TYPICAL % COMPOSITION OF POLYCHLORINATED BIPHENYL PRODUCTS *

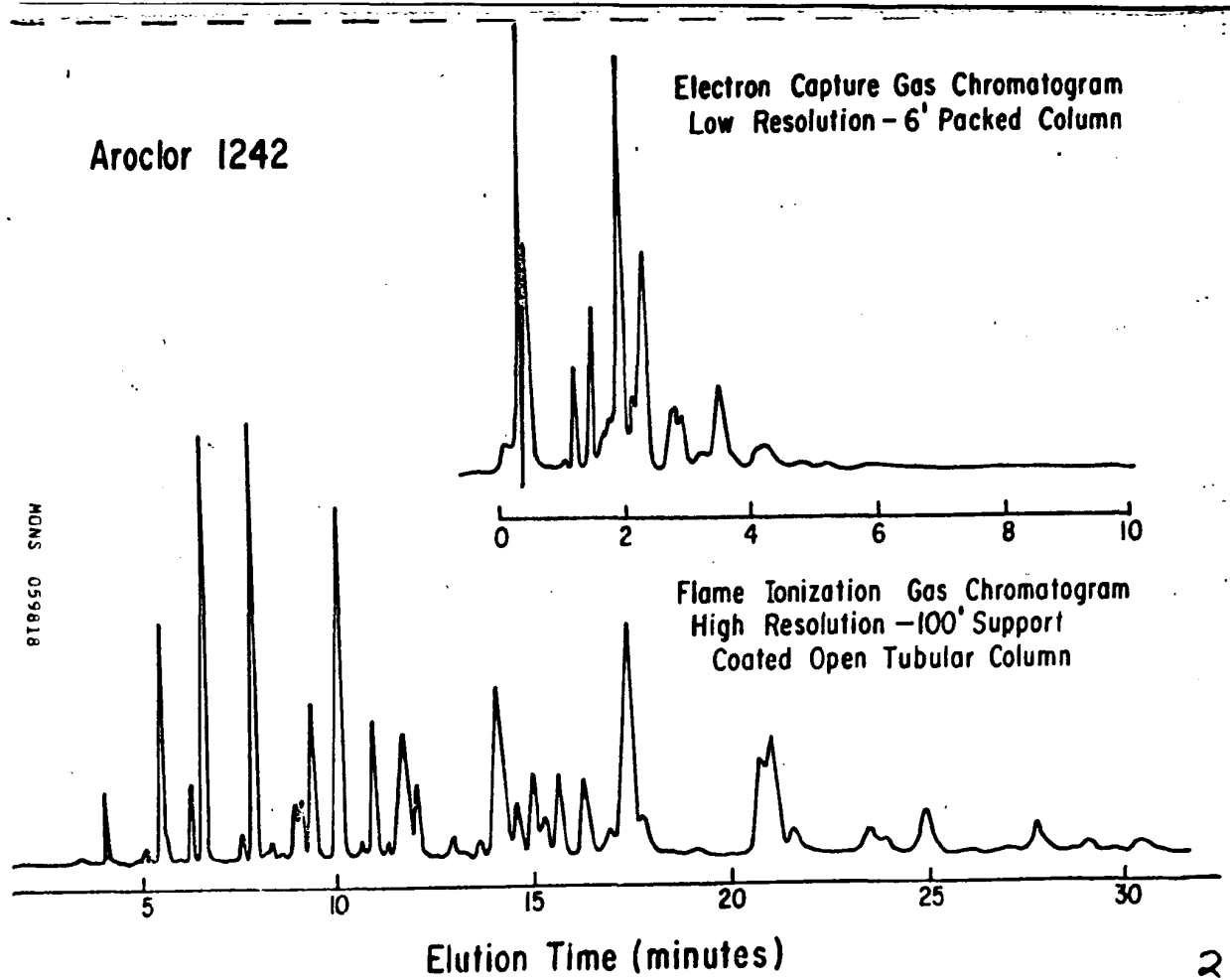
HOMOLOG # Cl/BIPHENYL	AROCLOR 1221	AROCLOR 1016	AROCLOR 1242	AROCLOR 1254
0	11	<0.1	<0.1	<0.1
1	51	1	1	<0.1
2	32	20	16	<0.5
3	4	57	49	1
4	2	21	25	21
5	<0.5	1	8	48
6	ND	<0.1	1	23
7	ND	ND	<0.1	6
8	ND	ND	ND	ND

