94 Line
W-582

Dr. E. A. Fluevog, Toledo
Mr. J. B. Bullitt, Lab.
Mr. J. W. Iliff, Lab.
Dr. P. B. Evans, Lab.
Dr. S. Horning, Lab.

Philadelphia Laboratory
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COLOR DRIFT OF IRON BLUE PIGMENTS IN 94 AND 194 LINE BAKING "DULUX" CHEVRON BLUE AND DARK BLUE ENAMELS

Introduction:

This investigation of overnight color drift occuring after baking 94-23150 Chrysler-Plymouth Chevron Blue and 194-22074 Dark Blue Baking "DULUX" really consists of two separate problems brought to our attention by customer complaints and the Production Department respectively. The first is excessive difference in color caused by a difference in baking schedule and the second is a change in tone from green-blue to red-blue in a twelve to twenty-four hour period after baking.

Conclusion:

The existance of the first problem was verified by giving a panel of 94-23150 the regular bake of 25' x 275°F., and a similar panel a bake of one hour at 225°F. The panel baked at the higher temperature was considerably more yellow in tone than the panel baked at the lower temperature, showing this difference in color to be related to the amount of heat used.

It was found that the color drift phenomena was essentially a chemical-oxidation reaction and that a gaseous oxidizing agent was needed to accelerate this reaction. A 27.5% solution of hydrogen peroxide was found to produce the same change in about 1-1/2 hours that occurred overnight in the laboratory. On the basis of this work, a hydrogen peroxide dip process could probably be set up for accelerating this "color drift" so the batches could be checked more quickly against standards for color match.

Experimental:

This color drift, which occurred with both W-582 and W-586 Iron Blue pigments did not occur in the same product when the iron blue pigment was replaced by W-505 Monastral Blue, indicating that the change was in the pigment and not the vehicle.

Oven ventilation had no effect upon the color drift-nor did exposure of the panel to sunlight, although the latter effected a sort of fading in color. Panels of the iron blue products kept for an overnight period in a vacuum dessicator in an atmosphere of CO_2 gas and those kept at a very low temperature did not redden in tone overnight like the control panel, suggesting that the reaction was one of oxidation. However, dipping the panel in acid solutions of potassium permanganate or potassium dichromate did not accelerate the color drift even when the panel was left in the solution several hours. However, when the panel was allowed to stand in a 27.5% solution of hydrogen peroxide, oxygen was slowly evolved and the color change took place in less than two hours. Considerable work was done originally along the line of this being a physical problem based on dispersion. Flocculation of the pigment seems to have a very slight effect on "color drift", but this problem is mainly one of a chemical reaction.

With the idea that varying film acidity at different stages of dry might be affecting the color, enamels were doped with phosphoric acid to maintain a definite acidity. These enamels baked out much greener in color than the controls, but drifted to about the same extent after baking.

Details of experimental work on this problem are found in Notebook 2972, pages 5-43.

PHILADELPHIA LABORATORY

J. C. Garver

J. C. GARVER

JCG/mhl