

"INDEXED" *rec*

Mr 18'53

Philadelphia Laboratory
October 4, 1946

MEMORANDUM REPORT NO. M-78

RETURN TO MARSHALL LABORATORY LIBRARY

ACETYLATED PHENOLIC RESINS IN FLOOR ENAMELS

REFERENCE COPY
NOT FOR CIRCULATION

Acetylated phenolic resins have been submitted by Dr. Sorenson for evaluation in floor paints. They were to be evaluated against pentaerithritol, chlorinated rubber formulas, the pre-war Porch and Deck enamel, the war time Interior Floor Enamel and Acid and Alkali paints.

Summary & Conclusions:

Enamels were made up using a pigmentation similar to that of the prewar Porch and Deck Dark Stone. The vehicles were made with linseed oil acids and phenolic gums by Dr. Sorenson using the acetic acid process. Gums used were para-tertiary, butyl, phenol, and high and low molecular weight straight phenol formaldehyde.

These resins make good floor enamels which are superior in alkali resistance to pentaerithritol alkyd enamels and are equal to acid and alkali paints made with VC-7738, a CWO phenolic varnish.

They are tack-free in 6 to 8 hours which is somewhat longer than the 3 to 4 hours required by the pentaerithritol enamels being used in the new "DULUX" Interior Floor enamel.

Application properties, film properties and the can stability are satisfactory.

The cost of an acetylated linseed oil resin will probably be less than that of VC-7738, the chinawood oil phenolic so a substitution for VC-7738 in the acid and alkali line should be considered when production facilities are available.

Details:

Enamels were made using a pigmentation of enamel lithopone, TiPure R-110 and Silux in the ratio 47:15:38 respectively and at a pigment volume of 29%. Driers were 0.01% cobalt and 0.5% lead on the oil. Skinning inhibitor, VH-7552 at 1-1/2% based on

the resin solids was used. To prevent settling and flooding, 0.1% soya lecithin on the pigment is included in the composite "45 Process" pebble mill grind.

Pentaerythritol resins when formulated as floor paints have potential enough to dry through in 3-1/2 hours. However, this is more than is need in most cases and the acetylated phenolic formulas have tack and hard dry potential sufficient for a satisfactory floor paint. They are ready for light traffic when they are tack-free, that is, in 6 to 8 hours.

These resins have a tendency to promote settling and flooding. However, 0.1% soya lecithin in a "45 Process" grind assists in the dispersion so much that after a four month storage, an enamel made this way has not settled to form either mud or a cake. This same product is satisfactory for flooding and shows slight brushmarks in thin films. The enamels are not gummy and do not sag as much as Forch and Deck enamel. This same sample after 4 months storage has not skinned or bodied.

It is a characteristic of these resins to impart a high gloss.

A sample of para-tertiary butyl phenol enamel has been given out as a field test to J. O. Ewart. He has brushed this out on his basement floor and reports that it is dry to walk on in less than 9-1/2 hours, and has good brushing properties, but floods. (Since this test, flooding was improved as described above.) Another sample was given to Dr. H. H. Hopkins for his screened porch. This porch has a cement floor and is exposed to the weather. Unfortunately a couple hours after the enamel was applied it began to rain and the rain drops were probably broken up into mist by the screens but were not kept out. The enamel has developed minute craters which are concentrated in areas most exposed to the weather, probably as a result of the rain since similar craters were formed by droplets of water on panels in the lab. Poor adhesion was noticed on the step leading from the kitchen. The room in the house most likely to be waxed is the kitchen and this step. Since adhesion on the step leading into the parlor and on the porch floor was good, it is assumed that wax was responsible in the areas where poor adhesion was encountered. Poor adhesion over waxed surfaces was obtained in the laboratory with the control floor enamels as well as this one.

A table of results is attached and details of formulations may be obtained from laboratory Notebooks No. 2974 and 3027.

PHILADELPHIA LABORATORY

William C. Johnson
W. C. JOHNSON

WCJ-mhl

TABIE I

<u>Code</u>	<u>P.V</u>	<u>Vehicle</u>	<u>Tack-free Sward Rocker</u> <u>Time</u>	<u>Reading</u> <u>a</u>	<u>Mech.</u> <u>Thumb</u> <u>b</u>	<u>Hot Cem.</u> <u>Resist-</u> <u>ance</u>	<u>Tensile %</u> <u>Strength Elong</u> <u>c</u>
P-100-P-55961	29	H.M.W./LOA Resin	6	5	good		0.9 20
P-100-P-55962	29	P.T.B.P/LOA Resin	8	4	good		1.2 10
631-901	22	RC-273/G-234	8	2	bad	22 hrs.	1.1 40
P-100-P-55945	29	10% Parlon X/PE/SBO A	4	5	good		1.2 20
P-353-P-72613	17	CWO phenolic				2 weeks	
P-100-P-72614	17	LOA/P.T.B.P.				2 weeks	
P-100-P-58180	22	10% Parlon X/PE/SBOA				22 hrs.	

a. 0 = soft, 10 = 40 Rocks when glass = 100 after overnight dry.

b. 45#/sq. in. through a slow cycle (16 hr. dry)

c. after 2 days dry.

H.M.W. - High Molecular Weight Phenolic.

P.T.B.P. - Para-tertiary Butyl Phenol