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PIGMENT COLOR RESEARCH REPORT

PAINT EVALUATION OF COALESCED C.P.C. BLUES (D-5761 & D-5763)

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NEWARK PLANT

PIGMENT COLOR RESEARCH REPORT

Title: PAINT EVALUATION OF COALESCED C.P.C. BLUES (D-5762 & D-5763)

SUBMITTED BY: D. H. Stubbs per FEB DATE SUBMITTED: 8-2-44

APPROVED BY: F. E. Bolton F E Bolton 8/12/44 DATE ISSUED: 8-12-44

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INTRODUCTION:

First examination of coalesced C.P.C. pigments in paint (KN-43-156) showed them to be too hard for satisfactory grinding with the three roll mill, although they could be ground with the ball mill, using a long period of tumbling. Since that time a substantial amount of work has been done to improve the ease of grinding of "Monastral" BX-CR. One laboratory sample of it, (1051-17L) was found to be nearly equal to a BT-172-D/"TI PURE" R-610 combination of equal C.P.C. content. Sample 1051-17L was treated with triethanolamine oleate followed by steam micronization.

The samples included in this study have been prepared by approximately the same technique as used in the preparation of 1051-17L, namely steam micronization. They were evaluated for relative money value at equal grinding versus "Monastral" Blue Toner BT-172-D, "Ramapo" Blue BP-173-D, and an Iron Blue (Milori Blue B-216-D).

PIGMENTS EVALUATED:

1. D-5762 - Pigment BX-CR - Charge 7
   Steam Micronized
   (CPC/"TI PURE" R-610 - 33.3/66.7)

2. D-5763 - Pigment BX-CR - Charge 3
   Steam Micronized
   (CPC/"TI PURE" R-610 - 25/75)

3. BT-172-D (SD-48265) - "Monastral" Blue Toner

4. BP-173-D (SD-48133) - "Ramapo" Blue

5. B-216-D (SD-48321) - C. P. Milori Blue

CONCLUSIONS:

D-5762 is too difficult to grind to be of interest to a paint manufacturer who uses the 3-roll mill for most of his production. For that reason it was rejected as a candidate for complete evaluation.

D-5763 is a borderline case, and may be too hard grinding to meet the requirements of many gloss enamel manufacturers. Its use will probably depend on whether cost, permanence of color, and freedom from flocculation are sufficiently attractive to overcome the objection of difficult dispersion.

The money value of D-5763 will depend upon which pigment it is in competition with, and the depth of tint in which it is to be used. The following tabulation shows the selling price per pound on D-5763 at which it would give equal cost per gallon to the respective pigment with

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which it is competing. These values are based on ingredient costs only and give no effect to grinding costs which would favor Iron Blue and "Ramapo" Blue particularly.

	Competing with		
	(a) BP-173-D/TiO_2	(b) BT-172-D/TiO_2	(c) B-216-D/TiO_2
Medium Tint (Matches D-5763) Value/lb. of D-5763	$1.26	$1.17	23¢
Light Tint (Matches 1/50-BT-172-D/TiO_2) Value/lb. of D-5763	1.16	91.5¢	14.5¢

It will be seen from the above that under these conditions of test, "Monastral" Blue BX-CR would have to sell for 23¢ at the deep shade and 14.5¢ at the light shade to equal Milori Blue at 36¢. These relationships illustrate a point previously observed in "Monastral" Blue BX-CR, namely, that the coalesced pigment is deeper in shade than its presumed composition would justify. However, when extended with more TiO_2, this condition no longer holds, and the true tinting value becomes the controlling factor.

The values shown above hold only under the conditions of this test - five tight passes on a laboratory mill in good condition. It is probable that in many paint mills, D-5763 would show a less favorable picture.

The strength comparisons at the 1/50 extension must be taken with some reservation, since the "Monastral" Toner and "Ramapo" Blue flocculated so rapidly that exact shade matching was difficult.

REFERENCES:

Paint Lab. Exposure Series 6887
Notebook 1036-61, 62, 63, etc.
Letter - D. H. Stubbs to A. Siegel - April 4, 1944
KN-43-156 - Evaluation of Pigment BX-CR

EXPERIMENTAL DETAILS:

A. Grinding:

Because roller mill grinding is used by the greater number of prospective customers, all grinding for this evaluation was done on the three roll mill. Bases were prepared by blending pigment with a medium oil alkyd varnish (GE-2458 - General Electric Co.) to give about

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the same consistency. The following proportions were used:

	BT-172-D	BP-173-D	B-216-D	D-5762	D-5763
Pigment -	30	30	35	56	60
GE-2458 -	70	70	65	44	40

All bases were given five passes over a fairly tightly set mill. The setting of the mill was not changed during the grinding, so it is believed that these pigments were subjected to as nearly the same degree of grinding as possible.

B. Texture:

Texture tests were made by reducing the millbases to substantially "ready mix" composition, then drawing them down over plastic with a .002" Bird applicator. The dispersion was approximately as follows:

B-216-D	Excellent
BP-173-D	Good+
BT-172-D	Good
D-5763	Fair-
D-5762	Poor

On the basis of these results it was decided to eliminate D-5762 from the study.