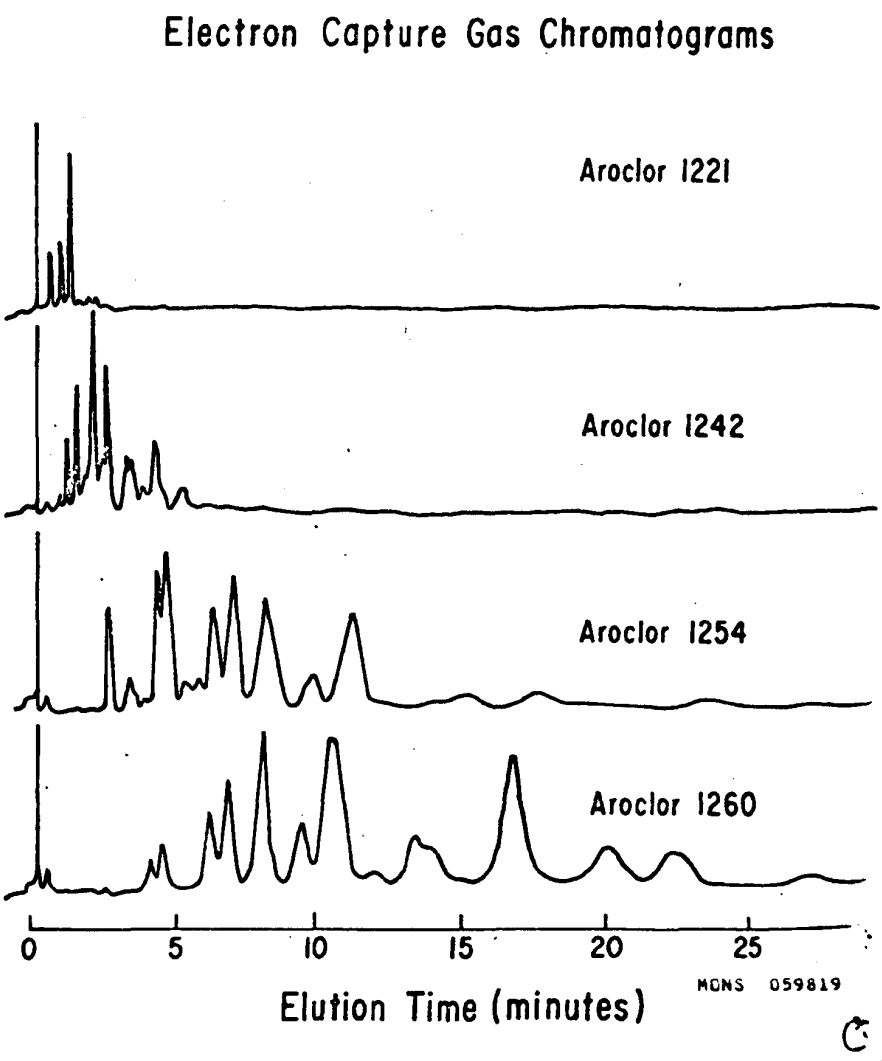
*PER CENT (W/W) BY GC/MASS USING AREA CORRECTION FACTORS BY HOMOLOG RESPONSE

NONE DETECTED, <0.01% = ND

MONS 059817

J. MIEURE


Aroclor 1242
Electron Capture Gas Chromatogram
Low Resolution – 6' Packed Column
0
2
4
6
8
10
Flame Ionization Gas Chromatogram
High Resolution – 100' Support
Coated Open Tubular Column
5
10
15
20
25
30
Elution Time (minutes)
MONS 059818


Electron Capture Gas Chromatograms
Aroclor 1221
Aroclor 1242
Aroclor 1254
Aroclor 1260
0
5
10
15
20
25
Elution Time (minutes)
MONS 059819

