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Abstract:

Stimulation of degradation of brominated flame retardants in lake sediments by NOAH gypsum

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The brominated flame retardants are a relatively new environmental challenge, and the need for more knowledge is crucial for treating the challenges associated with these substances. A study has been performed, in the process of finding an efficient way of treating the brominated flame retardants in contaminated waste. The effect of NOAH gypsum, with and without elemental iron added, on the debromation of the flame retardant compounds polybrominated diphenylether (PBDE), hexabromcyclododecane (HBCDD) and tetrabrombisphenol A (TBBPA) in lake sediments has been tested. All experimental work was carried out under anaerobic N2-atmospheric conditions. The samples were stored at 8^{O}C and 22 ^{O}C respectively and sampled after 2, 5 and 10 weeks.

Initial concentrations of PBDE, HBCDD and TBBPA were ∑ all PBDE 3292µg/kg dw, HBCDD 7272 µg/kg dw and TBBPA<1µg/kg dw respectively. The sediment was spiked to an initial TBBPA concentration of 202 µg/kg dw. After 10 weeks the TBBPA concentration was reduced by 36% and 49% with the Fe^{o} addition. The PBDE`s were also reduced, finding highly brominated PBDE´s decreased and lower brominated PBDE´s enhanced. Reference samples were analysed. The results demonstrated the NOAH gypsum as an efficient medium to degrade the brominated flame retardants.

In 2005 lake sediments contaminated with brominated flame retardants were successfully treated at NOAH´s facility at Langøya. The sediments came from Mjøsa, the largest lake in Norway. A textile factory using flame retardants in their production probably contributed to the lake contamination. The NOAH gypsum was used to stimulate the degradation of the brominated flame retardants.

Today NOAH is a facility for treating waste contaminated with brominated flame retardants.