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# Development-accelerator-releasing (DAR) Coupler: Part IV. The Effect of the DAR Couplers with Different Hydrazines on the Photographic Characteristics of Color Negative Material

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*ABSTRACT*

*The effect of five development-accelerator-releasing (DAR) couplers derived from different hydrazines on the photographic characteristics of color negative material has been studied It was found that the development-accelerator-releasing couplers examined may be used together with cyan couplers in a color negative material to increase the photographic speed; no apparent difference was observed with the different hydrazines.* © *1998 Elsevier Science Ltd. All rights reserved*

*Keywords*: DAR coupler, effect, *p*-hydrazine, *m*-hydrazine, photographic characteristics, color negative material.

## INTRODUCTION

The inclusion of a development-accelerator-releasing (DAR) color coupler in a color negative imaging layer has been suggested as a means of improving the photographic speed and photoefficiency of color development. A detailed photographic study has revealed that the action of a DAR color coupler involves a localized fogging of unexposed grains in close proximity to a strongly developing grain, and hence increases the number of developed silver halide grains per unit area [1, 2].

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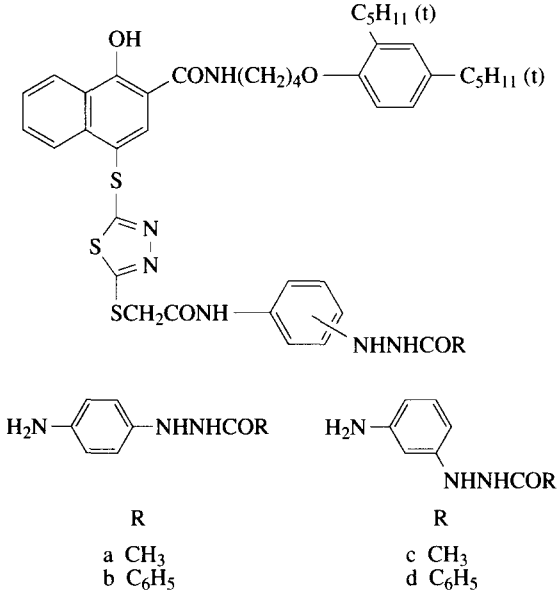
## EXPERIMENTAL

To examine the effect of DAR couplers on the photographic characteristics, a single-layer color negative coating structure was employed.

First, the amount of the DAR compounds on the color negative material was studied and this clarified that the effect of DAR couplers on the photographic characteristics is best with a 2.5 ml amount of 1% DAR coupler in ethanol solution. The chemical structure of the DAR couplers was as follows:




R

a $CH_3$
b $C_6H_5$

R

c $CH_3$
d $C_6H_5$

To obtain dye sensitometric response curves, the coatings were exposed stepwise to white light, followed by C-41 processing.

## RESULTS AND DISCUSSION

The dye sensitometric data for red sensitive coatings, according to the increase of sensitivity for the coating, are given in Tables 1–5.

It is apparent from the tables that the increase of photographic speed was excellent for the coating incorporating the DAR couplers, compared with coating without the DAR couplers. All compounds had an excellent effect for the coating with different sensitivity, although a little increase of fogging was observed. Comparing the DAR couplers containing the *para*-hydrazide group (a,b) with the DAR couplers containing the *meta*-hydrazide group (c,d), no apparent difference was observed, but compound A was the best for increasing the sensitivity.

**TABLE 1**

| *DAR Coupler* | *Laydown (ml) 1% ethanol solution* | *Sensitivity* | *Contrast* | *Fog* |
|---|---|---|---|---|
| — | 0 | 147 | 1.00 | 0.14 |
| a | 2.5 | 298 | 0.90 | 0.19 |
| b | 2.5 | 212 | 1.00 | 0.12 |
| c | 2.5 | 199 | 0.98 | 0.16 |
| d | 2.5 | 288 | 1.40 | 0.15 |

**TABLE 2**

| *DAR Coupler* | *Laydown (ml) 1% ethanol solution* | *Sensitivity* | *Contrast* | *Fog* |
|---|---|---|---|---|
| — | 0 | 167 | 2.00 | 0.20 |
| a | 2.5 | 240 | 1.90 | 0.44 |
| b | 2.5 | 192 | 2.10 | 0.36 |
| c | 2.5 | 199 | 1.95 | 0.26 |
| d | 2.5 | 199 | 1.70 | 0.20 |

**TABLE 3**

| *DAR Coupler* | *Laydown (ml) 1% ethanol solution* | *Sensitivity* | *Contrast* | *Fog* |
|---|---|---|---|---|
| — | 0 | 260 | 1.05 | 0.20 |
| a | 2.5 | 570 | 1.40 | 0.36 |
| b | 2.5 | 325 | 1.00 | 0.27 |
| c | 2.5 | 307 | 1.00 | 0.20 |
| d | 2.5 | 288 | 1.15 | 0.28 |

**TABLE 4**

| *DAR Coupler* | *Laydown (ml) 1% ethanol solution* | *Sensitivity* | *Contrast* | *Fog* |
|---|---|---|---|---|
| — | 0 | 500 | 1.30 | 0.11 |
| b | 2.5 | 570 | 1.30 | 0.14 |
| c | 2.5 | 600 | 1.10 | 0.11 |
| d | 2.5 | 710 | 1.50 | 0.13 |

**TABLE 5**

| *DAR Coupler* | *Laydown (ml) 1% ethanol solution* | *Sensitivity* | *Contrast* | *Fog* |
|---|---|---|---|---|
| — | 0 | 700 | 1.30 | 0.11 |
| a | 2.5 | 950 | 2.30 | 0.21 |

## CONCLUSIONS

Photographic speed increase over a wide range of sensitivity was observed when the DAR couplers employed in the study were incorporated within an experimental bromo-iodide T-grain emulsion; no apparent difference was observed in the DAR couplers with *para*-hydrazide group and *meta*-hydrazide groups.

## REFERENCES

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