Proceedings of the 8th International Conference on Environmental Science and Technology
Lemnos Island, Greece, 8 – 10 September 2003
Full paper Vol. B, pp. 416 - 421

REMOVAL OF PCBs FROM POLLUTED AND SPIKED SOILS AND SEDIMENTS USING SURFACTANTS

E. KOKKALIS[1], TH. KOUIMTZIS[1], C. SAMARA[1] and A. ANASTOPOULOS[2]

[1] Aristotle University of Thessaloniki, Department of Chemistry, Environmental Pollution Control Laboratory, GR-54124 Thessaloniki, Greece, [2] Aristotle University of Thessaloniki, Department of Chemistry, Physical Chemistry Laboratory, GR-54124 Thessaloniki, Greece
E-mail: kouimtzi@chem.auth.gr

EXTENDED ABSTRACT

Polychlorinated Biphenyls (PCBs) share with DDT the distinction of being among the first historically recognized persistent organic pollutants (POPs). Many of the same chemical and physical properties that had made them such desirable industrials, also made them one of the most widespread contaminants in the environment. This paper presents first results from a laboratory study for soil and sediment remediation from PCBs using surfactants.

Various types of soil/sediments were investigated: marine sediment from Thermaikos Gulf, riverine sediment from Axios river, agricultural soil from the area of Halastra and PCBs contaminatedsoil from an industrial area of Cyprus. The soil and sediment samples were spiked with a transformer oil acetone solution of known PCBs concentration. A gas chromatography analytical technique using Electron Capture Detection, (GC – ECD) has developed both for PCBs in transformer oil and sediments.
Batch experiments were carried out in order to investigate the parameters that affect the desorption behavior and remediation efficiency for spiked and historically polluted samples. Both anionic and nonionic surfactants such as Sodium Docecyl Benzenesulfonate (SDBS), Polyoxyethylene (4) lauryl ether (Brij 30), Polyoxyethylene (23) lauryl ether (Brij 35), Polyoxyethylene sorbitan monolaurate (Tween 20) and Polyoxyethylene sorbitan monooleate (Tween 80) were examined.
The use of surfactants to enhance remediation efforts has been of considerable interest in recent years. Despite successful laboratory studies, several field demonstrations of surfactant flushing have illustrated potential problems: lower contaminant removal than anticipated and changes in the hydrogeological nature of the aquifer. These reasons predicate the investigation of both surfactant and contaminant nature. The results indicated that in historically polluted samples, the use of surfactants does not sufficiently remove PCBs. In these cases is necessary to enhance remediation efficiency.

Key words: desorption; PCBs; remediation; soil; sorption; surfactants