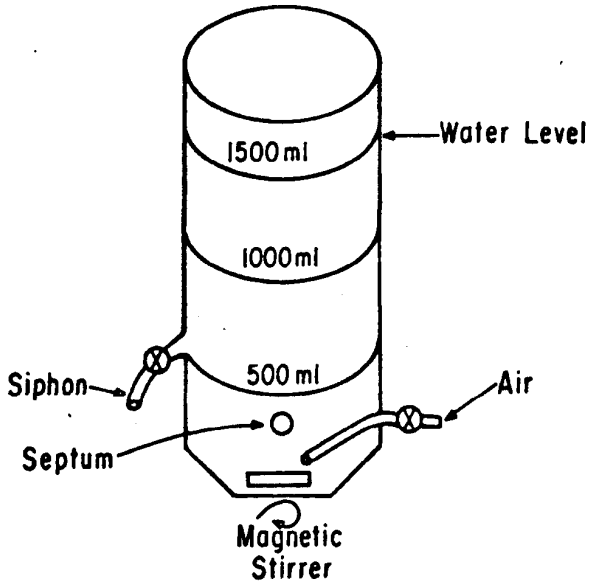
PRIMARY BACTERIAL DEGRADATION STUDIES

- SEMI-CONTINUOUS ACTIVATED SLUDGE DEGRADATION

RESIDUE ACCUMULATION STUDIES

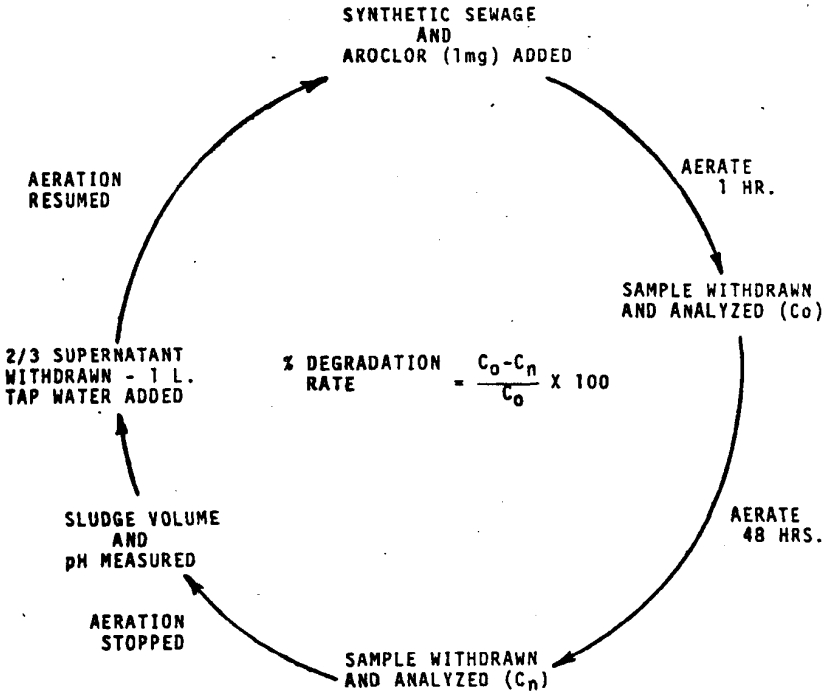
- FISH - CATFISH AND BLUEGILLS
- BIRDS - WHITE LEGHORN CHICKENS
- MAMMALS - ALBINO RATS AND BEAGLE DOGS

