

COLOR COMMITTEE

AMERICAN OIL CHEMISTS' SOCIETY, 1933-1934

The work of the Color Committee this year has been almost entirely along the line of developing a colorimeter having improved mechanical and optical construction. Improvements were desired that would permit easier matching of colors, elimination of handling of color glasses and more rapid operation.

Since an instrument embodying such features will be considerably more expensive and since the need for such an instrument is not felt by all laboratories, it seems desirable that the continued use of the present official instrument be permitted. The proposed semi-automatic instrument must then be so constructed as to give comparable readings.

The Committee has now inspected three proposed colorimeters submitted by the following makers:

Precision Scientific Co., Chicago, Ill.
The Emil Greiner Company, New York, N. Y.
The Tintometer, Ltd., Salisbury, England.

None of the three, as originally submitted, were entirely satisfactory and they were referred back to the makers along with our observations.

The Tintometer of the Precision Scientific Company was examined by last year's Committee.

In the case of the Emil Greiner colorimeter, considerable experimenting has been done on the optical system since it was first submitted.

The results are summarized in the following conclusions:

1. Any optical system that brings the two fields into actual contact is not satisfactory because it makes the difference in intensity of the light from the two fields too obvious, particularly when changing from 2 glasses to 3 glasses or the reverse. It is also true that in most cases an exact color match is not possible due to the fact that the color glasses do not transmit the identical wave lengths of light given by the oil. This continued difference in the shades of the two fields is confusing to most operators.

2. It is desirable to have the two fields close together as they are in the present instrument, but in a semi-automatic type it is not mechanically practical to have the tubes so close together.

3. The diaphragm holes that admit the light to the eyepiece must be small enough to avoid reflections from the sides of the oil tube but it is desirable to have the fields larger than this to get good observations.

4. The best source of light is still the 100 watt blue Mazda lamp. A number

of filter screens were tried out both between the light and the magnesia block and in the eyepiece, but all were found to give the oil an unnatural appearance.

The Emil Greiner colorimeter was altered in accordance with the above observations and in its final form the tubes were placed far enough apart to permit good mechanical construction. The diaphragm holes were made the same size as in the present standard instrument and the two fields were then brought close together by means of total reflecting prisms. Mirrors could also be used for this purpose but have the disadvantage that their reflecting power may change due to the silvering becoming dim. The fields were then magnified by a simple telescopic eyepiece which also serves to center the observer's eye and permit focusing for different eyes.

This instrument was extensively tried out by one of the Committee against the present standard colorimeter and found to agree very well. It is suggested that the incoming Color Committee give this improved instrument their consideration.

The Lovibond instrument had a number of very interesting features, such as, double illumination; the use of daylight filter between the source of light and the magnesia block; the use of mirrors for bringing the fields together; mechanical manipulation of color glasses; and the fact that the color glasses were enclosed. These, together with the fact that it is very reasonable in price, are worthy of much consideration, and we believe the incoming Committee will have an opportunity to investigate an improved Lovibond Tintometer.

Considering the work done by this and preceding Committees and considering the varied requirements of the members from an economic standpoint, it seems that the Society should adopt certain basic requirements for a colorimeter and then require each maker to submit his instrument for approval before it can be used for official work.

The following basic specifications are submitted for your approval:

1. The apparatus shall consist of a light-proof box with dull black interior containing a source of light and a reflecting surface, an arrangement for holding the standard color tubes and color glasses and an eyepiece for comparing the color of the oil and color glasses. The apparatus shall be so arranged that only reflected light from the source of illumination will pass through the oil tube and color glasses into the eyepiece.

2. The source of light shall be a 100

watt Mazda daylight electric bulb, located with its tip toward the reflecting surface and approximately 10 inches from the reflecting surface.

3. The reflecting surface shall be a magnesia block set at the proper angle to reflect the light vertically upward through the oil tube and color glasses.

4. The oil tube shall be not less than $\frac{3}{4}$ inches in diameter with a mark to indicate a depth of $5\frac{1}{4}$ inches of oil and located so that the bottom of the tube is approximately $2\frac{1}{2}$ inches above the reflecting surface.

5. The device for holding the color glasses shall be located alongside of the oil tube so that the light passing through the glasses will be a duplicate of that passing through the oil tube.

6. The light passing through the oil tube and color glasses shall be admitted to the eyepiece by two holes $\frac{1}{4}$ inch in diameter.

7. When a plain eyepiece is used containing no prisms, mirrors or lenses, the holes for admitting the light shall be $11/16$ inch center to center. The hole through which the operator observes the fields shall be $5/16$ inch in diameter and 10 inches from the holes where the light enters the eyepiece.

8. When an eyepiece is used containing prisms or mirrors, and lenses, the observed fields shall be round and shall not be in contact nor have more than $\frac{3}{8}$ inch apparent space between them. The apparent diameter of the fields shall not be greater than $\frac{1}{2}$ inch nor less than $\frac{1}{4}$ inch.

9. Any mechanical system for introducing the color tubes into the instrument or for handling the color glasses shall be approved by the Society before being used for official work.

The Committee believes that as long as we adhere to the use of Lovibond glasses as the basis of comparison, there is little more that can be done to improve the accuracy of our color reading without resorting to photo-electric measurements. Such apparatus seems to be out of consideration at the present time due to its high cost. It is believed that if the above specifications are adopted that the work of future committees can be confined to the inspection and approval of instruments for official use.

By W. D. Hutchins, *Chairman*

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