

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT
JOHN C. MACKIE, COMMISSIONER

February 2, 1959

To: C. J. Olsen

From: E. A. Finney

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Subject: Spectrophotometric Identification of Membrane Curing Compounds
Research Project 57 G-83. Research Laboratory Report No. 305.

Reported by: M. H. Janson

In response to a request dated July 2, 1958, 20 samples of membrane curing compounds were transmitted with your letter of July 16, 1958, to this laboratory. These had been received at Ann Arbor since April 16, 1958. In addition a curing compound sample was received on July 30, another on August 19, and two samples on September 16, 1958. This group of four samples was submitted with a request to test for wax.

For convenience this report will describe the test results on the group of four samples and then the group of 20 samples. All samples are identified in Table 1 which lists the East Lansing Laboratory number, then the Ann Arbor Laboratory number, the producer, batch number, type, and waxy materials content.

Test results of the four-sample group

A white-pigmented concrete curing compound identified as Permite, batch No. 6 POM-7821, received July 31, 1958, was given Laboratory No. 58 MR-131 (Table 1). Infrared spectrophotometric examination of the vehicle solids indicated the presence of wax. A waxy material was isolated by solvent extraction of the vehicle solids, and subsequent quantitative analysis indicated the presence of 15 percent waxy materials in the vehicle solids. An infrared spectrum prepared for quantitative estimation of waxy materials indicated the presence of 16 percent waxy materials. The presence of waxy materials in this sample was reported by phone to your office on July 31, 1958.

Another white-pigmented concrete curing compound identified as Permite, PM60 batch No. 6 POM 7829A, received August 19, was given Laboratory No. 58 MR134. Infrared spectrophotometric examination and solvent extraction of the vehicle solids confirmed the presence of waxy material. This result was phoned to your office on August 19. Quantitative estimation by the infrared technique indicated the presence of 17 percent waxy materials and by solvent extraction, 16 percent.

On August 26, R. J. Pellman of Aluminum Industries, Inc., submitted for wax test a sample of the resin which is used in formulating Permite. Infrared examination and solvent extraction of the resin confirmed the presence of waxy materials. The waxy material was considered a plasticizing agent. It was learned that this plasticized resin had been used by Aluminum Industries in all 1958 production of white pigmented curing compounds to this date.

Two white-pigmented concrete curing compounds, identified as Permite batch No. 6POM 7829A and batch No. N6POM 7829B, were received September 16 and were given Laboratory Nos. 58MR143 and 58MR144 respectively. It should be noted that sample Nos. 58 MR134 and 58 MR143 carried the same batch number (Table 1).

A waxy material was identified, isolated from each sample, and reported to your office by telephone. Samples 58 MR143 and 58 MR144 were found to contain 17 and 19 percent waxy materials respectively by the infrared technique, and 17 and 18 percent by the solvent extraction technique.

A sample spectrum typical of the vehicle solids spectra obtained from this group of samples is included to illustrate the basis for estimation of waxy materials. Solvent extraction of the waxy material and infrared examination

