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OPTICAL ENGINEERS SPECIALIZING IN INSTRUMENTS AND TESTS FOR APPEARANCE PROPERTIES OF MATERIALS

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Mr. Rolf Kuehni
Technical Department
Verona Division
Baychem Corporation
P. O. Box 385
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Union, N. J. 07083

Dear Mr. Kuehni:

Thank you for your letter of November 18, 1971. I can describe in a little greater detail what I was thinking of by enclosing several paragraphs from a paper I recently gave before the Louisville Paint Society. The overall title of the paper was, "Color Difference Methods--Which One is Right?". In this paper, I discussed the work in Holland of Friele and others and the enclosed two pages are taken from the paper I gave.

To me, the discontinuities which you found in the shapes of the color difference ellipses would coincide with changes from dominance of one chromaticity component to the other, that is, there are areas where the changes from dominance of Δa difference to dominance of Δb difference. As Friele points out, it is whichever of these two is greatest that establishes the major criterion for color difference sensitivity.

I would recommend that you send a reprint of your paper to Dr. Friele and ask if he has any comments on it. It is most interesting to me.

Very truly yours,

HUNTER ASSOCIATES LABORATORY, INC.

Richard S. Hunter, President

RSH:js

Enclosure

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RECENT WORK ON COLOR DIFFERENCE ANALYSIS IN HOLLAND

BY: RICHARD S. HUNTER, HUNTER ASSOCIATES LABORATORY, INC.

I have been much impressed by the work in Holland where not only have Vos and Walraven been developing a working model of the eye, but Friele has been testing their developments in actual practical situations and coming up with proposals which embody both their theoretical considerations and his practical findings. Friele makes a number of observations which may lead us to revise our thinking about the measurement color differences.

Friele's first observation is that there is probably no gadget up in the human brain taking the square root of the sum of three squares. He says the three dimensional model of color difference makes no sense. Instead, he says it is the largest of the physiologically unique visual differences between the two specimens that count, ΔL, Δa, or Δb, whichever is largest. This observation actually doesn't change things very greatly because it is always the largest component of color difference that counts the most.

The second thing that Friele says is that color difference magnitudes should not be expected to be constant in their relationship with color difference signals. Color differences in the gray area of the color solid can always be expected to be seen more readily by the eye than those out in the saturated colors. The reason for this is that the nerves carrying the

signals from eye to brain are working at a low level and are very sensitive to increments when colors are near gray. With brilliant chromatic colors, on the other hand, the nerve paths are saturated with color information so that small changes in level of optical signal, cannot be transmitted by the already saturated nerves.

There was quite a bit of evidence at Driebergen supporting this view. Everyone found the color difference ellipses to be smaller in the middle of the color solid than at the outer edges.

Color Difference relative magnitudes can also be expected to change with level of illumination because the nerve signal saturation will be reached at lower chromatic saturations in high illumination than in low. There is good reason to believe that observed magnitudes of color difference change significantly with change of level of illumination even though spectral character of illumination remains the same.