

8. A weak alcohol (proof strength) suffices to dissolve the flavour giving constituents from the oil; and the employment of a stronger alcohol merely adds to the cost of the extract, without corresponding improvement of quality.

9. The citral of lemon-grass oil is not to be confounded with that from true lemon oil. Both citrals are more or less indefinite bodies, being essentially aldehydic, but associated with aromatic substances which are lemon-like in one case and more or less verberna-like in the other. The distinction between them is not, at present, evident to chemical methods.

10. Methods for the quantitative determination of citral are being studied; and it is hoped that a practical method may be discovered, thus enabling Lemon Extract to be judged by determination of the component to which it owes its commercial importance.

By an Order in Council of 17, Oct. 1912 (published as Departmental Circular G. 1045) Lemon Extract is defined as below:—

“Lemon Extract is the flavouring Extract prepared from lemon peel, or from oil of lemon, and contains, along with more or less of the terpenes of Lemon Oil, not less than two tenths (0.2) of one per cent of citral derived from Oil of Lemon.”

This definition recognizes that the terpene content of lemon oil (consisting of above 90 per cent of the whole) is of secondary importance as a flavouring material. The flavour-giving components of lemon oil are essentially citral and citronellal, with smaller amounts of other substances. It remains true, however, that some difficulty is found in fully removing these flavour-giving components of the oil, without at the same time taking into solution a large portion, or even the whole of the terpenes; and the successful manufacture of a terpeneless lemon flavouring extract demands great care, and experience, as will be seen in the further study of this report.

The Order in Council just mentioned defines a Terpene Lemon Extract, as follows:—

“Terpene lemon extract is the flavouring extract prepared as above described, and contains not less than five (5) per cent of Oil of lemon, and not less than two tenths (0.2) of one per cent of Citral, derived from oil of lemon.”

This article (terpene lemon extract), is identical with the ordinary lemon extract of the U.S.A. regulations. Its manufacture demands the use of strong alcohol, without which the terpene content of oil of lemon cannot be held in solution. It has the advantage of assuring the corresponding citral content; while, in order to obtain the required amount of citral in solution where a weaker alcohol is employed, a high degree of care and skill are demanded on the part of the manufacturer.

The method employed in Citral determination in these extracts is that described by Hiltner (Jour. Ind. and Engin. Chemistry, 1909, p. 798). The method appears in Leach, Food Inspection and Analysis, Second Edition, p. 868; also in Parry's "Food and Drugs", 1911, p. 264; and in Abstract. Journ. Soc. Chem. Industry, 1910, p. 172.

Hiltner's work indicates a degree of accuracy which makes possible the determination of citral within 0.01 gramme per 100 cc. where amounts varying from 0.025 to 0.200 are present.

Work done in this laboratory shows that a somewhat less degree of accuracy than that indicated above, is obtainable with commercial extracts, possibly due to progressive oxidation of the aldehyde in presence of sunlight, and on prolonged keeping. Still another difficulty appears where the article is artificially coloured, a concession permitted without declaration by Order in Council of 9th January, 1915 (G. 1167).

The total error due to combination of all these causes may amount to 0.03 citral; and I have taken the precaution of allowing a departure of 0.05 from the standard requirements of 0.20 citral per 100 cc, before declaring the sample adulterated, under the Act. In no case has this conclusion been reached until two more determinations were made upon the sample.