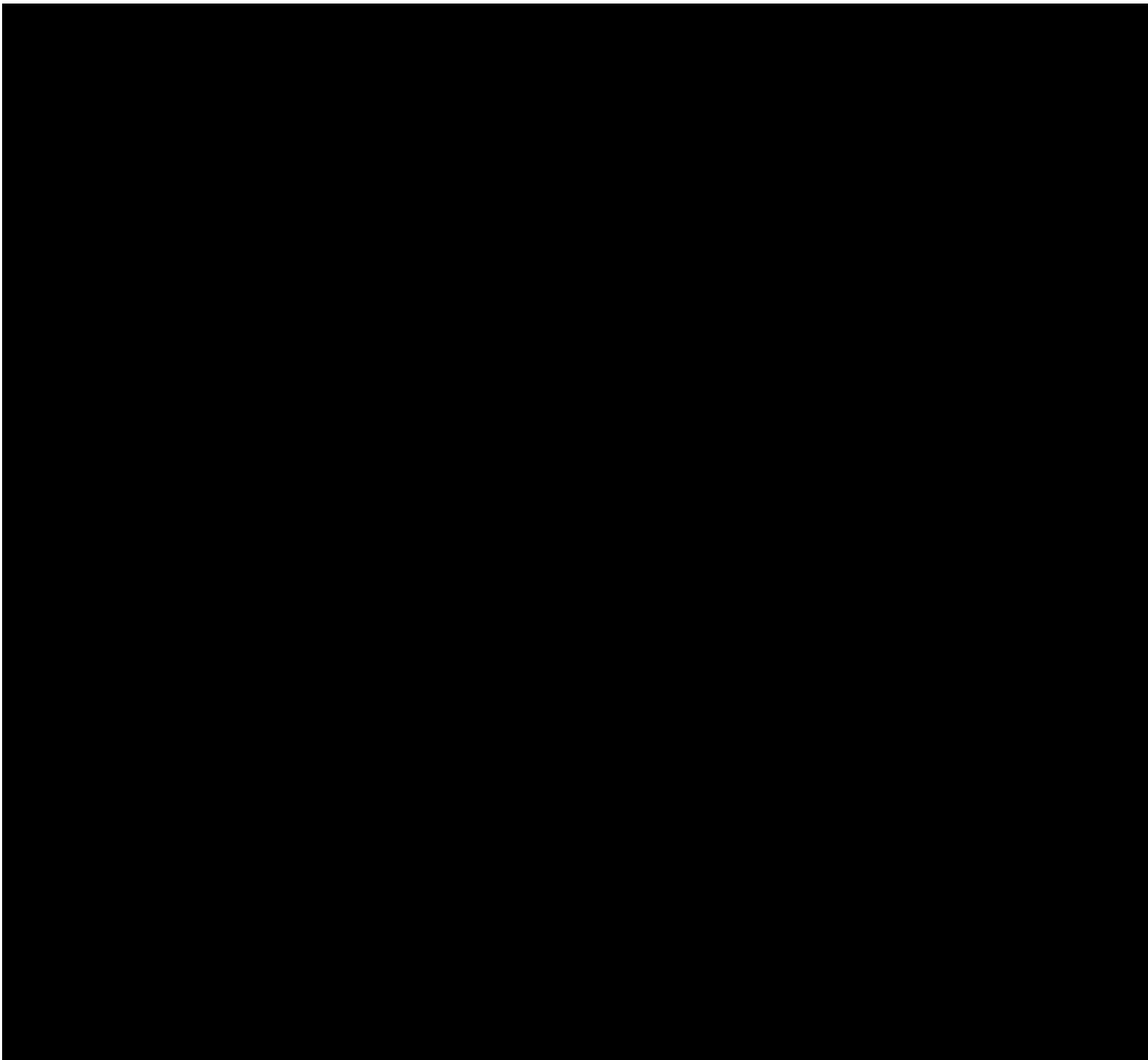

Subject: Exterior Emulsion Paint

Contributors: Richard M. Holsworth, Earl E. Saville

Objective: TR2205E3 - To improve Exterior Emulsion Paints

Summary:

1. Rhoplex AC-34, Rohm & Haas Co., is being evaluated in a primer and a finish coat. Eagle Picher # 202, basic silicate white lead, reduced Cedar stain transfer to the finish coat when used in the primer.

