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SUBJECT

EVALUATION OF SUSPENDING AGENTS

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EVALUATION OF SUSPENDING AGENTS

General Statement:

The production of exterior house paint primers high in White Lead and low in inert pigment content presents a definite problem as to suspension in the package.

Various agents have been recommended as aiding suspension, and it was decided to try them in a house paint primer which experience had shown to be deficient in its suspension properties on storage.

The formula selected was the early formulation of the Lincoln Paint & Color Company's Bare Wood Primer.

Formula Composition:

810 Lbs.	18 Dry	Basic Lead Carbonate
90 "	1538 Dry	Zinc Sulphide
10 Gals.	(785)	Bleached Linseed Oil
13-1/2 Gals.	(3)	Raw Perilla Oil
31 Gals.	(3)	Raw Perilla Oil
20 "	(291)	China Wood Oil Reducer
3 "	(548)	Linseed Oil Fatty Acids
4-1/2 Gals.	(1257)	Solvent Naphtha
1/8 Gal.	(152)	Concentrated Cobalt Resinate Drier
2-3/8 Gals.	(31)	Lead, Manganese, Linseed Oil Drier
1/2 Gal.	(12)	Water
1/2 "	(1767)	Anti-Skinning Solvent

All paints of this series were produced in laboratory size pebble mills on a 12 hour run.

Procedure:

Batches of this paint were prepared using the following variations of this formula:

1. Blank - no treatment - standard formula.
2. Substitution of 2 Gals. (2899)Y for 2 Gals. (785). (2899)Y has an analysis of 4.84% aluminum naphthenate and 95.16% light blown linseed oil.
3. Substitution of 10 Gals. (2899)Y for 10 Gals. (785).
4. Addition of 2-1/2 Lbs. Rubberine Gel C (American Lecithin Co.) to Batch #1.

The composition of Rubberine Gel C is 55.69% Lecithin, 2.195 Phosphorous, 43.14% Soya Bean Oil, and 1.17% Water.
5. Addition of 5 Lbs. of Lecithin to Batch #1.

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6. Addition of 5/8 Gal. of CTV 1253 to Batch #1. 5/8 Gal. of CTV 1253 represents 1% of non-volatile vehicle of Batch #1. CTV 1253 is our development of National Lead Company's Lead Soap suspender and has an analysis of 59% China wood oil, 34% turpentine, and 7% basic lead carbonate.
7. Addition of 1-7/8 Gals. of CTV 1253 to Batch #1. 1-7/8 Gals. of CTV 1253 represents 3% of non-volatile vehicle of Batch #1.
8. Addition of 2-1/2 Lbs. of 547 Dry (aluminum stearate) to Batch #1.
9. Addition of 2-1/2 Lbs. of 547 Dry as B-117 to Batch #1. B-117 is composed of 32 3/4% of 547 Dry (aluminum stearate), 47% kerosene, 20 1/2% light blown linseed oil.
10. Substitution of Advasol #2 (Advance Solvents Corp.) for (31) and Soligen 6% Cobalt (Advance Solvents Corp.) for (152) in Batch #1. Analysis of Advasol #2 is 12 1/2% metal, 8 parts of lead to 1 part manganese.
11. Addition of 2-1/2 Lbs. Ninol #646 (Edwal Laboratory, Chicago) to Batch #1.
12. Addition of 2-1/2 Lbs. Dupanol (E. I. Dupont DeNemours Co.) to Batch #1.
13. Addition of 5 Lbs. of Crude Fatty Alcohol (Advance Solvents Corp.) to Batch #1.
14. Addition of 5 Lbs. of Hydrogenated Fatty Alcohol (Advance Solvents Corp.) to Batch #1.
15. Addition of 2-1/2 Lbs. Naphthenic Acid (Advance Solvents Corp.) to Batch #1.
16. Substitution of Nuodex Company's lead, manganese, and cobalt naphthenates for those of the Advance Solvents Corp. on an equal metal basis in Batch #10.

Package Condition after 10 Days:

None of the paints are settled badly at this time and the comparisons are made to the standard, or Batch #1.

1. Considerable settling; mostly soft.
2. and 3. Conditions similar; both good; better than #1. Settling is less fluffy.
4. Very similar to #1.
5. Less settling than #4; slight tendency to settle.

