous polypropylene hollow fibers filled with a few microliters of organic solvent, were immersed in aqueous samples of wet sludge which were spiked with the PBDEs at ng/l level. Parameters such as salt concentration, stirring speed, extraction time and pH were optimized and the optimum extraction conditions were then applied to the determination of PBDEs in sewage sludge from Källby sewage treatment plant in Lund. The optimized method allowed detection of 5.1 µg kg<sup>-1</sup> and 0.43 µg kg<sup>-1</sup> of BDE-47 and 183, respectively, in dried sludge. The findings were compatible with the results from recent research on PBDEs level in sewage sludge samples from Sweden. Although BDE-209 was expected to have the highest level, it was not detected. Limit of detection, photodegradation or/and biodegradation of BDE-209 during treatment or experiment are major reasons. Low organic solvent consumption, low sample volume requirement, high preconcentration factor, simplicity without using expensive instrument for extraction and excellent sample clean-up are some important factors that make this sample preparation technique very useful for determination of PBDEs in sludge.

### KEYWORDS

PBDE, Gas Chromatography, Sewage Sludge, Membrane Extraction, LPME

### Cite this paper

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