Monsanto

FROM (NAME & LOCATION) R. H. Munch - St. Louis Organic Research - South Second Street

DATE January 19, 1970

cc W. R. Richard
L. R. Stark
D. Fowlkes

SUBJECT AROCLOR FOR CAPACITORS

REFERENCE

TO : Q. E. Thompson

Jim Bernhardt has fractionated samples of Aroclor 1142 and 1130 through a 25 plate 1 inch Oldershaw column. Data sheets for the fractionations are attached. From the cuts, we have reformulated four blends in such a way as to greatly decrease the concentrations of unchlorinated biphenyl and biphenyl chlorinated with more than four atoms of chlorine per molecule. See the distillation data sheets for the make-up of the blends.

In the case of 1142, this resulted in a sample designated blend 3 which was very similar to Aroclor 1242. This material would probably be a satisfactory substitute for Aroclor 1242. Unfortunately, the yield is only 82%. The remainder is more highly chlorinated material which would have to be disposed of in some manner.

Blends 1 and 2, made from 1130 fractions, were made by eliminating low boiling fractions of the material. This material could be recycled for further chlorination. Unfortunately, 4,4'dichlorobiphenyl crystallized from these samples when they were cooled to -30°C. A fourth blend was therefore made eliminating two additional fractions high in that isomer. This reduced the amount of crystallization but did not entirely eliminate it. Blends 1 and 2 were filtered at -30°C to remove the 4,4'isomer. The mother liquor from these blends would also, in all probability, be a good capacitor dielectric. It would have a somewhat higher DK (4.88 vs. 4.85) than Aroclor 1242 and better low temperature properties. The low chlorine fractions and the 4,4'isomer could be recycled to the chlorination. There would be little or no material to be disposed of from a process in which a sharper fractionation or freezing was used to eliminate the 4,4' dichlorobiphenyl.

Gas chromatographic analyses of the 4 blends and the two mother liquors are attached. These show that a fluid of this type could not have more than about 3.3% of 4,4' isomer as determined by this method.

DSW 150395

IN 10 REV 11-65

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A product based on this kind of processing would seem to be our best bet for a quick substitute for our regular Aroclor 1242 when we must eliminate the higher homologs to achieve biodegradability. We should therefore do enough more work to determine the cost of producing a product of this type having composition similar to those of Blend 1 and 2 mother liquors.

R. H. Munch

js

DSW 150396

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ARCLOR 1130 — FROM NEXT TO LAST CHLORINATOR — N_2 BLOWN IN LAB

5897
2699
3198 gm charge + 33 gm CaO Sp.Gr. 1.38

	Cuts Needed	wt. Needed	ml. needed	Dist.	Cum wt.	%	Cum %	
	0-1 %	31.98	23.17	36	36	1.13	1.13	S
	1-5	127.92	92.70	112	148	3.50	4.63	L
	5-70	2078.70	1506.30	1982	2130	61.98	66.60	L
	70-75	159.90	115.87	148	2278	4.63	71.23	S
5.	75-80	159.90	115.87	150	2428	4.69	75.92	S
6.	80-85	159.90	115.87	154	2582	4.82	80.74	
7.	85-90	159.90	115.87	140	2722	4.38	85.12	L
8.	90-95	159.90	115.87	169	2891	5.28	90.40	L
9.	—	—	—	85	2976	2.66	93.06	L
RESIDUE	(actual)			236	3212	7.38	100.44	

Blend #1 2 through 9 91.5%
2 2 " 6 3212 / 3198 = 79.6% } of charge
4 2, 3, 6, 7, 8, 9 14 gm gain
82.6%

Cut 1	Cut 2	Cut 3a	3b	3c	3d	3e	3f	Cut 4	Cut 5
194	281	447	439	470	745	506	307	306	317
158	169	163	147	153	177	136	156	158	167
36	112	284	292	317	568	370	151	148	150

Cut 6	Cut 7	Cut 8	Cut 9	Residue	
310	298	322	232	1678	269
156	158	153	147	1409	33
154	140	169	85	269	236 actual

DSW 150397

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AROCLOR 1142 FROM CONT BLOWN TANK

6293
2537
3756 gm charge + 37-38 gm CaO

	Cuts Needed	wt. Needed	ml needed	Dist.	Cum. wt.	%	Cum %
1.	0-1%	37.56	27.22	59	59	1.57	1.57
2.	1-5	150.24	108.87	96	155	2.56	4.13
3.	5-70	2441.40	1769.13	2524	2679	67.20	71.3
4.	70-75	187.80	136.09	202	2881	5.38	76.7
5.	75-80	187.80	136.09	197	3078	5.24	81.9
6.	80-85	187.80	136.09	183	3261	4.87	86.8
7.	85-90	187.80	136.09	189	3450	5.03	91.8
8.	90-95	187.80	136.09	127	3577	3.38	95.2
RESIDUE (Actual)				176	3753	4.69	99.9
(with CaO)				214	3791		

3756 gm chg.
3753 gm Recovery
3 gm (loss)

