



ALLIED RESEARCH BULLETIN

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SUBJECT

TREATED LITHOPONE

Prepared by H. F. Saunders

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ALLIED RESEARCH LABORATORIES

Chicago, Illinois

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TREATED LITHOPONE

Modified or "treated" pigments are now available in four distinct types. The pigments in each type possess a number of characteristics which make them of interest in the control of certain undesirable properties in paints and enamels, particularly those of the low cost formulations.

The exact behavior of a treated pigment in a formulation is very definitely dependent upon the nature of the liquids used; it being possible to accentuate one or more of the special characteristics of the pigment, or, on the other hand, to reduce such characteristic to a point where it is no different from the regular or untreated pigment.

Consequently, performance in formulations in general cannot be predicted, but, knowing the tendencies of each type, a trial in the formula, substituting a treated pigment of the type showing the desired tendency for the untreated pigment will give a lead from which modification in the liquids will be indicated.

TREATMENT TYPES OF LITHOPONE

I	II	III	IV
Miscibility			
Grinding ease		Chemical	
Suspensibility	Wetting	reactivity	Fine texture
Brushing ease	Increased flow	Extra	Increased flow
Retarded flow	Increased gloss	leveling	Increased gloss
Ponolith J types	Albalith #35	Albalith #94	Ponolith #212, #42
Albalith #95 and #106	Permolith #44		Albalith #107
Permolith #12 and #22			

Permolith #12 and Permolith #22 are offered as of the first type of treatment, and correspond to the Ponolith J treatment and the Albalith #95 and #106 in general properties.

In a given formulation the consistency will run approximately that of 461 S, and their use is recommended:

1. To give retarded flow in formulations in which sagging is troublesome.
2. To give increased suspension in the package where settling is a problem.

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3. To reduce costs in low priced formulations, through the general principle that it seems possible in a number of cases to reduce the amount of non-volatile in a formula through their use, or to replace some of the higher priced oil by a certain amount of fish oil or other lower priced oil.

4. To further reduce costs by taking advantage of the greater ease of mixing in the paint mixer and possible reduction of grinding time.

Permolith #24 corresponds to Permolith #22 except that it carries a considerably lower consistency. It may be used straight or as a percentage with Permolith #12 or #22 to reduce consistency.

Permolith #44 is of the second type. It is a low consistency pigment of increased wetting properties, increased flow and increased gloss.

These four pigments, Permolith #12, Permolith #22, Permolith #24 and Permolith #44 are now available to formulators; and the Allied Research Laboratories is anxious to cooperate with the factories for their utilization in formulations where their particular characteristics would be desirable or have merit.

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ALLIED RESEARCH BULLETIN

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SUBJECT

USE OF PULP LITHOPONE IN FLAT WALL PAINTS
OF THE FLAT-TONE TYPE

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USE OF PULP LITHOPONE IN FLAT WALL PAINTS OF THE FLAT-TONE TYPE

December 17, 1935

The technique for the pulping of lithopone has been carefully studied and definitely established for operating practice as summarized in last report No. RC-6, of September 10, 1935.

The pulping procedure determined upon, and as described, has been found by continued experimental work to be the most suitable for reducing the water content of the pulp and consequently of the finished paints to the minimum. It also serves to bring about a surface condition on the lithopone particles which is most compatible with the formulation demands of both flat and semi-gloss paints. In addition, it makes it possible to transmit the pulp through a pipe line.

Pulp products of very satisfactory performance may be obtained by the use of other oils, including the blown oils, but they are open to one or more objectionable features: either (1) they carry such large percentage of entrained water as to be out of the question for quality products; they (2) carry such large percentage of a particular type liquid as to render them acceptable to only a limited number of formulations; or (3) they are of such consistency and character that they do not lend themselves to economical handling in the Lithopone Plant.

These special pulps which have been produced have many desirable characteristics and while they should not be considered for use in the high grade flat wall paints of the Flat-Tone type, they may be utilized in the formulation of special types of flats of the semi-paste and ready-to-use types, where the objections cited above are not important. The high degree of dispersion of the lithopone particles resulting in increased hiding power permits of exceptional economies in formulation.

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Having decided upon the preferable technique of pulping for maximum usage and having established the specifications on the pulped product (BW 150), the thinning of the pulp for flat wall paints has been conducted along two lines of experimental endeavor.