Semi-Continuous Activated Sludge Test Unit



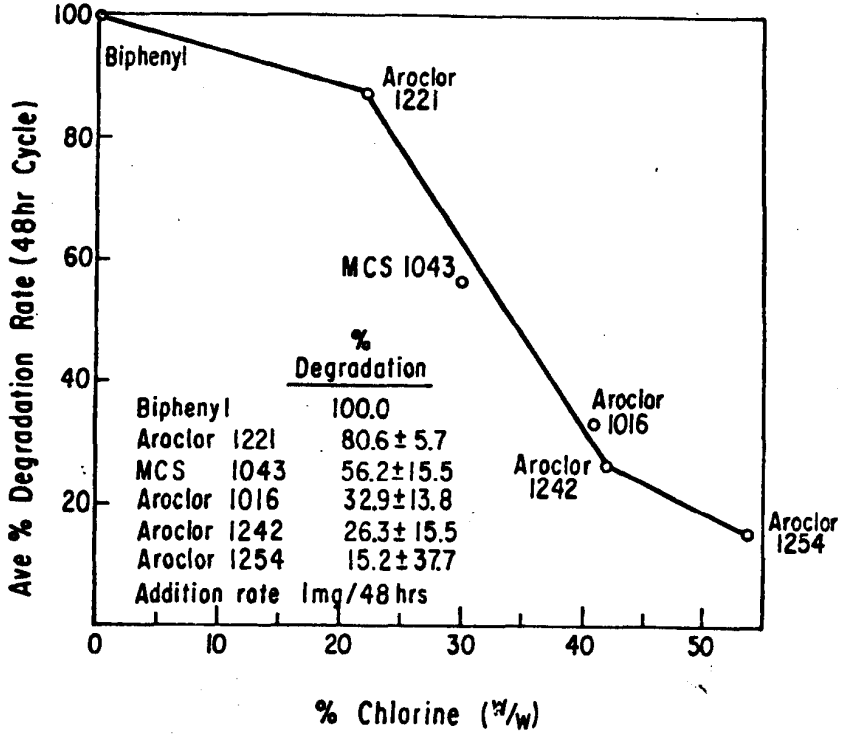
MONS 059821

MECHANICAL CYCLE



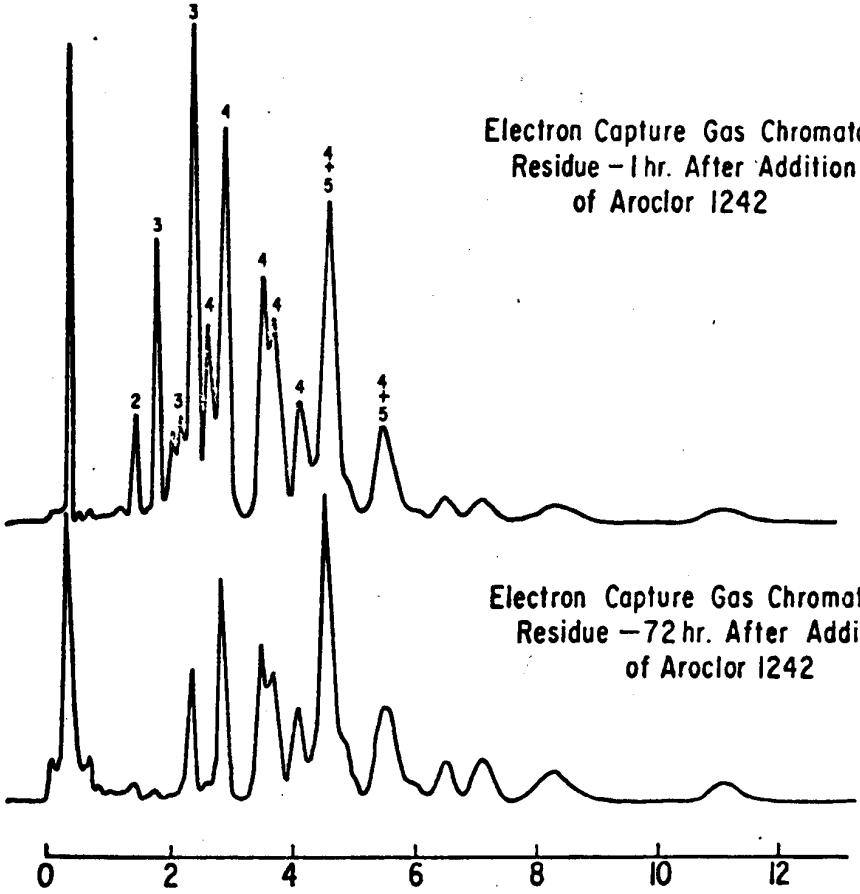
MONS 059822

Semi-Continuous Activated Sludge Degradation of Polychlorinated Biphenyls



MCNS 059823

Semi-Continuous Activated Sludge Degradation of Aroclor 1242



MONS 059824

BACTERIAL DEGRADATION STUDIES

CONCLUSIONS

- RATE OF PRIMARY DEGRADATION INCREASES AS THE DEGREE OF CHLORINATION OF THE AROCLOR PRODUCT DECREASES

BIPHENYL>AROCLOR 1221>MCS 1043 >AROCLOR 1016>AROCLOR 1242>AROCLOR 1254

- BIPHENYL, MONO-, DI-, TRI-, AND TETRACHLORO BIPHENYL HOMOLOGS UNDERGO PRIMARY BACTERIAL DEGRADATION

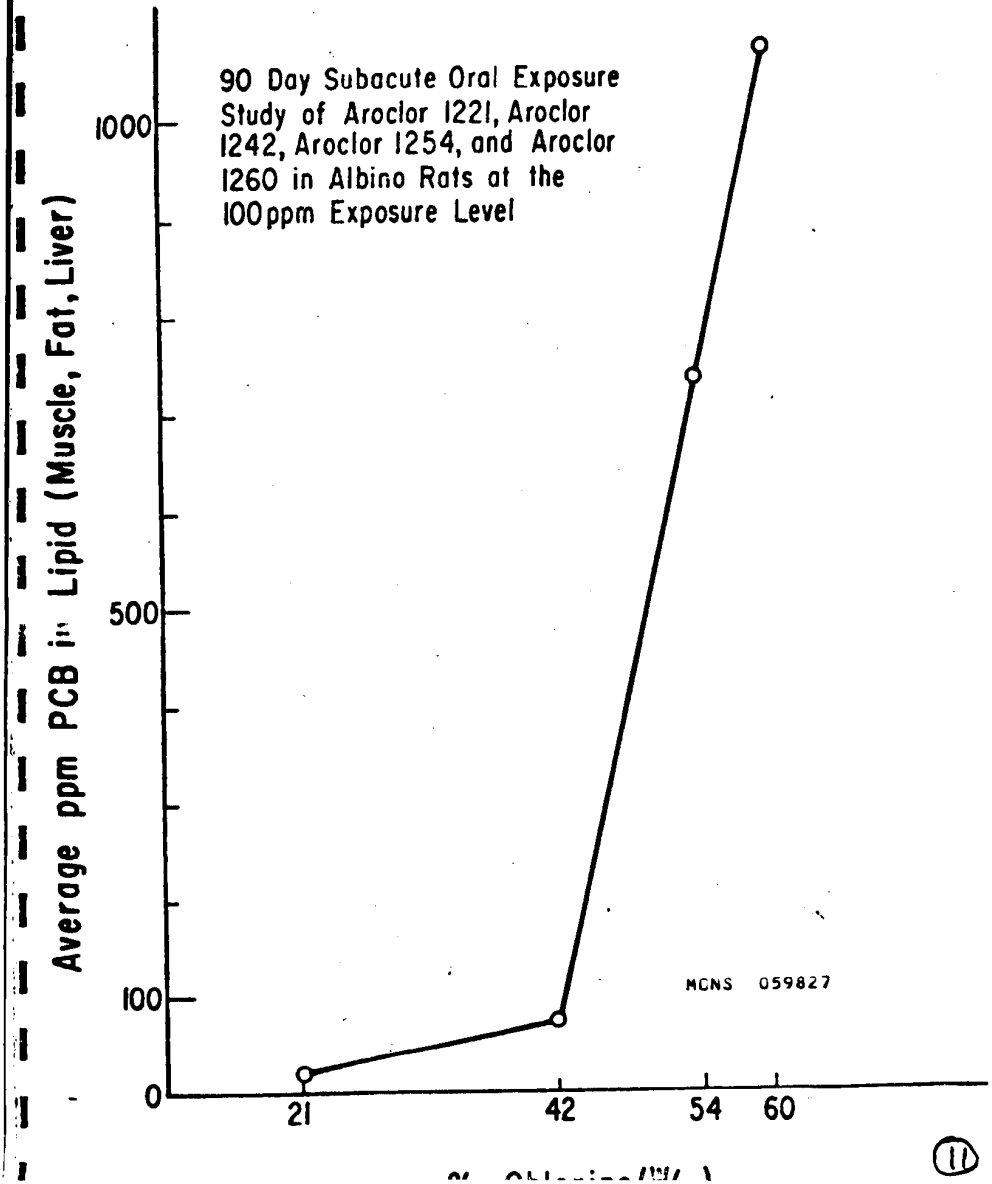
PCB RESIDUES IN CHICKENS (PPM)