Blend 3 = 1 through 5 81.95 % of charge

DSW 150398

STLCOPCB4039839

GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

AROCLOR 1130 BLEND 4 CR-150624 C-20 N

Peak No.		RT	AREA	AREA PRCNT	Cl No.
1	O_2	1e4.	13939.	0.75	D
2	OMe.	262	251565.	13.49	1
3	Meta	346	14117.	0.76	1
4	Para	365	92072.	4.94	1
5	2,6	386	14918.	0.80	2
6	2,4 and 2,5	417	363733.	19.51	2
8	2,3'	497	126874.	6.80	2
9	2,4' + 2,5'	535	527878.	28.31	2
10		636	7748.	0.42	
11	2,5,2'	668	126316.	6.77	3
12	3,3'	705	8334.	0.45	2
14	3,4'	737	10228.	0.55	2
15	4,4'	791	76960.	4.13	2
16	2,3,2'	832	43263.	2.32	3
17	2,5,4'	898	125928.	6.75	3
20	3,4,2'	992	45372.	2.43	3
		1032	487.	0.03	3
23		1117	14995.	0.80	

DSW 150399

GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

AROCLOR 1130 BLEND 1 C-2618

Comp.	RT	AREA	AREA PRCNT	Q No.
1	183	9129.	0.26	0
2	261	403443.	11.49	1
3	344	25374.	0.72	1
4	364	150118.	4.28	1
5	384	28278.	0.81	2
6	415	592285.	16.87	2
7	495	212972.	6.07	2
8	532	860012.	24.49	2
	X 563	195.	0.01	
	X 565	554.	0.02	
	X 569	1536.	0.04	
10	633	23512.	0.67	
11	667	275005.	7.83	3
12	700	52240.	1.49	2
13	735	45603.	1.30	2
14 4.0	795	259713.	7.40	2
15	832	149264.	4.25	3
16	899	263668.	7.51	3
17	990	99130.	2.82	2
18	1030	8364.	0.24	
19	1088	8027.	0.23	
	1091	1164.	0.03	
20	1114	41558.	1.18	

DSW 150400

GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

AROCLOR 1130 BLEND 2 C-20 M

	RT	AREA	AREA PRCNT.	GP NO.
1	186	10120.	0.29	0
2	266	446790.	12.80	1
3	351	30078.	0.86	1
4	371	171821.	4.92	1
5	391	37609.	1.08	2
6 7	423	658376.	18.86	2
8	505	234223.	6.71	2
9	543	948001.	27.16	2
	577	1329.	0.04	
10	646	23041.	0.66	
11	680	296498.	8.50	3
12	714	49188.	1.41	2
13	749	46505.	1.33	2
	X 787	3613.	0.10	
15 4,4'	808	261034.	7.48	2
16	847	128331.	3.68	3
17	910	109785.	3.15	3
20	1006	31579.	0.90	3
21	1044	1747.	0.05	

DSW 150401

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GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

AROCLOR 1130 BLEND 1 M.L. CR-150618 C-2[illegible]

Comp.	RT	AREA	AREA PRCNT	Cl No.
1 [illegible]	183	6674.	0.24	0
2	261	343010.	12.45	1
3	344	16740.	0.61	1
4	363	99118.	3.60	1
5	383	21113.	0.77	2
6	414	497456.	18.05	2
7	493	175987.	6.39	2
9	529	724059.	26.27	2
10	631	8417.	0.31	
	632	5064.	0.18	
11	664	231263.	8.39	3
12 13	698	35374.	1.28	2
14	732	32089.	1.16	2
15 - 4[illegible]	785	100809.	3.66	2
16	827	120635.	4.38	3
17	894	224489.	8.15	3
20	985	77847.	2.82	3
21	1024	2452.	0.09	
22	1026	1277.	0.05	
	1085	2663.	0.10	
23	1110	29466.	1.07	

DSW 150402

STLCOPCB4039843

GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

AROCLOR 1260 BLEND 2 M.L. OR-150618

	RT	AREA	AREA PRCNT	I NO.
1	182	6797.	0.25	0
2	261	488541.	13.79	1
3	344	26830.	0.76	1
4	363	134417.	3.79	1
5	383	29361.	0.83	2
6	414	738946.	20.85	2
8	494	256644.	7.24	2
9	531	1045326.	29.50	2
10	651	17789.	0.50	
11	665	331815.	9.36	3
12	697	42914.	1.21	2
14	731	41004.	1.16	2
15	785	117677.	3.32	2
16	827	134404.	3.79	3
17	889	110524.	3.12	3
20	982	18887.	0.53	3

DSW 150403

STLCOPCB4039844

GC DATA REDUCTION FROM PAPER TAPE LOGGING

INSTRUMENT INFOTRONICS INTEGRATOR

BLEND 1 CRYSTALS CR-150618

	RT	AREA	AREA PRCNT	K No.
1	181	1967.	0.09	0
2	257	87896.	4.01	1
3	341	2419.	0.11	1
4	360	232115.	10.60	1
5	380	4449.	0.20	2
6	408	127415.	5.82	2
7	485	42225.	1.93	2
8	526	197225.	9.01	2
9	627	3073.	0.14	
10	653	60114.	2.74	3
11	659	5154.	0.24	2
12	694	3158.	0.14	2
13	726	19755.	0.90	2
14	794	1274933.	58.21	2
15	820	39121.	1.79	3
16	881	69310.	3.16	3
17	976	19781.	0.90	3

DSW 150404

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