1. Blown Oils

Because of the experience gained during the last ten years, together with the lower cost of this type liquid, a careful study was made of formulations which might utilize the desirable properties which blown oil imparted to the old Flat-Tone.

2. Heat Bodied Oils

The favorable characteristics imparted to Flat Wall Paints by this type of vehicle have been generally recognized and were consequently studied as the second line of investigation.

Attempts to use blown oils as the basic vehicle have been unsatisfactory. They did induce a high degree of ease of brushing, but the paints were short, brush marked badly and lacked wet edge. It was found very definitely that under the limiting conditions imposed by formulation and application, the blown oils increased ease of brushing and retarded flow and leveling, while the use of heat bodied oils gave a high degree of flow, some degree of pull under the brush and increased consistency. The degree of flow imparted to the paint was proportionate to the degree of bodying of the oil. In the ultimate formulation a balance of these two types of oil was utilized through the liquids (798), a very slightly blown linseed oil, and (2301), a liquid made with a 12 - 14 minute bodied oil base.

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In working with the blown oils there appeared to be very little difference in the shortness of the paint under the brush with oils of different degrees of oxidation, the brush marking being excessive in the presence of inert pigments, regardless of the time or degree of the blowing. Of course, it has been impossible to cover the entire field, but the results with the different blown oils investigated have been in such complete agreement that further investigation on this line was abandoned. Attempts to compensate for the shortness by the use of high solvent thinners, Solvesso, Pine Oil, Dipentene, etc. were unsatisfactory. The addition of secondary emulsifiers such as basic lead acetate, calcium linoleate, aluminum naphthenate, excess lecithin, gloss oil, zinc naphthenate, etc. gave but slight improvement, insufficient in proportion to the amount used to warrant their use. Details of the many experiments conducted with the various oils and other materials are available to the proper factory officials and should be reviewed by them when applying the suggested type of formulation to large scale factory operations.

In general, therefore, as far as use of the blown oils is concerned, it may be fairly well stated that for Flat-Tone formulations a small amount of that type liquid may be utilized to produce ease of brushing, and as a balancing control for lower consistency, but that the major portion of the binder in the formulation should be the long-flow, heat-bodied type of liquid typically represented by (2301).

Formula DP 94 is here presented for discussion:

1012 pounds	BW 150
90 "	1552 dry
3-5/8 gallons	(798)
3-5/8 "	(440)
14-1/4 "	(2301)
8-3/4 "	(141)
14-3/4 "	(348)
100 gallons - theoretical yield.	

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Base White 150

81.4%	(by weight)	461 dry
.2		547 "
.9		(2)
.8		(548)
13.9		(348)
1.8		(12)W
<u>1.0</u>		Lecithin
100.		

The earlier Flat Wall productions from the BW 150 and as discussed in the earlier report No. RC-6 carried extremely high opacity in proportion to the quantity of Lithopone present, one pound of lithopone in the pulp being equivalent to nearly 1.25 pounds of regularly dried and processed lithopone. This high opacity, in combination with the high degree of brightness necessitated the use of a much greater quantity of tinting color to match the color card tints of the old Flat-Tone. This was considered objectionable and the formula now presented has substantially overcome this objection by decreasing the amount of lithopone while still retaining a slight, but definite increase in hiding power over the present Flat-Tone.

The use of amorphous silica as 1552 dry as in present Flat-Tone has some well recognized objections, such as higher cost, flow retardation, etc. and attempts were made to use the other more desirable extenders available, such as 20 dry. In order to meet the low angular sheen (flatness) desired, substitutions with other inerts have not been found desirable. If and when a higher degree of sheen is acceptable, a portion of the 1552 dry may be replaced with 20 dry, the sheen increasing in proportion to the replacement.

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To meet the low consistency factor (thinness) insisted upon by the Sales Department, it was necessary not only to sharply reduce the pigment concentration, but to use a lithopone of low oil absorption. It is well established that the pulping process produces a form of pigment tending to settle, since the very means necessary to induce pulp formation are opposed to suspension. It is also known that the lower the oil absorption of lithopone the greater its settling tendency.

