PHYSICAL BEHAVIOR OF PCBs IN THE GREAT LAKES

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PREFACE

In December 1981, a group of 35 scientists from the United States and Canada met in Toronto for two days to discuss the physical behavior of PCBs in the Great Lakes. This book is a collection of papers, most of which were presented at that meeting. The issue is of obvious importance: PCBs are among the most notorious environmental contaminants and the Great Lakes are invaluable as a resource for fishing, recreation, transport, and as a source of potable water. But the meeting and this text have a deeper purpose. Perhaps from the understanding of the environmental behavior of PCBs in the Great Lakes will come concepts and information that will be valuable in elucidating and controlling the behavior of other contaminants in other aquatic systems.

The focus of this book is physical rather than biological, with the notable exception of Veith's paper on bioconcentration. This focus does not imply a lack of concern for the biosphere or for the effects or toxicology of PCBs; it merely represents an attempt to tackle a smaller problem of manageable proportions. Besides, the environmental fate of PCBs is largely controlled by physical processes, with biodegradation of lower chlorine congeners being the outstanding exception.

Many lessons have been learned from PCB studies in the Great Lakes. The importance of having reliable physical-chemical property data for individual congeners can not be overestimated. Analytical chemistry, as always, plays a key role. The need for individual consideration of each congener (and not a vague group of PCBs) is now obvious. Processes in the sediments, water column, atmosphere, and at their interfaces must be understood individually and collectively. Mathematical models can synthesize component studies into an overall picture of the contaminant's chemodynamic behavior and determine which processes and compartments are of greatest importance. Failure to reconcile environmental reality with a model (as occurs here with PCB volatilization rate estimation) highlights erroneous measurements or predictive equations. It

is ironic that PCB contamination has been the cause of a significant advance in our understanding of the Great Lakes and, it is hoped, will result in an improved ability to prevent future contamination.

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Donald Mackay is Professor for the Department of Chemical Engineering and Applied Chemistry of the University of Toronto. He is also associated with the university's Institute for Environmental Studies. Dr. Mackay was born and educated in Glasgow, Scotland, where he obtained BSc and PhD degrees in Chemical Engineering. Before his present position, he was a research fellow at the University of Toronto, working on the kinetics of high-temperature reactions in shock waves. He then returned to the United Kingdom to work with Imperial Chemical Industries Ltd. on industrial petrochemical reactions and separations. Dr. Mackay's research interests include the fate and effects of toxic organic compounds in the environment, acquisition and correlation of physical-chemical data for such compounds, and development of models of organic toxicant partitioning, transport and reaction.

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