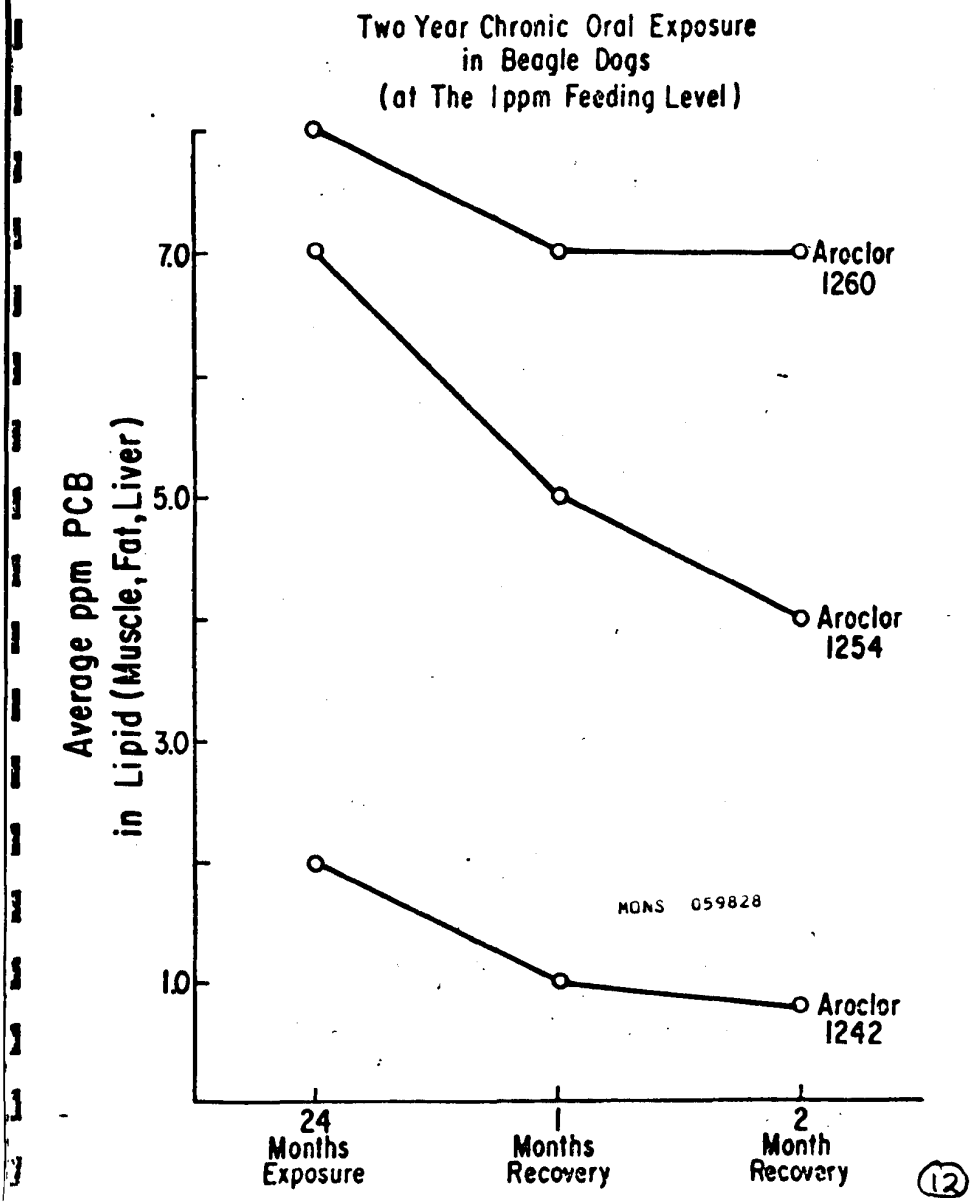
ORAL EXPOSURE LEVEL	AROCLOR 1242			AROCLOR 1254			AROCLOR 1260		
	1	10	100	1	10	100	1	10	100
†THEORETICAL RESIDUE	126	1260	12602	126	1260	12602	126	1260	12602
*RESIDUE AFTER 90 DAY EXPOSURE	14	136	1312	38	362	3506	65	607	5909
*RESIDUE AFTER 30 DAY RECOVERY	9	77	749	17	164	1580	26	232	2363