Consequently, it must be recognized that a formulation with such basic materials would have a greater tendency toward development of settling troubles in the package. The use of suspending agents has been made in an endeavor to correct this objectionable feature. Unfortunately the suspending agent which past experience indicates as most satisfactory, aluminum stearate, gives heavy consistency and since this heavier consistency is at present considered undesirable, it can be used only in very small amounts. Now experience has also shown that the larger the batch made (heavier equipment) the greater the tendency toward reduction of consistency. Therefore, it would be expected that the consistency of the formula when made in the proposed 1000 gallon pebble mill will be somewhat lower than the laboratory runs. If this proves out, it will permit the addition of a pound or more of aluminum stearate to the 100 gallons, which will materially aid in suspension in the package.

The Lecithin employed acts as a suspending agent and the maximum amount of aluminum stearate compatible with the specified consistency as shown by the small sized paint batches has been added in the formula. Accelerated settling tests to date show a condition similar to that of the present Flat-Tone, both as to quantity and character of the settling, but this point can only be determined

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with certainty by time storage tests. Samples covering the range of experimental endeavor have been set aside for this purpose. Other suspending agents investigated, such as calcium linoleate, zinc and aluminum naphthenates, etc. showed some interesting differences in flow, but no particular advantage from the suspending angle.

For other types of formulation, such as the lower priced flat and semi-gloss paints, which should be of particular interest to several of the affiliated companies, the pulping process can be applied to higher consistency lithopones, such as 461 S and 461 H, so that competitive flat wall paints of the full body type can be prepared with as low as 600 pounds of pulp per 100 gallons (equivalent to about 500 pounds of dry lithopone on a weight basis and 625 pounds on a hiding power basis) producing flats of acceptable hiding power and at a low cost.

In addition, we have found that naphthenate type driers, particularly lead, accentuated early settling. The regular (440) shows most promise. It has been found that gloss oil in conjunction with the naphthenate driers aids somewhat, but that the regular (440), oil type drier is still preferable. Further tests are now under way to extend the study of the relation of drier to suspending qualities as well as further investigation of miscellaneous suspending agents with regards both suspending and flow.

The use of kerosene (141) is dependent on the degree of wet edge considered necessary and perhaps can be replaced entirely with mineral spirits when large production batches are made. This would be desirable as to minimizing danger from "flashing."

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The formulation DP 94 previously given has shown the most satisfactory all-around results. The opacity is slightly greater than old Flat-Tone at the normal spreading rates. The consistency is in line with the request made by the Sales Department for a package consistency usable direct from the can. The flow and leveling are excellent, definitely superior to the old type. Brushing is easy, with less tendency for the brush to "ride" somewhat as appears in the old Flat-Tone. The wet edge is satisfactory. Drying under normal conditions is very slightly faster than on old Flat-Tone, and the film after 12 hours is somewhat harder.

In the DP 94 the brightness has been left as that obtained directly from the material without addition of blue or other agent to effect a lowering of brightness. A slight reduction in brightness would seem to be indicated as desirable, since it would assist in making the tinting with color more in line with the experience acquired with old Flat-Tone. This may easily be done by addition to the production batches and the decision should be made at that time in consultation with the Sales Department.

As compared with old Flat-Tone the pigment/inert ratio of DP 94 has not materially altered, the 1552 dry being 9.95% of the total dry in the old formula against 9.84% in the DP 94. Also, whereas the old formula carries 1.33 gallons of oil per 100 pounds of combined pigment, the DP 94 carries 1.43 gallons per 100 pounds. The slight increase should give a somewhat better film as to tightness and washability. This checks out on a panel test with regular glazing liquid.

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Pigment - Binder Relations

<u>By Weight</u>	<u>Rox 15185</u>	<u>DP 94</u>
Pigment	89.6%	88.8%
Binder	<u>10.4</u>	<u>11.2</u>
	100.	100.

<u>By Volume</u>		
Pigment	68.2%	65.7%
Binder	<u>31.8</u>	<u>34.3</u>
	100.	100.

<u>Weight per Gallon</u>	15.65 lbs.	14.25 lbs.
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Note: Weight per gallon of Martin-Senour Neu-Tone is 13.25 lbs.

Acme No-Lustre	13.18 "
Wall Hide	12.50 "

The general production procedure has not been changed from that given in the earlier report RC-6. The tendency for (2301) to separate when too sharply reduced is overcome by the procedure of using all vehicles as one pre-mixed liquid which is added to the pebble mill after the pulp, plus inert extender has been given a preliminary wetting run in the mill. This method is simple and economical, only a short final mix being necessary in the mill to attain the desired characteristics. The length of time spent in this final mixing controls consistency and flow.

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