2. Busan 11, zinc oxide, and lead silicate are being studied for can stability and exterior exposure.

3. ERL-1167, styrene acrylic, was selected as the base latex for further studies of hydrophile-free paints. With Rhoplex T-123 all properties were satisfactory except shelf life.

4. A new series of Emulsion Polymer Thickeners has indicated that the choice of surfactant is critical.

Future Work:

1. Evaluate Busan 11 and zinc oxide with acrylic emulsions.

2. Continue work on reactive pigments to develop better storage stability especially with styrene-acrylates.

3. Continue work on styrene-acrylate latices to improve the viscosity stability with Emulsion Polymer Thickeners.

4. Improve the mechanical stability of paints made with EPT latices or develop a fast viscosity recovery after agitation.

5. Continue studies on the influence of inerts on hydrophile-free paints.

6. Make full line of colors with Emulsion Polymer Thickeners.

7. Check rust inhibitors.

8. Continue work on modification of latex with a vehicle that would polymerize or oxidize for improved durability on wood.

9. Modify latex paints with penetrating drying vehicles to improve chalk binding.

10. Check water reducible acrylics with Emulsion Polymer Thickeners.

11. Improve film build of water reducible paints to eliminate uneven texture of the substrate.

12. Test effect of tint bases on hydrophile-free paints.

13. Continue work on improving mixing procedures of hydrophile-free paints.

14. Study feasability of thickening acrylic, styrene-butadiene, and polyvinyl acetate paints with Emulsion Polymer Thickeners.

15. Develop equipment for low temperature filming and low temperature blister and cracking studies.

Discussion:

1. Rhoplex AC-34

Rhoplex AC-34 was evaluated as the vehicle in a primer and a finish coat.

A 28 PVC primer was made using titanium dioxide, calcium carbonate and mica as the pigment system. The wood staining on Cedar was so severe the paint was not acceptable. On substituting Eagle-Picher # 202, basic silicate white lead, for a portion of the inerts, the stain transfer to the finish coat was practically eliminated.

A 35 PVC exterior paint with AC-34 was placed on exposure both at Elmwood and New Orleans.

2. Reactive Pigments

Latex paints containing Busan M-11 and zinc oxide have been exposed in New Orleans for mildew studies.

The Busan-containing paints made with Lytron X-684, QP-4400, and stabilized with Daxad 30 and Igepal CO-630 have increased in viscosity slightly indicating some instability of the latex in the presence of Busan.

The stability of the paint made with Lytron X-684 and zinc oxide and stabilized with tetrapotassium pyrophosphate and Igepal CTA 639 is not satisfactory. The paint made with Victamide and Igepal CTA 639 has maintained viscosity and stability to date.

GL D011781

3. Hydrophile-Free Paints

The Quarterly Research Report, Fourth Quarter, 1960, First and Second Quarter, 1961, reported the use of Rhoplex T-123, Rohm & Haas Co., and some Emulsion Polymer Thickeners made by the Resin Emulsion Laboratory. These paints had good leveling properties and a decidedly improved water resistance.

The Emulsion Polymer Thickeners (includes T-123) were assumed to give most of the thickening properties. However, a review of previous data indicate the base latex supplies a large portion of the gelling properties.

ERL-1140, a styrene acrylate, stabilized with 2.0 parts ammonium soyate per 100 parts monomers, formed a gel easily when mixed with Rhoplex T-123, and produced a stable paint viscosity. However, the Resin Emulsion Laboratory felt this latex would present a production problem in storage and handling. A series of latices, ERL-1149, 1150 and 1151 with 3.0, 4.0, and 5.0 parts of ammonium soyate respectively, was made. These latices did not produce a gel in the finish paint with Rhoplex T-123. The affect of the additional soap was checked in two ways. A blend of ERL 1140 and 1149 to give 2.5 parts soap gave a very slight gel. Also addition of 0.5 parts ammonium soyate to ERL-1140 reduced the gelling action to very slight, resulting in a low viscosity paint. RCR-0214, containing 2.5 parts ammonium soyate also produced a slight gel.

Another series of latices was checked and ERL-1167 was selected as the best latex to give the necessary viscosity and also latex stability. ERL-1167 is stabilized with 2.5 parts of ammonium soyate and the acrylamide was reduced from 2.4 to 2.0 parts. Paints made from this latex have gelled satisfactorily and have good water resistance.

