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DEVELOPMENT OF A UNIVERSAL TINTING COLOR

INTRODUCTION:

The National Lead Company has available a color mixing system for various types of paints which employs a blending base and color blender. Examination of the color blender revealed it to be suitable for tinting oil base paints and also water based paints except "Sealer-Coater." Work was initiated under Investigation WT-221 to develop a tinting color for "Sealer-Coater" and under Investigation WT-222 to modify the recently revised but unreleased Fluid Harrison Oil Colors for suitability as universal tinting colors.

SUMMARY AND CONCLUSIONS:

We have developed four tinting colors consisting of a red, yellow, blue and black capable of dispersion in water or oil based paints. These products are pastes, composed of pigment, solid alkyd resin, raw oil and wetting agent, which when diluted with water are suitable for tinting "Sealer-Coater," "Flow-Kote" (latex and PVAc), "Speed Easy Flat" and other water phase paints, or if diluted with thinner are suitable for alkyd or orthodox paints and enamels. The proper selection of pigments and the absence of thinner in the resin appears to eliminate tinting color phase migration and color brush wash-out problems.

Some initial evidence indicated that Turkey Red Oil (H-522), a mixture of approximately 1/2 sulfated castor oil and 1/2 water, may be a promising vehicle. However, the Turkey Red Oil was reactive with certain pigments and thus limited in its utility.

ACTION TAKEN OR RECOMMENDED:

From the work done to date, it would seem that numerous colors could be formulated and it is suggested that a project be initiated to cover the development of a complete line of these dual dispersible tinting colors.

This line would have remarkable flexibility as it would be used for all types of trade sales products. The decision for additional work on a project level should be made by the Sales Department; the cost is estimated to be \$10,000.

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EXPERIMENTAL DETAILS:

The tinting colors consist of a combination of a 64% soya bean oil glycerine phthalate resin (RC-268), raw linseed oil (H-253), an alkyl aryl polyether alcohol Triton X-100, (KH-5063) and pigment. These bases have the appearance of oil colors. They do not "dry up" on standing as do conventional water paint tinting colors. The breakdown would be as follows:

		<u>Composition</u>		
<u>Color</u>	<u>Code</u>	<u>Pigment</u>	<u>Vehicle</u>	
Blue	P-29-U-31528	Mon. Blue Lake (KW-5054) 55.6%	RC-268/H-253/KH-5063 19.4/ 13.0/ 11.1%	
Red	P-29-U-31529	Red Iron Oxide (W-303) 75%	11.1/ 8.3/ 5.6%	
Black	P-29-U-31530	Boneblack (W-284) 60%	17.7/ 13.3/ 9.0%	
Yellow	P-29-U-31531	Chrome Yellow Lt. (W-634) 70%	13.2/ 10.0/ 6.8%	

(A) Vehicle Formulation

The mechanism of the dual dispersibility appears to be the wetting of a hydrophilic pigment with a water dispersible vehicle composed of oil and/or resin and a wetting agent which is soluble oil or water. This conclusion was drawn from the fact that when the pigment is wetted initially with the organic vehicle and subsequently modified with the oil and water-soluble wetting agent, no dispersibility in water paints results.

The purpose of the alkyl resin is to provide the necessary sealing characteristics for "Sealer-Coater" when it is deeply tinted with a large amount of tinting base.

Although it has not been definitely established that thinner in the tinting color flushes organic pigments into the internal phase of emulsion paints, we feel in view of past experience that thinner should not be used in the vehicle combination for the present.

The bases possessed satisfactory tinting properties in the strongly organophilic systems such as "Dulux" Super-White Gloss.

An alternate technique that may be developed is the incorporation of a wetting or dispersing agent which is water-soluble but relatively oil insoluble in a pigment and oil vehicle composition.

Some limited work which consisted of the dispersing of "Nacconal NRSF" (an alkyl aryl sulfonated anionic agent) in a mixture of alkyd resin, linseed oil and red iron oxide revealed that the material was dispersible in both systems.

(B) Pigmentation

The proper choice of pigments is very important in order to get the dual dispersibility. The pigments used in this work were the water-dispersible grades of the various pigments or pigments hydrophilic in character.

The formulation of each pigment seems to be a particular problem. Generalization for a class of untreated pigments does not seem possible as red iron oxide (W-303) is satisfactory; whereas, red iron oxide (W-895) is unsatisfactory in the same particular vehicle combination.

Also, of importance in the choice of pigments is chemical reactivity as they must be alkali and acid resistant. If the line is to be extended to include exterior paints, durability must also be considered.

(C) Stability

Satisfactory package stability exists so far for the bases. A comprehensive study of paints tinted with these bases has not been undertaken; however, limited information seems to indicate a satisfactory level of performance.

(D) Manufacturing Problems

No unusual manufacturing problems are anticipated. The bases would be premixed and roller ground. Caution must be exercised to be certain that the pigment is wetted by the vehicle combination as a homogeneous solution and not by one of the vehicle components in preference to another. This could be assured by a special vehicle blending procedure or by precautions in pigment loading.

(E) Cost Information

The only direct cost comparison would be in case of the red base and Indian Red Harrison Oil Color. Approximate cost figures at equal pigment content indicate a cost increase of 10% over the Indian Red Color. The other colors would be the same or slightly higher. However, optimum formulation, the use of more effective or cheaper wetting agents and the incorporation of solvents may reduce the cost.

COURSE OF DEVELOPMENT:

With the knowledge that a universal tinting color line is possible work could be undertaken to formulate the required colors and adjust the formulations on an optimum basis.

- (1) The vehicle composition should be adjusted to the lowest cost consistent with dispersibility and sealing characteristics.
- (2) The pigments should be selected on the basis of dispersibility, tone, cost, and chemical reactivity. In the case of certain pigments, it may be necessary to request specific surface treatment by the manufacturer.
- (3) Upon the selection of the range of bases, suitability and stability programs should be undertaken.

REFERENCE:

Notebook 5395

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