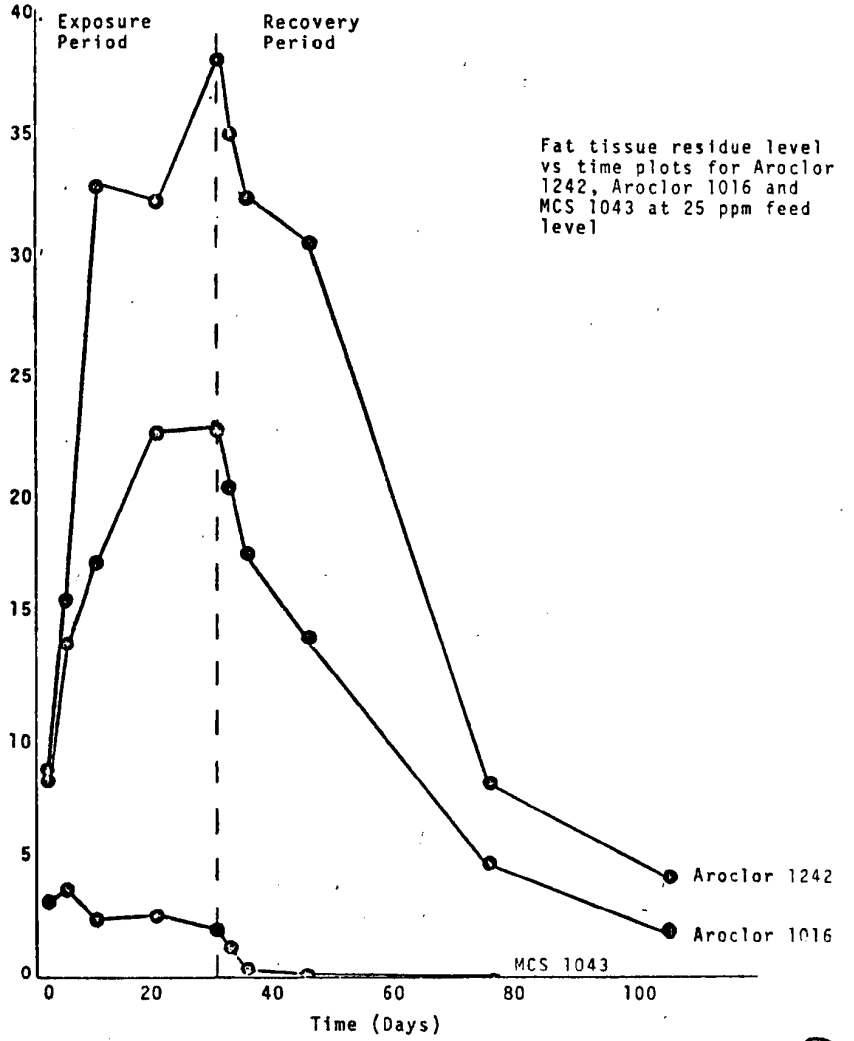
†IF TOTAL PCB CONSUMED WERE RETAINED

*AVERAGE PPM IN LIPID - ALL TISSUES

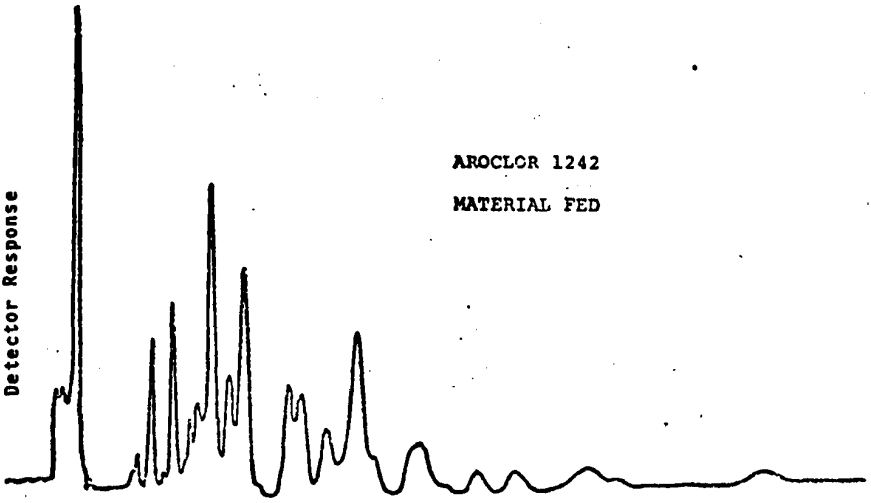
MONS 059826

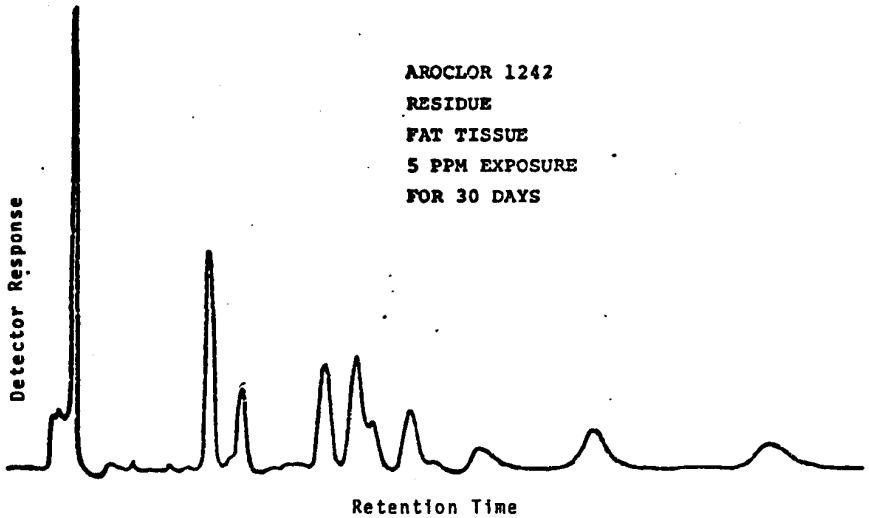

90 Day Subacute Oral Exposure Study of Aroclor 1221, Aroclor 1242, Aroclor 1254, and Aroclor 1260 in Albino Rats at the 100ppm Exposure Level
Average ppm PCB in Lipid (Muscle, Fat, Liver)
1000
500
100
0
21
42
54
60
MONS 059827


Two Year Chronic Oral Exposure
in Beagle Dogs
(at The 1ppm Feeding Level)
Average ppm PCB
in Lipid (Muscle, Fat, Liver)
7.0
5.0
3.0
1.0
Aroclor
1260
Aroclor
1254
Aroclor
1242
MONS 059828
24
Months
Exposure
1
Months
Recovery
2
Month
Recovery