ERL-1167 was accepted for further studies. A ratio of 73 parts to 27 parts Rhoplex T-123 gave a good viscosity in white paints at 45 PVC. Paints have been exposed on panels and on test houses.

Normally paints thickened with emulsion polymer thickeners have increased in viscosity for several weeks and then become stabilized. To date the viscosity of ERL-1167 paints is still rising and there are indications of a continuing rise.

Initial studies indicate the inerts and the amounts of inerts have an appreciable influence on the application and flow properties. A program has been started to evaluate the affect of inerts on the rheological properties.

The blister and crack resistance of these paints have been very satisfactory.

4. Emulsion Polymer Thickener (EPT)

Considerable work has been done to determine the amount of Rhoplex T-123 to give optimum gel. The tests have indicated the Rhoplex T-123 should be 25 to 30 % of the total latex (T-123 included). At this level the brushing and leveling properties are the best.

A new series of Emulsion Polymer Thickener was made by Mr. Visger. These latices were substituted for Rhoplex T-123 in a 45 PVC paint with ERL-1167-3 as the base latex.

1214-45, 7 % methyl acrylic acid, emulsified with 2 parts Alipal CO-436 1214-49, 5 % methyl acrylic acid emulsified with 2 parts Alipal CO-436.

1214-49, 5 % methyl acrylic acid emulsified with 2 parts Alipal CO-436.

1214-50, 5 % methyl acrylic acid, redox polymerization emulsified with 2 parts Alipal CO-436.

These latices formed gels very rapidly when mixed with ERL-1167-3 but thinned on adding grind and the remainder of the water. These paints are too thin.

1214-5, 7 % methyl acrylic acid, emulsified with 3.4 parts Alipal CO-436, gelled very rapidly and maintained the gel after the grind and water was added. This paint was too heavy to be useable.

Another series with different surfactants is under study but there are no results to date.

Subject: W-249 (SW's 18M, 18 % Leaded Zinc Oxide) in Y-1800 and Y-1867, TR4203E2.

Contributors: J. E. Southwick, R. W. Green, J. Bednarik

Objectives: To compare standard leaded zinc oxides (W6, W35, W1) versus SW 18M.

Conclusions and Recommendations: We are now using 18 M (W-249) in Y-1800 and are obtaining approximately 15¢/gallon cost savings. At the end of 10 months exposure in New Orleans we recommend that the Imperial formula (Y-1867) be converted to use W-249 with a cost savings of approximately 11¢ per gallon.

Detailed Results: The following paints have been exposed in New Orleans, vertical north and south, one coat over Y-1851.

Panel #	Paint	Pigment	Checking	Mildew	Chalk	Gen. Appearance
174 south	Y-1867	W-6 (std.)	10	10	5	9
174 North	"	"	10	8	6	6
175 south	"	W-35, W-1	10	10	5	9
175 north	"	" "	10	7	6	8
176 south	"	W-249 (18M)	10	10	5 1/2	9
176 north	"	" "	10	6	6	7
177 south	Y-1800	W-1, W-35 (std.)	10	10	5	9
177 north	"	" "	10	5	-	5
178 south	"	W-249 (18M)	10	10	5	9
178 north	"	" "	10	4	-	4

All paints were formulated to have equal zinc oxide content and where lead sulfate is lowered, as in the case of W-249, inert is replaced on an equal oil demand basis.

ELMWOOD RESEARCH CENTER
QUARTERLY RESEARCH REPORT
THIRD QUARTER, 1961

Subject: Polyurethane

Contributors: H. W. Holkesvig, A. Zier

Objectives:

1. Determine how to prepare reproducibly the oil modified urethane systems. - RX3201-Q3

Summary:

1. Factors involved in the processing of oil modified urethane systems have been defined to insure reproducibility. As a result the linseed oil - PE version, RCR-5051, is being extensively tested for floor finish and satin finish varnish.

Discussion:

1. The factors found to be most important in reproducing oil modified urethane systems include:

   a. Alcoholysis reaction and catalyst. Lead is not a good choice, calcium naphthenate is best.

   b. PE is most difficult polyol to use due to its tendency to precipitate out of solution upon cooling below 220°F.

   c. Addition of TDI directly to alcoholysis product prior to any solvent addition is advantage in obtaining clear products.

   d. Use of tin or lead as a catalyst for urethane reaction insures prompt attainment of zero NCO content.

   e. Establishing a constant viscosity as endpoint is a useful processing tool for making uniform batches.