ORGANIC CHEMICALS DIVISION, R&D LABORATORIES, ST. LOUIS

COMPUTER

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SPECIALTY PRODUCTS

AROCLOR ENVIRONMENT PROGRAM

EC/GC analyses of the January composite sample of the JFQ sewer effluent for PCB's verified that the amount being discharged is remaining low. The amount found, 13.0 ppb, is in close agreement with last month's 12.1 ppb. The internal specification for plant discharges is ∿10 ppb total PCB's.

Analysis of a second composite egg sample from Agway Company again verified the presence of PCB's. The level found was 190 ppb calculated as Aroclor 1248 on a wet weight basis. "Bakery meal", a component of their chicken feed appears to be the most logical source of the PCB's found in the feed and in chickens that consume it. EC/GC analysis of a bakery meal from Agway confirmed this suspicion. 480 ppb PCB was found and the EC chromatogram of the meal extract was almost identical to earlier chromatograms of the feed extracts. Since "bakery meal" is prepared by pulverizing stale bakery goods, containers and all, it is possible that recycled coated paper may be the ultimate PCB source. Alternately, the PCB's could be introduced into the meal during processing.

Effluent samples from Mead Company were found to contain low levels of Aroclor 1242; from <1.5 ppb to 2.2 ppb except for a 24 hour composite secondary effluent which contained 24 ppb.

Comparative EC/GC analysis of duplicate Anniston plant effluent samples for PCB's were carried out at Anniston and St. Louis. The levels of PCB's found, calculated as Aroclor 1242, were 2 to 4 times greater than those reported by Anniston. The reason for the disagreement lies in the methods used to estimate the PCB level. Anniston uses the peak height technique, while we employ the total area of the envelope. The two techniques produce equivalent results when the isomer distribution of the Aroclor in question is unaltered. The search for a more absolute quantification will be continued. Additional exchange samples will be analyzed using the total area calibration procedure.

Analysis of tissues from the Bio-Test toxicity studies has not been initiated, although rat tissues from the first 12 months of the two year chronic oral study of Aroclor 1242, Aroclor 1254 and Aroclor 1260 in albino rats are in hand.

The status of the fish samples from the last survey of the water shed associated with the Anniston plant is unchanged, about 50% of the samples have been analyzed to date.

BIODEGRADATION TESTING

The eight week statistical study of the effect that seven different variables have on the SCAS disappearance rates of three model compounds is completed with the exception of a few sample extracts that remain to be analyzed by EC/GC. Variables being evaluated are:

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		1 Level	2 Level
1)	Sludge level	2500 mg/1.	1250 mg/1.
2)	Air sparge	0.5 cu.ft./hr.	1.0 cu.ft./hr.
3)	Feed level	5 mg/cycle	1.0 mg/cycle
4)	Water miscible solvent	5 mg/250 microliter	5 mg/100 microliter
5)	Sampling	Top of unit	Bottom of unit
6)	Introduction of sample	Sub-surface at top	Vortex of Stirrer at bottom
7)	Time	24 hr. cycle	48 hr. cycle

It is hoped that this study will help provide a better understanding of what occurs when water insoluble materials are exposed to a mixed bacterial population in the presence of an alternate energy source.

MCS 1043, MCS 1016, Aroclor 1242, Aroclor 1254, and Arobromochlor 1232

Two weeks of the scheduled four week sampling period have been completed for these materials. The feeding cycle being employed allows the test materials to be exposed to the sludge for two 48-hour and one 72-hour period per week. MCS 1043, MCS 1016, Arobromochlor 1232 and Aroclor 1242 samples from the 48-hour cycles are being analyzed by UV spectroscopy. The remaining 72-hour samples and all Aroclor 1254 samples are being analyzed by EC/GC. The first week UV analyses (2 data points per material) tentatively indicated that the observed disappearance rate of MCS 1043 was greater than Arobromochlor 1232 which in turn disappeared more rapidly than MCS 1016 and Aroclor 1242. At this time there are not enough data points to differentiate MCS 1016 and Aroclor 1242. The EC/GC analysis of the Aroclor 1254 samples and the 72-hour samples of the other materials have not been completed.