Exposure Period
Recovery Period
Fat tissue residue level vs time plots for Aroclor 1242, Aroclor 1016 and MCS 1043 at 25 ppm feed level
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
Time (Days)
Aroclor 1242
Aroclor 1016
MCS 1043

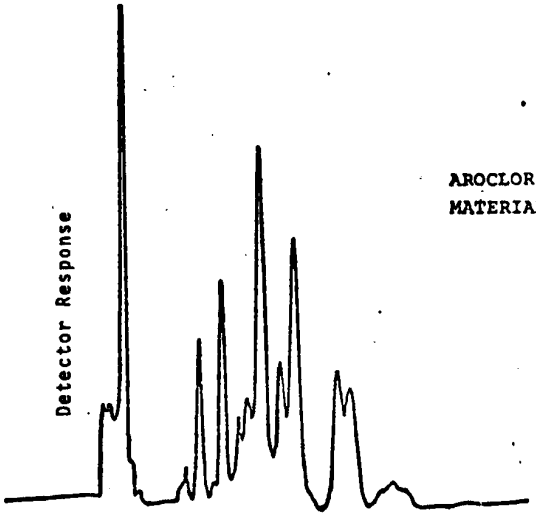
MONS 059829

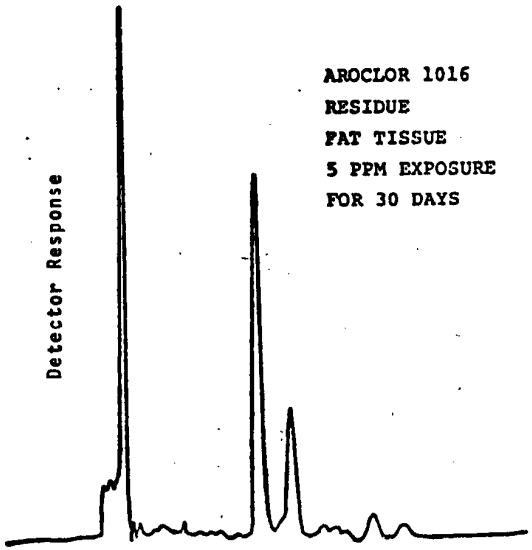




MONS 059830

(14)





MONS 059831

(13)

CONCLUSIONS

RESIDUE BUILDUP STUDIES

- FOR ALL PRODUCTS THE PCB RESIDUE LEVEL INCREASED AS THE EXPOSURE LEVEL AND PERIOD INCREASED

- RELATIVE TO AROCLOR 1260, THE HIGHEST CHLORINATED PRODUCT STUDIED, THE PCB RESIDUE LEVEL DECREASED EXPONENTIALLY AS AS THE WEIGHT % CHLORINE OF THE PRODUCT DECREASED

