The Colour Grading of Fatty Oils

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Abstract

The lightness or darkness of an oil, now commonly disregarded by the practical grader using the Lovibond system in the U.S.A. is shown to be of importance.

IT HAS been established by K. S. Gibson (1) that the lightness or darkness of an oil is usually disregarded by the practical observer in giving an oil a Lovibond colour grade. That this is so arises from the American practice of matching a layer of the oil against fixed yellow units (35 for cottonseed oil) and variable red.

It will be generally admitted, and indeed it is obvious to the eye, that the series of colours so obtainable is fixed and limited to one series of shades and intensities, so that lighter and darker colours of the same shade cannot be matched exactly. In general therefore the match is poor. Confirmation of this is given by Fig. 1. of K. S. Gibson's paper (1) and Fig. 8. of that of H. J. McNicholas (2), where only a negligible percentage of oils have colours corresponding in transmission values with the 35 yellow/0 to 25 red series.

The American method of matching has also been used in England, notably for soya bean oil and whale oil, with of course different values for the fixed yellow and the depth of oil. It is however, now falling out of favour here, owing to the deficiency noted above.

We believe that oil chemists are vitally interested in the factor neglected by the American method and that they cannot afford to dispense with the information it yields.

If two oils of the same Lovibond grading are so different in colour that one may be three times as dark as the other (e.g. E4 and F8 in the figures referred to above) or even if they are much closer in transmittance, the difference will certainly be due to some difference in the nature and/or proportion of colouring matter dissolved in them. Consequently the ease of refining the two oils to the same state and appearance will be different and the darker oil may cost far more to work. It may even prove impossible to bleach the dark oil to the same extent as the pale one.

Hence we cannot agree that the American method is entirely satisfactory and, as we remarked, there is now a tendency over here to attempt to carry the matching more nearly to perfection in order to obtain the extra information desired.

The recommendation of the makers of the Lovibond glasses, that the number used should be limited to three is obviously a compromise; and we believe it arises not only from a desire for simplicity and standardization which has been carried too far, but that it represents an attempt to minimize a very real difficulty.

The glasses appear to be calibrated on the colour flashed on their surface without any account being taken of the reflection and absorption effects of the supporting glass. Consequently the visual appearance of a single glass is not the same as that of two glasses adding to the same numerical value. This can be readily checked by placing a three yellow glass in one field of the instrument and a combination of a two yellow and a one yellow in the other field. The latter is obviously darker and duller and a match can only be obtained by adding one colourless glass to the paler field.

This experiment suggests one method for the control of the brightness factor which might prove acceptable, namely to add colourless glasses on one or other side of the instrument until the match becomes the best possible. In using such a method it is imperative to restrict the colourless glasses to the minimum number, and to record not only the number used and the field in which they are placed, but also the total number of glasses used in both fields.

The darkness factor may then be recorded as the integer corresponding to the difference between the total numbers of glasses (coloured and colourless) in the two fields, with a positive sign if those in the matching field predominate and a negative sign if those placed with the oil predominate.

This method allows a minimum step of 9% in the brightness grading, which is probably too large for the highest accuracy, but extensive operation of such compensation has convinced us that it is very much more satisfactory than the fixed three-glass method. Any alternative method of brightness compensation involves photometric balancing and the introduction of some form of optical system (e.g. crossed nicols) which would prove more cumbersome though possibly of greater utility. The colourless glass method has the advantage of retaining the system of Lovibond scale descriptions now understood by so many technologists and laymen.

LITERATURE

(1) K. S. Gibson. Oil and Soap **14.** 286. (1937).
(2) H. J. McNicholas. Oil and Soap **12.** 167. (1935).

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