P Ex 2820

Monsanto INDUSTRIAL CHEMICALS COMPANY

FROM (NAME & LOCATION) R. E. Keller - South Second Street - St. Louis

DATE: October 28, 1971

SUBJECT: ALLEGED DIOXINS AND BENZOFURANS IN PCB'S - INPUTS FOR REPORT

REFERENCE: HSB 10-22-71 Memo to REK/WRR

TO: W. R. Richard
General Offices

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The attached reports and summary data table for furans cover information in hand on the above subject.

Overall, we should be able to meet predicted regulatory agency maximum permissible levels of chlorodibenzofurans in our PCB/PCT products. Data in hand show that Aroclor 1242, 1254, 1260 and MCS 1016 contain no detectable (<2 ppm)[a] furans (or chlorodibenzo-p-dioxins). Aroclor 5442 contains no detectable (<5 ppm) furans.

The above position is based on the belief that higher levels would be permitted for furans because of lower toxicity compared to dioxins. The data shown on the confidential attachment from a European manufacturer shows that tetrachlorodibenzo-p-dioxin has an acute toxicity to rabbits at least 30X that for tetrachlorodibenzofuran. Regulatory agencies, including the EPA, are currently imposing 0.1 ppm max. for tetrachlorodibenzo-p-dioxin in 2,4,5-T and hexachlorophene. On this basis, a 2 ppm max. level should be acceptable for furans.

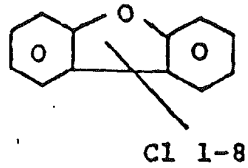
If we are required to push the detection to 0.1 ppm, we will need to synthesize furans and develop more sensitive methods. This will be costly, and difficult technically, especially for PCT products.

Based on experimental work in our own laboratories and in part at the University of Utrecht -

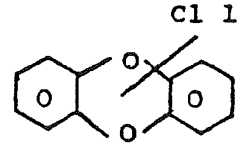
We Know

1. Monsanto Aroclor 1242, 1254, 1260 and MCS 1016 contain no detectable (<2 ppm) chlorodibenzofurans (I) or chlorodibenzo-p-dioxins (II) of the type below. Aroclor 5442 also contains no detectable (<5 ppm) chlorodibenzofurans or chlorodibenzo-p-dioxins.

(I)



(II)



[a]On a per component and not total furan basis.

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2. Competitive products - Prodelec and Bayer chlorinated biphenyls similar in composition to Aroclor 1260 contain detectable furans (up to 30 ppm) and no dioxins (<2 ppm). Japanese product from Shizuki similar to Aroclor 1242 contains no detectable (<2 ppm) furans or dioxins.

3. All the above PCB products contain chlorinated naphthalenes at ppm levels. Aroclor 5442 contains either chlorinated anthracene or phenanthrene.

Don't Know or Limited Information Only

1. Biodegradability of furans -

   Toxicity to bacteria may be a problem for biodegradation studies.

2. Photodegradation of furans -

   Work by the USDA indicates that photodegradation of dioxins under conditions in which water is the solvent is probably extremely slow in the natural environment.

3. Existence of furans (or dioxins) in the environment or as biological residues -

   Methodology normally applied to analysis of environmental materials will not make this detection.

Questions for Medical

1. Toxicity of other impurities -

   Chlorinated naphthalenes, anthracene and/or phenanthrene found in above commercial products?

2. Acute toxicity or teratogenic effects of chlorodibenzofurans relative to dioxins? Availability of published data in the public domain for reference purposes?

3. Based on the above - the odds that 2 ppm max. for chlorodibenzofurans will be put on our products?

I suggest that the only immediate analytical work would be to firm up furan data for remaining PCB/PCT products with existing methodology. Out of this, we should decide what minimum monitoring is needed to insure that our manufacturing process produces no furans in our final products. Additional analytical method development work should be done only if lower detections are needed, based on inputs such as adverse toxicity findings from others.

RK

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