Monsanto

PCB - Research

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SUBJECT DETECTION OF POLYCHLORINATED TERPHENYLS (PCT) IN THE ENVIRONMENT

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For some time now, we have been concerned about the possibility of PCT being present in environmental samples. So far, we have not detected PCT in any of the environmental samples that we have analyzed for PCB's.

In conjunction with the above statement, it should be noted that there are several obvious reasons that could explain the conspicuous absence of PCT in PCB containing samples. First, they may not be present at detectable levels in environmental samples because of the smaller number of pounds presently being manufactured and consumed or the current end uses may be different enough that they are not released to the environment. Secondly, the difference in physical properties (vapor pressure, water and lipid solubility, environmental stability, etc.) may be responsible for their absence in the environment. Thirdly, their absence could be explained by the limitations of the analytical methods now being used by residue analysts to look for chlorinated hydrocarbons (CHC).

We have previously established that PCT can be extracted and isolated from tissues in the same manner that PCB's are, and that PCT can be detected by electron capture gas chromatography (EC/GC) if one operates isothermally at high enough temperatures. However, EC/GC is not particularly well suited for the detection of PCT, especially at the lower temperatures used to analyze for PCB and other CHC.

To illustrate this point, I have chromatographed a series of solutions containing a constant amount of Aroclor 1254 (PCB) and increasing amounts of Aroclor 5460 (PCT). The temperature employed is that which we normally use when analyzing for PCB. The EC/GC traces obtained are shown in the accompanying figure.

From these chromatograms, it can be seen that the Aroclor 1254 trace is uneffected until the PCT/PCB ratio is 10/1 or better. At this point some of the Aroclor 1254 peaks begin increasing and an apparently new peak or two appears. When the ratio is increased to 50/1 the changes become increasingly apparent.

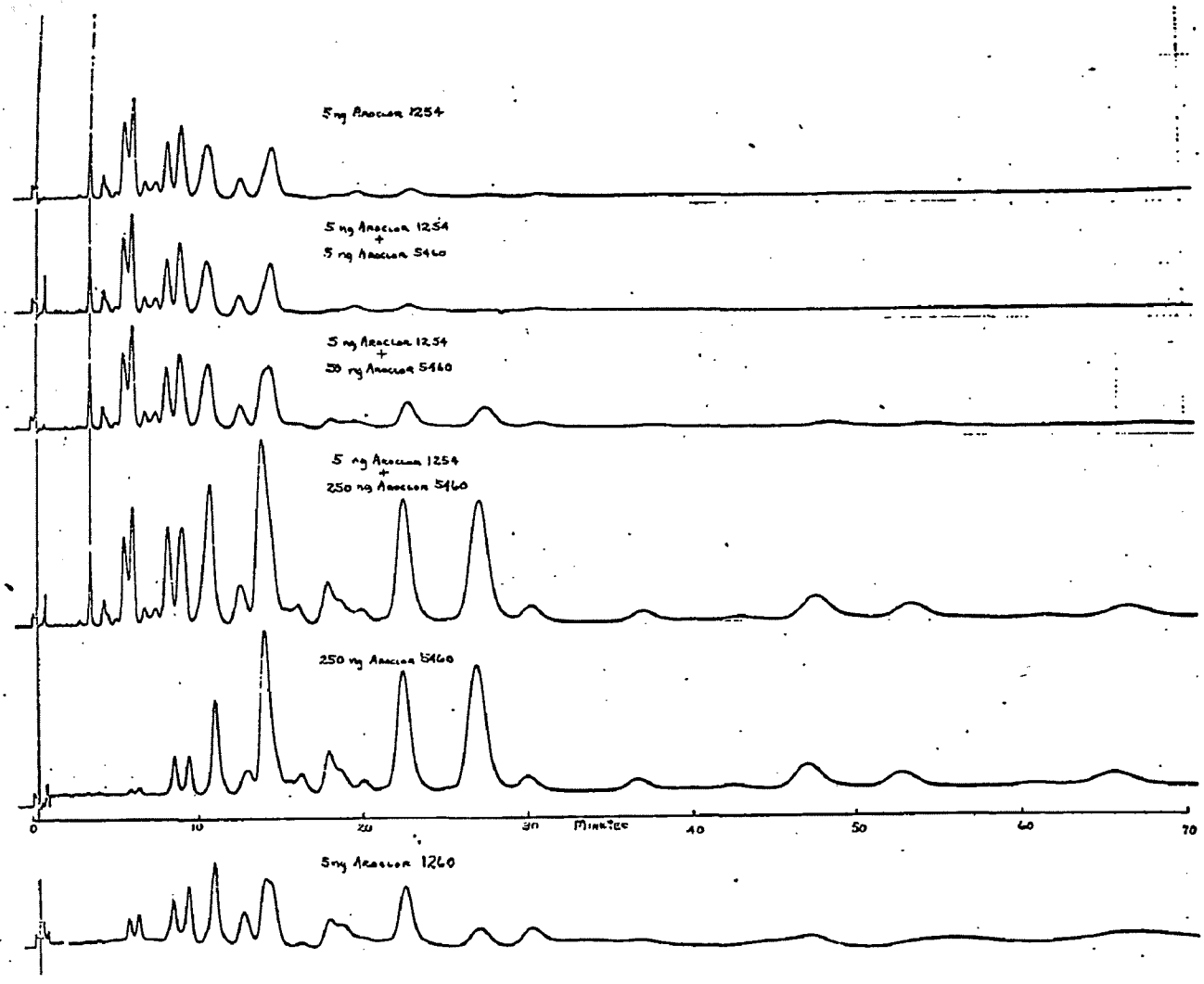
A comparison of the EC trace of Aroclor 5460 at the 250 ng level (50/1) to the trace obtained for Aroclor 1260 shows that the new peaks are really PCB and not PCT. The detection of PCT when analyzing tissues for PCB would, therefore, require that the ratio of PCT/PCB be something greater than 250/1.

We are currently exploring other analytical methods for the detection of PCT.

E. S. Tucker

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5 mg Aroclor 1254
5 mg Aroclor 1254 + 5 mg Aroclor 5460
5 mg Aroclor 1254 + 50 mg Aroclor 5460
5 mg Aroclor 1254 + 250 mg Aroclor 5460
250 mg Aroclor 5460
0
10
20
30
Minutes
40
50
60
70
5 mg Aroclor 1260

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