

A REVIEW OF CHLORINATED BIPHENYL CONTAMINATION IN NATURAL WATERS

GILMAN D. VEITH and G. FRED LEE

Water Chemistry Laboratory
University of Wisconsin, Madison, Wis. 53706, U.S.A.

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Abstract—A review of the present state of knowledge concerning environmental contamination by organochlorine compounds indicates that the chlorinated biphenyls may be one of the more widespread contaminants. The significance of this contamination has not yet been evaluated due, in part, to the lack of systematic analytical procedures for the quantitative and qualitative determinations of the components of chlorinated biphenyl mixtures. The possibility of the chlorinated biphenyls producing serious errors in chlorinated pesticide analyses is emphasized.

INTRODUCTION

CHEMICAL determinations of the types and concentrations of chlorinated pesticides in natural waters have become increasingly important to fish management, wildlife ecology, and water pollution control. Based on gas chromatographic (GLC) analyses of environmental samples, pp'DDE is generally considered to be one of the more widespread contaminants. However, implicit in every GLC analysis is the possibility that unresolved and/or unidentified components which have specific retention volumes similar to that of the desired substance may introduce serious errors in the interpretation of the chromatogram. Increasing numbers of investigators have reported the presence of organochlorine compounds in environmental samples which cannot be identified as the common chlorinated pesticides. Although the unidentified compounds have been attributed from presumptive evidence to the metabolites of common pesticides, plasticizers, or chlorinated biphenyls, proper chemical identifications have not been reported. Therefore, when studying natural water systems which receive industrial wastes, it may be more correct to consider unidentified compounds as chlorinated organic contaminants until confirmation techniques are developed.

Within the last three years, the chlorinated biphenyls (or polychlorinated biphenyls—PCB) have received considerable study. The preliminary evidence indicates that this group of organochlorine compounds may be widespread in the environment. For example, WIDMARK (1967) reported that mass-spectrum analyses of compounds eluting from GLC of fish and bird extracts indicated that unknown organochlorine compounds were present which behaved as chlorinated biphenyls of higher chlorine content. More recently, mass numbers and chlorine numbers per molecule for each peak in the chromatograph of commercial chlorinated biphenyl were reported (JENSEN *et al.*, 1968). However, to our knowledge, no spectral data or other confirmatory data for positive structural identification of these compounds have ever been published.

With this improper basis of identification, a number of other publications have followed which identify unknown compounds as chlorinated biphenyls. Since mixtures of chlorinated biphenyls may contain greater than 20 compounds which can only be