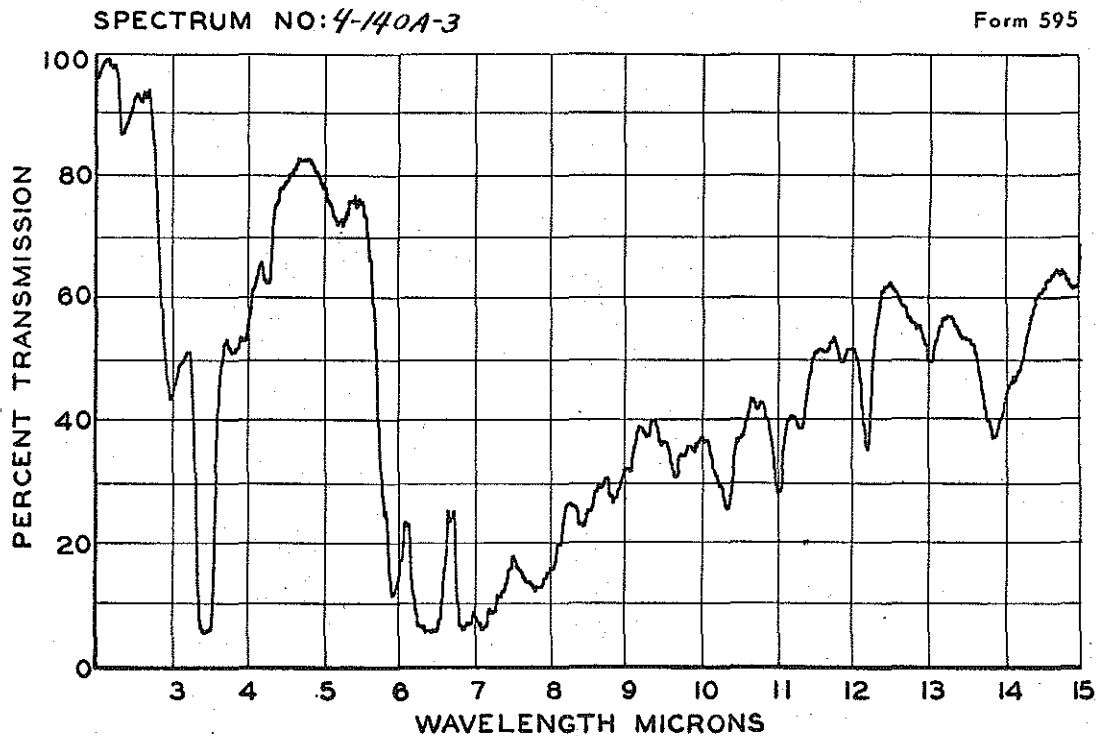


Figure 1. Sample Spectrum

of the waxy material and the wax-free resin indicated that the absorption maximum at 5.9 could be attributed to the wax-free resin and the absorption maximum at 13.75 to the waxy material. Peak depths were measured from a reproducible base line and the ratio of the depths determined at 13.75 to 5.9. A series of ratios were obtained from mixtures containing known quantities of waxy material and wax-free resin, using the products of the solvent extraction to prepare the mixtures. A calibration curve was prepared from a plot of peak ratios versus wax concentration, and used to estimate wax content in the curing compound samples.

Test results of the 20-sample group

Infrared spectra of the vehicle solids were recorded and the presence of waxy materials was suspected in Sample Nos. 58 MR110, 113, 114, 116, 117, 118, 120, and 122.

Solvent extraction of the Permite samples 58 MR110, 113, 114, 117, and 118, was omitted because the infrared spectra obtained from these samples were similar to those obtained from samples in the group of four Permite curing compounds described above, and because it had been learned that the same resin was used throughout the year by Aluminum Industries, Inc. Solvent extraction verified the presence of waxy materials in 58 MR116, 120 and 122 and the absence of waxy materials in 58 MR109, 111, and 127. The latter samples were considered representative of the curing compounds supplied by these respective manufacturers. Sample 58 MR115 was checked by solvent extraction because it represented a transparent curing compound supplied by Aluminum Industries Inc. Solvent extraction verified the absence of waxy materials. Results of the wax determinations are listed in Table 1. Infrared results were obtained from qualitative infrared spectra, and therefore, agreement between results was not expected.

Samples of all subsequent shipments this year as mentioned in your letter of July 16, 1958, would be appreciated.



E. A. Finney, Director
Research Laboratory Division

EAF:MHJ:sw

cc: W. W. McLaughlin
F. E. Legg

TABLE 1

IDENTIFICATION OF MEMBRANE CURING COMPOUNDS

Laboratory Number		Producer	Batch No.	Type	Wax Content, Percent	
East Lansing	Ann Arbor				Infrared	Chemical
58 MR131	58 CH448	Aluminum Industries, Inc.	6POM-7821	White Pigmented	16	15
58 MR134	58 CH566	Aluminum Industries, Inc.	6POM-7829A	White Pigmented	17	16
58 MR143	58 CH697	Aluminum Industries, Inc.	6POM-7829A	White Pigmented	17	17
58 MR144	58 CH698	Aluminum Industries, Inc.	N6POM-7829B	White Pigmented	19	18
58 MR109	58 CH119	Artco, Inc.	1-58	White Pigmented	--	--
58 MR110	58 CH137	Aluminum Industries, Inc.	11704	White Pigmented	9	--
58 MR111	58 CH146	Murphy-Phoenix	M-63	White Pigmented	--	--
58 MR112	58 CH184	Murphy-Phoenix	M-64	White Pigmented	--	--
58 MR113	58 CH218	Aluminum Industries, Inc.	None Given	White Pigmented	6	--
58 MR114	58 CH230	Aluminum Industries, Inc.	PM-60-11704	White Pigmented	9	--
58 MR115	58 CH231	Aluminum Industries, Inc.	V167-400	Transparent	--	--
58 MR116	58 CH233	Truscon Laboratories	None Given	White Pigmented	44	56
58 MR117	58 CH234	Aluminum Industries, Inc.	6POM-5822	White Pigmented	8	--
58 MR118	58 CH235	Aluminum Industries, Inc.	6POM-5822A	White Pigmented	14	--
58 MR119	58 CH241	Murphy-Phoenix	M-17	White Pigmented	--	--
58 MR120	58 CH259	Truscon Laboratories	2281J	White Pigmented	56	50
58 MR121	58 CH328	Murphy-Phoenix	M-85	White Pigmented	--	--
58 MR122	58 CH339	Horn Company, Inc.	682-83	White Pigmented	40	36
58 MR123	58 CH343	Murphy-Phoenix	MC-8	Transparent	--	--
58 MR124	58 CH360	Artco Inc.	13-58	Transparent	--	--
58 MR125	58 CH366	Truscon Laboratories	2070 K	White Pigmented	--	--
58 MR126	58 CH368	Artco Inc.	12-58	White Pigmented	--	--
58 MR127	58 CH380	Swift and Company	8184	White Pigmented	--	--
58 MR128	58 CH381	Swift and Company	8177	Transparent	--	--