TCB, Aroclor 1221 and 2,2'-Dichlorodiphenyl Ether

A four week sampling period for these units has now been completed as has all the EC/GC analyses of the 2,2'-dichlorodiphenyl ether samples. The disappearance rate for the chlorinated ether was slightly less than that of MCS 1043 but greater than that of either MCS 1016 or Aroclor 1242. EC/GC analysis of the TCB and Aroclor 1221 samples has not been completed.

Statistical analyses were run on biodegradation data obtained for 2,2'-dichlorodiphenyl ether and the results compared with previously tested fluids.

HB-40 and MIPB

SCAS testing of HB-40 and MIPB has been concluded. Upon completion of the last 4-week sampling period the units were monitored for

HB-40 and MIPB (Cont'd)

an additional week without feeding of the test material to determine how rapidly the less degradable components disappeared. The mean disappearance rates for the 24-hour cycles were 78% for MIPB and 49% for HB-40, which are comparable to rates observed in earlier studies. A final test in which the feed level was increased to 50 mg (5X) gave disappearance rates of 75% for MIPB and 30% for HB-40 in a 24-hour exposure period. A special study report will be issued.

AROCLOR PRODUCTS

XRF analyses showed that 5 of 6 samples of current WGK, Dept. 246, chlorine used for Aroclor production, contain <35 ppm bromine. This is lower than the 100-300 ppm found over the last several months.

DIELECTRIC FLUIDS

Probability theory was used to predict the effectiveness of a suggested procedure for blending dielectric fluids.

DIBUTYL PHENYL PHOSPHATE

The thermal stability of dibutyl phosphorochloridate was determined for a JFQ process safety audit. Two overlapping exothermic reactions were observed with gas evolution being associated with only the second one. The minimum detectable heat evolution rate of 0.2 cal/min/kg rate occurred at -7°C and the transition to the hotter reaction at about 130°C. IR analysis of the decomposition gases showed 1-butene and trans 2-butene as the major component.

MCS 1016

The heat of vaporization of an Aroclor 1142 heart cut fraction was measured by differential scanning calorimetry as 48 cal/g at 248°C. By the same method a value of 66 cal/g was obtained for biphenyl at 170°C. These data were needed for engineering design of the fractionating column for the MCS 1016 process.

AROCLOR 5460

The thermal stability of Aroclor 5060 in the presence of sodium hydroxide and lime was determined to provide safety information for the low-color Aroclor 5460 process at Anniston. We observed a significant exothermic reaction and gas evolution above 230°C, confirming the observations made at Anniston in a recent plant test.

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4,4'-DICHLOROBIPHENYL

A vapor pressure curve for 4,4'-dichlorobiphenyl was generated between 200 and 350°C. The 4,4'-material was simulated with a mixture of chlorobiphenyl homologs to produce a liquid needed for the Recording Tensimeter. The chlorobiphenyl mixture was a narrow distillation fraction of Aroclor 1129 containing 23% of the 4,4'-isomer and having a boiling point close to that of 4,4'-dichlorobiphenyl.

DECACHLOROBIPHENYL

GC analysis of Aroclor 1268 shows that it contains 12% decachlorobiphenyl. This information was needed to determine the feasibility of preparing the decachlorobiphenyl by further chlorination of Aroclor 1268.

MONOCHLOROBIPHENYLS

Products chlorinated from the 8% to the 21% level were analyzed by GC for isomer distribution to obtain information on a possible route to producing a monochlorobiphenyl product.

2,2'-DICHLORODIPHENYL ETHER

Material undergoing biodegradation testing was found to contain two significant impurities. GC/MS analysis identified these components as a monochlorodiphenyl ether (ca 0.1%) and a trichlorodiphenyl ether (ca 2%).

PYDRAUL 312A and F9A

Vapor pressure curves were produced for these products using Monsanto's Recording Tensimeter. The data were needed for field use in hydraulic system designs.

NMR and IR findings indicate that Houghtosafe 1120 from Republic Steel is a reformulated fluid based on isopropylphenylphosphate.

PYDRAUL 135

Deposits on a filter and a valve stem from a new machine at Inland Steel were shown by IR and emission to be unrelated to the fluid.

HYDRAULIC FLUIDS

95% confidence limits were calculated for the pump wear test.

HB-40

Color components in Anniston process residue were partially characterized by GC/MS.