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PIGMENT COLOR RESEARCH REPORT

Progress Report

ALKALI RESISTANT RED TONER, RT-539-D.
PLANT DEVELOPMENT AND STANDARDIZATION.
PLANT ASSISTANCE STUDY.

Period Covered: MARCH, 1945 - SEPTEMBER, 1946 - MAY-JUNE, 1948.

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PLANT DEVELOPMENT AND STANDARDIZATION.
PLANT ASSISTANCE STUDY.

MARCH, 1945 - SEPTEMBER, 1946 - MAY-JUNE, 1948.

CHARGES: 12-40 (Development and Standardization)
31-40 (Plant Assistance)

SUBMITTED BY: E. J. Hess E. J. Hess DATE SUBMITTED: 1/31/49

APPROVED BY: J. O. Morrison J. O. Morrison Feb 4, 1949. DATE ISSUED: 2/7/49.

INTRODUCTION:

Difficulty with the masstone intensity of production subsequent to plant RT-539-D standardization made it necessary to retain manufacture of this alkali resistant red toner under Chemical Division supervision. Low production rate retarded completion of this work to a considerable extent.

SUMMARY & CONCLUSIONS:

In the report covering the previous development study of RT-539-D (see KN-44-87) it was shown that the first RT-539-D plant standard, lot 42337, was unsatisfactory because of its excessive masstone intensity compared with the laboratory and semi-works standards, K-1386 and lot 5824. Experience had shown that variation in raw materials, particularly in "Naphthanil" BS quality, had a considerable effect on masstone and tint.

RT-539-D plant manufacture was resumed in March, 1945, after a lapse of about eight months. Early production averaged very slightly dark, dull in masstone and blue and dull in tint versus the standard, lot 42337, in spite of the application of the diazo clarification variable (used in an attempt to obtain improved masstone and tint intensity).

Subsequently, a number of "Naphthanil" BS shipments were received which gave consistently dark, dull masstone, yellow, intense tint products versus the standard. It was during this period (October - December, 1945) that it was decided to re-standardize RT-539-D on a more realiztic basis from the standpoint of masstone intensity. A blend of three plant batches, lot 47249, made during this period, was submitted for evaluation as a new RT-539-D standard in March, 1946, and accepted in May of the same year. Results of rubout tests on the various RT-539-D standards are recorded below:

Included in these tests are:

K-1386 - The laboratory standard.
RT-539-D, lot 5531 - The first semi-works standard.
RT-539-D, lot 5824 - The second semi-works standard.
RT-539-D, lot 42337 -The first plant standard.
RT-539-D, lot 47249 -The current plant standard for the period covered by this report.

Varnish Dryer rubout tests

Lot 5531 vs K-1386:	s.intense	-	O.K. - vs.yel. & intense
Lot 5824 vs K-1386:	tr. dark	-	tr.weak - vvs.yel.& intense
Lot 5824 vs Lot 5531:	s.dull	-	O.K. - O.K.
Lot 42337 vs lot 5531:	vvs.lt.,intense	-	O.K. - vvs.blue
Lot 42337 vs K-1386:	vs.lt., intense	-	vvs.wk. - vs.yellow
Lot 42337 vs lot 5824:	vs.lt., intense	-	O.K. - vs.blue
Lot 47249 vs lot 5824:	dark, s.intense	-	vvs.str. - s.yel.,s.int.
Lot 47249 vs lot 42337:	dark,dull	-	O.K. - yel., vs.intense

RT-539-D manufacture, subsequent to the setting-up of lot 47249 as the standard, was on the light masstone, blue, dull tint side of standard. Thus, in correcting the intense masstone of the previous standard, two new sources of difficulty were introduced in the new standard, that is, abnormally dark masstone and yellow tint. These difficulties apparently were a result of failure to standardize "Naphthanil" BS to at least some degree for use in RT-539-D.

Manufacture during this period was all shipped as sub-standard material by authority of the Sales Division.

Because of the raw material problem at the time, both as to quantity available and quality, the Production Division decided to assume supervision of RT-539-D manufacture pending solution of the raw material standardization problem by Orchem. Accordingly, a new standard RT-539-D formula, based on current practice, K-2385, was issued and the process was turned over to plant supervision in September, 1946.