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6. Definite tendency to settle more than #1.
7. Less settling than #6. More like #1.
8. Settled portion is short in nature but very soft; better than #1.
9. Nearly as good condition as #8; better than #1.
10. Slightly more settling than #1.
11. Equal settling and similar to #1.
12. Similar to #9; better than #1; not equal to #8.
13. Slightly softer and better than #1.
14. Not as soft as #13; only slightly better than #1.
15. Slightly greater tendency to settle than #1.
16. Most settling at this time of any of series; slightly greater settling than #6; definitely more settling than #10.

Package Condition after One Month:

1. Considerable settling; most soft; some firm.
2. Settling is softer than #1.
3. Equal to #1.
4. Suspension slightly better than #1.
5. Suspension is better than #4 and #1.
6. Definitely harder settling than #1; unsatisfactory.
7. Much better than #6; definitely better than #1.
8. Settled portion is puffier and softer than #1.
9. Equal to #8.
10. Better than #1; does not have the firm settling on bottom.
11. Slightly better than #1; settling is soft.
12. Slightly better than #1.
13. Very slightly better than #1.
14. Slightly better than #1.

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15. Equal to #1.

16. Definitely more settling than #1.

Package Condition after 6 Months:

The results obtained after six months' storage are grouped below, with the paints having the least and softest settling shown first and the least satisfactory batches last.

Group 1. Soft settling - very easily stirred.

Best	-	Batch # 5.	5	Lbs. Lecithin added to batch #1.
2nd	-	"	4.	2-1/2 " " " " " "
3rd	-	"	12.	2-1/2 " Dupanol " " " "
4th	-	"	8.	2-1/2 " 547 Dry " " " "
5th	-	"	9.	2-1/2 " 547 Dry as B 117 added to batch #1.

Group 2. Definite settling - possible to stir up.

6th	-	Batch # 7.	1-7/8	Gals. of CTV 1253 added to batch #1.
7th	-	"	11.	2-1/2 Lbs. Ninol added to batch #1.
8th	-	"	15.	2-1/2 Lbs. Naphthenic Acid added to batch #1.
9th	-	"	13.	5 Lbs. Crude Fatty Alcohol added to batch #1.
10th	-	"	3.	10 Gals. (2899)Y substituted in batch #1.
11th	-	"	2.	2 Gals. (2899)Y " " " "

Group 3. Firm settling - more difficult to break up.

12th	-	Batch #10.	Substitution of Soligen Driers for Regular.	
13th	-	"	1.	Standard formula.
14th	-	"	14.	5 Lbs. Hydrogenated Fatty Alcohol added to batch #1.
15th	-	"	16.	Substitution of Nuodex driers in batch #1.
16th	-	"	6.	5/8 Gal. of CTV 1253 added to batch #1.

Conclusions:

Based on the formula variations described above and from the observations made of package condition over a period of six months, the following summary is given.

1. The suspending agents that performed best are:

Lecithin - Rubberine Gel C - addition of 5 Lbs. to 100 Gals.
Lecithin - Rubberine Gel C - addition of 2-1/2 Lbs. to 100 Gals.
Dupanol - addition of 2-1/2 Lbs. to 100 Gals.
Aluminum Stearate (dry form) - 2-1/2 Lbs. per 100 Gals.
Aluminum Stearate (as B 117) - 2-1/2 Lbs. per 100 Gals.

2. Using the maximum amount of National Lead Company's White Lead suspender gives results nearly comparable to above, but using minimum amount causes increased settling rather than suspension. Also, using the maximum amount does not prevent early settling, but tends to keep the settling soft.

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3. Advance Solvents Company's naphthenate driers have equal or very slightly superior suspending properties compared to standard manufactured driers, but Nuodex naphthenate driers cause harder, more firm settling than either Advance Solvents' or the regular driers.
4. Using Crude Fatty Alcohol shows some advantage over regular formula for suspension, but use of hydrogenated fatty alcohol with this formula showed poorer suspending properties.
5. The following suspending agents have some advantages over the standard formula in that the settled portion is a little easier to break up, but not good enough to warrant their adoption in the proportions used.

Ninol	2-1/2	Lbs.	per	100	Gals.
Naphthenic Acid	2-1/2	"	"	"	"
Aluminum Naphthenate	3/4	"	"	"	"
Aluminum Naphthenate	3-3/4	"	"	"	"
Crude Fatty Alcohol	5	"	"	"	"

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