

Chapter VI

SUMMARY

Polychlorinated biphenyls (PCBs) are members of the halogenated aromatic group of environmental pollutants that have attracted great concern because of their worldwide distribution, persistence in the environment, and possible deleterious effects. The widespread use of PCBs coupled with improper disposal practices resulted in the discharge of large quantities of these environmental pollutants into non-target sites, such as soils, river and lake sediments, and landfills. Because of the possible health hazards associated with PCBs, remediation of the PCB contaminated sites is required to reduce the potential for further dissemination.

I evaluated the extent of degradation of Aroclor 1242 from a surface soil, using an acetoclastic methanogenic consortium enriched from a municipal anaerobic digester. Different microcosms were set up using different amounts of soil and were manipulated by different feeding levels, in order to enhance dechlorination activity. Disappearance of Aroclor 1242 was observed in the microcosms. Significant differences in Aroclor 1242 removal were observed between inoculated and uninoculated (control) microcosms, suggesting that the methanogenic consortium was responsible for the degradation of Aroclor 1242. It could not be determined if the disappearance of Aroclor 1242 was due to anaerobic dehalogenation. However, it was confirmed that disappearance of Aroclor 1242 was not due to evaporation losses during sample extraction.

The soil used in this study was an aged surface soil, reportedly contaminated in the early 1970's. I extracted Aroclor 1242 from the soil, and the concentrations I found were slightly different, but comparable to the reported value. The toxicity of this Aroclor 1242 contaminated surface soil was evaluated on an acetoclastic methanogenic consortium enriched from a municipal anaerobic digester. Different microcosms were set up containing different amounts of soil. Toxicity was determined based on the decreased rate of methane production in the microcosms relative to non-soil containing controls. The level of methane production in the microcosms followed a particular pattern and decreased with an increase in the amount of soil. Whether this decrease in methane production was due to the toxicity of Aroclor 1242 on the methanogenic consortium or

due to inhibition of methanogenesis by trapped oxygen in the surface soil, was not clear. The rate of acetate metabolism (total gas production) was linear for most of the microcosms.

Based on the results of this study, a long-term study is recommended for the determination of both biodegradability and toxicity of PCBs. It is recommended, all traces of oxygen present in the soil, be removed prior to the addition of an anaerobic inoculum.

VITA

Swati Das was born in 1971 in a town named Cuttack, in the State of Orissa, India. She received her B.S. in Biology in 1991 and M.S. in Biology in 1993 from Sambalpur University, India. She came to the United States in 1994, after marrying Prakriti K. Das, who has been brought up here in the US. In 1995, she started her M.S. in Environmental Science under Crop and Soil Environmental Sciences at VA Tech. She will get settled at the tidewater area in Virginia.