

**PROGRESS REPORT**  
ORGANIC CHEMICALS DIVISION  
RESEARCH DEPT. - ST. LOUIS, MO.

POLYSULFIDE  
SEALANT F

|                                                                   |                                 |               |                 |                    |
|-------------------------------------------------------------------|---------------------------------|---------------|-----------------|--------------------|
| REPORTED BY<br>N. W. Touchette<br>→ A. W. Morgan<br>D. S. Moorman | FOR<br>Sept. 1969               | DETAILS<br>No | REPORT NO.<br>2 | PROJECT<br>PLAS-55 |
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PROJECT TITLE

EXPLORATORY AND FUNDAMENTAL STUDIES ON PLASTICIZERS

PROJECT OBJECTIVE

To develop plasticizers low in volatility and water sensitivity for calcium carbonate filled Thiokol polysulfide rubber sealant formulations.

Summary

Calcium carbonate filled polysulfide rubber formulations suffer from severe water sensitivity problems. A series of Monsanto commercial and experimental plasticizers were tested in a typical formulation to determine if any significant performance variations could be isolated. From the data obtained it appears that no plasticizer tested totally eliminated the problem but Santicizer 278 was generally the best material screened.

Plasticizers tested were:

Santicizer 278  
Santicizer 261  
Santicizer 160  
Santicizer 902  
Aroclor 1260  
Aroclor 1254  
Chlorowax 500  
HB 40  
Bis(4-chlorobutyl) adipate  
Bis(4-chlorobutyl) phthalate

The general formulation used was:

|          |                              | PHR       | Formulation |
|----------|------------------------------|-----------|-------------|
| Resin    | Thiokol LP-32                | 100       | 100         |
|          | Plasticizer                  | 15 and 40 |             |
|          | Non-coated CaCO <sub>3</sub> | 40        |             |
| Catalyst | Lead Dioxide                 | 50        | 15          |
|          | Stearic Acid                 | 5         |             |
|          | Sl60 or S902                 | 45        |             |
|          | Sulfur                       |           | 0.1         |

The following points may be emphasized:

1. No system showed exceptional water resistance but Santicizer 278 and Chlorowax 500 were the best. Chlorowax 500 is incompatible in the Thiokol miscibility test.
2. When the samples are immersed in water, elongation and tensile increase but modulus decreases.
3. The Thiokol volatility specification is quite mild when run by their test method. If this specification is kept Aroclors now used should have little difficulty in meeting volatility requirements. Fogging is still an issue, however.
4. Probably the best method for attacking this problem would be by studying plasticizer/particle adsorption. If a plasticizer is found which selectively coats CaCO<sub>3</sub> to protect it from water, the problem could be greatly reduced.

*A W Morgan*

A. W. Morgan

*D. S. Moorman*

D. S. Moorman

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