Monsanto

FROM (NAME & LOCATION) W. R. Richard - Research Center

DATE May 22, 1970

cc: D. A. Olson DOLSO
H. S. Bergen HBERG
L. R. Stark
P. D. Fowlkes

SUBJECT AROCLOR 1232 REPLACEMENT

REFERENCE HSB to WRR, 5/20/70

TO : J. R. Savage - JSAVA

Howard Bergen has asked for a biodegradable Aroclor 1232 which will not crystallize. One suggestion was to blend Aroclor 1236 with Aroclor 1221.

Crystallinity in blends of the di- and tri chlorinated biphenyls is due principally to the 4,4'-dichlorobiphenyl isomer. Listed below are the 4,4' contents of various Aroclor 1200 series compositions.

	4,4'-dichlorobiphenyl	Crystallinity R.T.
Aroclor 1221	3.2%	None
Aroclor 1230	4.7%	
Aroclor 1232 (direct chlorination)	7.0%-8.0%	Crystallizes
Aroclor 1232 (direct chlorination isomerized $AlCl_3$)	6.0-8.0%	"
Aroclor 1232 (1221/1246 Blend)	2.5%	None
Aroclor (1236 1237)	6.6%	Crystallizes
Aroclor 1239	?	None
Aroclor 1242	1.8%	None

	4,4' Content	Temp.
Aroclor 1232	7.7%	25°C Crystallizes
	3.6%	0°C equilibrium l/s
	3.2%	- 9.5°C equilibrium l/s

To make an Aroclor 1232 which does not crystallize we need a composition with <4.0% 4,4'-dichlorobiphenyl and preferably one with ca. 3.0%.

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The blend of Aroclor 1237 and 1221 will have a 4,4' content of 5.6% and the 100% Aroclor blend almost certainly crystallizes on standing. For blends with oil the solubility of the 4,4'-dichlorobiphenyl should be checked if we know the approximate compositions of oil and Aroclor used. Possibly Wynn Oil and Radiator Specialties would test these formulations. We will work with N. Johnson.

The only Aroclor which has shown moderate biological degradation with typical river water bacteria is Aroclor 1221. This rate is 1/20 or less that of soft alkylbenzene sulfonate. Aroclor 1242 was refractive under these conditions. Aroclor 1232 by direct chlorination and Aroclor 1232 D.C. isomerized have not been run. The 4,4'-dichlorobiphenyl isomer is resistant to biodegradation.

Based on what we know now, Aroclor 1221 seems to be the best immediate answer. We will check swell content of rubbers with Aroclor 1221 and with Aroclor 1221/hydrocarbon oil blends.

Aroclor 1232 direct chlorination is less attractive than Aroclor 1221, with questionable crystallinity on standing.

The Aroclor 1236/Aroclor 1221 blend will be tested for crystallinity in an oil blend but may give problems.

WR.

W. R. Richard

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