- RELATIVE LEVELS OF PCB RESIDUES FOUND WERE -

  FISH>>>>>CHICKENS>RATS>DOGS

- RELATIVE PCB RESIDUE LEVELS IN TISSUES WERE -

CHICKENS	FAT = MUSCLE>LIVER
RATS	LIVER>FAT = MUSCLE>KIDNEY
DOGS	LIVER>FAT = MUSCLE

- FOR ALL PRODUCTS THE DOGS AND RATS EXCRETED AND/OR METABOLIZED 93 TO 99% OF THE TOTAL AROCLOR ORALLY INGESTED

- CHICKENS EXCRETED AND/OR METABOLIZED PRODUCTS INJESTED ORALLY AS FOLLOWS -

  90% OF AROCLOR 1242
  70% OF AROCLOR 1254
  50% OF AROCLOR 1260

CONCLUSIONS

RESIDUE FALL-OFF

- DOGS AND CHICKENS CONTINUED TO EXCRETE AND/OR METABOLIZE PCB RESIDUES, INCLUDING PENTA AND HEXA HOMOLOGS, RETAINED WHEN PLACED ON PCB FREE RECOVERY DIETS

  DOGS > CHICKENS

- RELATIVE RESIDUE FALL-OFF RATES SHOWED -

  DOGS: AROCLOR 1242>AROCLOR 1254 >AROCLOR 1260

  CHICKENS: AROCLOR 1242>AROCLOR 1254>AROCLOR 1260

CONCLUSIONS

RESIDUE STUDIES

ALTERATIONS OF AROCLOR HOMOLOG DISTRIBUTION

- ALTERATION OF THE HOMOLOG DISTRIBUTION OF ALL PRODUCTS WAS OBSERVED IN ALL STUDIES EXCEPT FISH

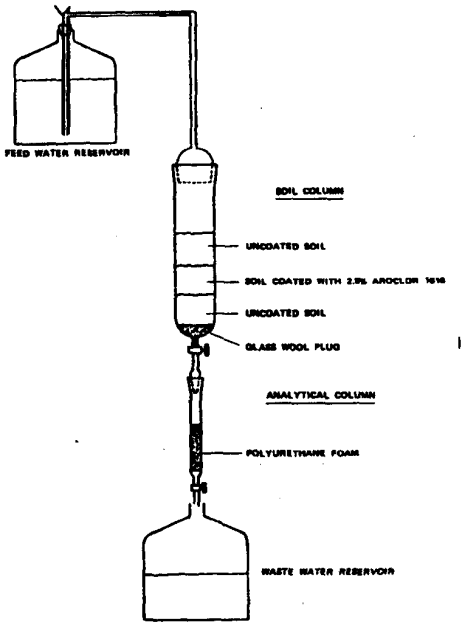
- LOWER CHLORINATED HOMOLOGS PRESENT IN ALL PRODUCTS WERE PREFERENTIALLY EXCRETED AND/OR METABOLIZED

- ALTERATION OF THE HOMOLOG DISTRIBUTION INCREASED AS THE WEIGHT % CHLORINE OF THE PRODUCTS DECREASED (INCLUDING PENTA AND HEXA HOMOLOGS)

  AROCLOR 1221>>AROCLOR 1242>AROCLOR 1254 >AROCLOR 1260

  DOGS>RATS>CHICKENS>>>>>FISH

SOIL PERCOLATION APPARATUS



MONS 059835

COMPOSITION OF SOILS, PERCENTAGE

	NORFOLK SANDY LOAM	RAY SILTY LOAM	DRUMMER SILTY CLAY LOAM
SAND	82.5	6.2	2.8
SILT	11.0	83.2	55.4
CLAY	5.5	9.6	35.8
ORGANIC CARBON	1.0	1.0	6.0

MONS 059836

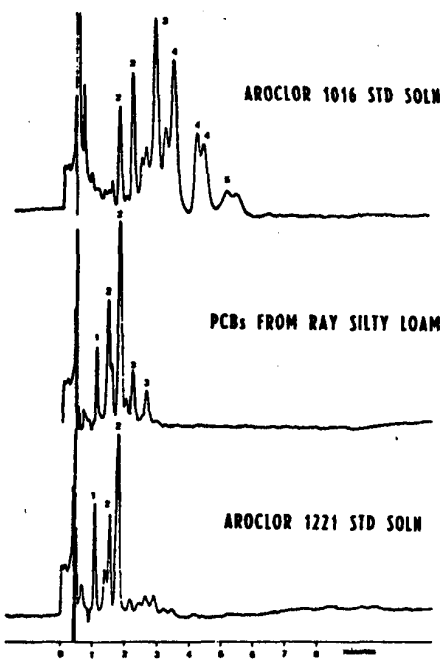
PCB MIGRATION IN SOILS

SOIL	BREAKTHROUGH VOLUME, LITERS
NORFOLK SANDY LOAM	~12
RAY SILTY LOAM	~18
DRUMMER SILTY CLAY LOAM	>60

TOTAL VOLUME EQUIVALENT TO 50-100 FEET OF RAINFALL

MONS 059837

PCB ELECTRON CAPTURE GAS CHROMATOGRAMS



MONS 059838

CONCLUSIONS FROM SOIL PERCOLATION STUDY

- PCB'S ARE NOT READILY LEACHED FROM SOIL BY PERCOLATING WATER

- EASE OF LEACHING DECREASES IN THE FOLLOWING ORDER:
  NORFOLK>RAY>DRUMMER

- ONLY THE LESS CHLORINATED, MORE DEGRADABLE HOMOLOGS LEACHED FROM THE SOILS

MCNS 059835