

Monsanto

FROM (NAME & LOCATION)

A. W. Morgan - St. Louis Organic Research

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CC: M. W. Farrar Res. 1
J. R. Darby Res. 1
R. H. Mills Res. 3
J. A. Cannon Res. 3
A. W. M. Coaker Res. 3
C. S. Shull Res. 3

SUBJECT : β -Phenoxy Benzyl Phthalate
Aroclor Replacement Polysulfides

REFERENCE :
TO : N. W. Touchette
Res. 3

copied for F.G. Sutton

Initial evaluations of β -phenoxy benzyl phthalate as a potential Aroclor replacement in polysulfide sealants have been completed. Excellent grind and flow properties have been found and, from a working standpoint, the β -phenoxy ester is exceptionally good. Both Aroclor 1254 and the β -phenoxy material form well bodied pastes with low sag. Pastes utilizing Santicizer 261 or Santicizer 278 demonstrated considerable sagging and latched body. Results of the evaluations were as follows:

Resin	1	2	3	4
Formula: Thiokol LP 32	100	100	100	100
Carbon Black (Stalex F 12)	30	30	30	30
S-261	25			
Aroclor 1254		25		
β -phenoxy benzyl phthalate			25	
S-278				25
Catalyst: Lead Dioxide	50	50	50	50
Stearic Acid	5	5	5	5
S-261	45			
Aroclor 1254		45		
β -Phenoxy benzyl phthalate			45	
S-278				45
Blend: Resin 100				
Catalyst 15				

Cure Times: Aroclor 1254/ β -Phenoxy Benzyl Phthalate 4-5 hours
Santicizer 261/Santicizer 278 15-45 minutes

Plasticizer	Shore A Hardness	Tensile PSI	100% Modulus PSI	% Elongation	24 Hour Charcoal Volatility	Water Absorption % Absorbed	% Lost
S-261	16	197	53	650	3.3%	1.50	0.60
Aroclor 1254	30	305	92	700	11.0%	1.20	0.46
β -Phenoxy benzyl phthalate	24	247	70	600	1.97%	1.77	0.83
S-278 (A2 12/25/69)	22	244	61	650	1.7%	1.78	0.67

This compares favorably with earlier data.
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It is seen that β -phenoxy benzyl phthalate gives essentially Santicizer 278 properties with Aroclor 1254 working characteristics. A less efficient ester might be desired as the plasticizer is often added to cheapen the formulation. The tetrachlorophthalate analogue might be less efficient, however, it would appear that biodegradability must be determined before any product containing aromatic chlorine is promoted. Otherwise we may find ecological problems similar to those of the Aroclors.

From this evaluation it is felt that β -phenoxy benzyl phthalate and its analogues hold enough technical promise to warrant a more general and thorough evaluation. This evaluation will be completed in one month.

Considering the possible need for such a compound it is recommended that a reasonable cost study be made based on purchased and manufactured β -phenoxy ethanol. C. S. Shull has pointed out that we are basic in phenol, benzyl alcohol, and phthalic anhydride and use large quantities of ethylene oxide, all at reasonable costs. Manufacturing reportedly has an available facility for preparing β -phenoxy ethanol. It appears that considerable flexibility is possible in determining routes to this product, and it is hoped that costs for other analogues, including that one made with 711 alcohol, may be considered.

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