Early in 1948, a "Naphthanil" BS standard, lot 1028, acceptable to both Orchem and Newark, was set up. Laboratory functional tests by Orchem using the RT-539-D process showed that the majority of "NBS" shipments were an acceptable match to this standard. The results of these tests also indicated that the excessively dark masstone and yellow tint of the standard, lot 47249, would be difficult to match consistently with normal "NBS" and Sales was requested to permit restandardization on the light, blue side of this standard. This request was rejected because of customer preference for the dark, yellow type product.

Plant trial batches showed that known control variables would give the desired yellow tint but that the only immediately available solution to the dark masstone problem was restandardization of the "NBS", at a darker masstone level (similar to "NBS", lot 209). As this could not be done, the process was returned to the laboratory in June, 1948, for a process variable study.

The result of the subsequent laboratory work is reported separately.

DISCUSSION:

RT-539-D manufacture was scheduled in the plant in March, 1945, for the first time since July, 1944. Five batches were made using a modified K-1982 formulation during the period March to September, 1945.

The following variables were used:

1. Diazo clarification was resorted to in an attempt to improve masstone and tint intensity.

2. An increase in coupling temperature to 160°F (standard K-1982 temperature was 150°F.

3. An increase in para soap from 7 pounds to 20 pounds per batch.

4. An increase in the acetic acid used for precipitating the "NBS" from 90 pounds to 120 pounds per batch.

5. Various solution temperatures for the PNOA in the range of 80-120°F were used (standard: 90°F).

Light masstones were obtained with the 160°F coupling temperature as expected. There may have been a very slight improvement in masstone intensity noted as a result of the diazo clarification but no variable or combination of variables was effective in correcting the dull masstones and blue, dull tints being obtained with the PNOA and "NBS" available for use during this period.

In October, 1945, production quality changed from light, dull, blue to a dark, dull masstone, yellow tint type product and this continued through December, 1945. Eight batches were made during this period using decreased para soap and clarification of diazo in an attempt to obtain more intense masstone and bluer tint but without success. It was during this period that it was decided to re-standardize on the basis of the duller masstone type and three batches of current material were selected as components of the proposed new RT-539-D standard, lot 47249. This new darker, duller, yellower blend was finally accepted as standard in May, 1946.

Meanwhile, on resumption of manufacture in February, 1946, another type of product was obtained. Two batches made in February and March, 1946, were somewhat lighter in masstone and only slightly yellower in tint than standard lot 42337.

This trend continued in the eight batches made during the period June to August, 1946. All of this manufacture was light and blue versus the new dark, yellow standard, lot 47249.

Because of the low production volume and the various problems connected with raw material quality and availability at the time the Production Division decided to assume supervision of manufacture of RT-539-D until closer control of raw material quality was established. Accordingly, a new RT-539-D formula, K-2385, based on the then current process was issued which differed from the previous standard formula, K-1982, as follows:

1. The diazo is clarified before coupling.

2. The para soap amount was increased from seven pounds to 20 pounds.

3. The acetic acid used for precipitating the NBS was increased from 90 pounds to 120 pounds.

The Production Division accepted supervision of RT-539-D manufacture in September, 1946.

Sunsequent to the setting up of the new "NBS" standard, lot 1028, a plant assistance work request was issued requesting restandardization of RT-539-D on the basis of the new "NBS" standard quality. Three plant batches were made in May, 1948, using coupling temperature, buffer salt amount, and type of "NBS" variables. Results indicated that it would be difficult to match standard lot 47249 if dark masstone type "NBS" was not available. Attempts to obtain authorization from Sales to restandardize on the light, blue side of the current standard were not successful and the process was returned to the laboratory in June, 1948, for a process variable study.

PATENT SITUATION:

There is no patent restriction in the manufacture of RT-539-D. It is not believed that this study has resulted in any patentable developments.

GLOSSARY:

RT-539-D: An alkali resistant red toner resulting from the coupling of PNOA diazo and "NBS".

PNOA: Para nitro ortho anisidine.

"NBS" "Naphthanil" BS - the meta nitranilide of beta hydroxy naphthoic acid.

EXPERIMENTAL DETAILS: DSM-49-13.