Further drawdowns of the D-5763 enamel were made using .003" and .005" applicators. The dry films of enamels applied with such a series of applicators would be approximately as follows:

	Dry Film Thickness
.002" Applicator -	.0005 inches
.003" " -	.00075 "
.005" " -	.00125 "

It is believed that the .005" applicator applies a film which represents the average film thickness in practical use more nearly than the others. It was found that such a film obscured most of the grit present in D-5763 enamel, but it is questionable whether a paint manufacturer would pass such a product if he examined it carefully, especially in gloss enamels.

It should be noted that D-5763 is inferior in texture to a previously steam micronized "Monastral" Blue BX-CR, 1051-17L, which was rated equal, or at most only slightly inferior, to BT-172-D. Other steam micronized samples (too small for paint evaluation) have shown wedge grit and strength development superior to BT-172-D. This suggests that further study of the technique of micronization of BX-CR may possibly overcome its deficiency in texture.

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C. Comparisons for Money Value:

Relative money values were compared at two depths of shade. The darker shade comparisons were made by using an enamel of D-5763 as the color standard. This enamel was adjusted to a consistency of 75-80 KU and to complete hiding at a spreading rate of 700 ft 2/gal. Blends of B-216-D, BP-173-D, and BT-172-D, respectively, with "TI PURE" R-610, were prepared to match hiding, consistency, and shade of the D-5763 enamel.

When satisfactory matches had been prepared, their costs per gallon were calculated. The cost per pound for which D-5763 would have to be sold in order to compete with each of the other pigments was then calculated, and may be seen from the following tabulation:

	Matches for Shade of D-5763 Enamel of "TI PURE" R-610 plus		
	BP-173-D	BT-172-D	B-216-D
Cost/gal.	$2.05	$1.98	$1.22
Price per pound of D-5763 to duplicate cost/gal.	1.26	1.17	.23

A second cost comparison was made at the depth of a 1/50 blend of BT-172-D/"TI PURE" R-610. The same technique as employed with the darker tints was used, namely to match the shade and depth of the control as closely as possible with various pigment combinations. All enamels were adjusted to 75 to 80 KU with complete hiding at 700 ft 2/gal. Calculating cost per pound of D-5763 on the same basis as before, the following figures were obtained:

	Matches for BT-172-D/"TI PURE"R-610-1/50 Blend Blends of "TI PURE" R-610 with		
	BP-173-D	BT-172-D	B-216-D
Cost/gal.	$1.43	$1.40	$1.28
Price/lb. of D-5763	1.16	91.5¢	14.5¢

The following tabulation shows the composition of enamels with used in these cost comparisons:

	Matches for D-5763 Enamel			
N.B.No.	1036-62A D-5763	1036-62B BP-173-D	1036-62C BT-172-D	1036-62D B-216-D
Blue Pigment	10.0%	4.07%	3.18%	2.99%
"TI PURE"R-610	-	6.25%	5.58%	4.81%
GE-2458	81.9%	75.10%	81.71%	87.20%
Aamscosolx"P	6.1%	12.71%	7.90%	2.70%
Drier (KV-30)	2.0%	1.87%	1.63%	2.30%
	100 .0%	100.00%	100.00%	100.00%

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Matches for BT-172-D/"TI PURE" R-610 1/50

N.B.No.	1036-63A BT-172-D	1036-63B BP-173-D	1036-63C B-216-D	1036-63D D-5763
Blue Pigment	.35%	.44%	.48%	1.70%
"TI PURE" R-610	17.67%	19.60%	15.60%	15.82%
GE-2458	76.68%	74.20%	78.68%	76.66%
"Amscosolv" F	3.40%	3.89%	3.20%	3.76%
Drier (KV-30)	1.90%	1.87%	2.04%	2.06%
	100.00%	100.00%	100.00%	100.00%

The ingredient prices used in calculating costs of the above enamels were as follows:

BT-172-D	$3.50 per lb.
BP-173-D	3.08 " "
B-216-D	.36 " "
GE-2458	.15 " "
"Amscosolv" F	.035" "
Drier (KV-30)	.10 " "
"TI PURE" R-610	.16 " "

D. Color Comparisons:

At equal depth of shade, the hues of these enamels differ quite markedly because of the nature of the blue pigment. The following color readings were made on sprayed chips, and will differ very slightly from color comparisons made by either drawdown or paintout. This fact was responsible for some trouble in adjusting depths of shade to equality. Apparently both BT-172-D and BP-173-D flocculate slightly as soon as they are reduced with White. In adjusting their tints versus a non-flocculating pigment, fair matches in depth could be obtained by drawdown comparison, but application by spray or brush develops slightly greater strength in the BT-172-D or BP-173-D tints. Adjusting these enamels as closely as possible in spite of the difficulties, the following color differences were noted:

Blue Pigment	Medium Tint (Matches depth of D-5763)	Light Tint (Matches 1/50 -BT-172-D/TiO_2)
D-5763		
BP-173-D	red & s. clean	clean & red
B-216-D	very red; v.s. dirty	v.s. dirty; very red
BT-172-D	red; v. s. clean	s. clean and red

An exposure series (S-6687) has been prepared to check relative durability and color retention of these pigments.

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