TABLE VII

Approximate Composition of Octadecadiene in the Concentrates

	Percentage of total diene	
	C	C′
Preconjugated diene	10	9
Non-conjugated diene	90	91
Linoleic	59	66
Isomeric linoleic[a]	31	25
Total *trans* diene	38	27

[a] Includes both *cis,trans* or *trans,cis* isomer of linoleic acid and geometric isomers with widely separated double bonds.

where K_1 and K_2 are the observed specific extinction coefficients of the sample at 232 mμ following alkali isomerization for 25 and 60 min, respectively (after correcting for conjugation originally present); x and y are the weight fractions of linoleate and *cis,trans* or *trans,cis* isomer, respectively.

Fractions C-2 and C′-2 were isomerized for 25 min, 60 min, and 4 hr with 6.5% KOH in ethylene glycol following the procedure of Jackson *et al.* (21) and the results appear in Table VI.

As mentioned by Jackson *et al.* (21), the results are not quantitative. Nevertheless, two conclusions could be drawn from the results. A *trans,trans* isomer of linoleic acid is not present in amounts detectable by this method since the K_{232} values at 4 hr are essentially the same as at 60 min. Also contrary to previous reports (4,9), only a small amount of the isomers in these fractions consisted of *cis,trans* isomers of linoleic acid. The remainder of the isomers must consist of non-conjugated acids whose double bonds having *cis,trans* configuration are separated by more than one methylene group, since the specific extinction coefficient did not increase even after long periods of isomerization. The trienoate concentrates (C-3 and C′-3) could not be examined by this method since linolenic acid undergoes destruction during the long periods of isomerization (23–25).

Further Comments on the Nature of Octadecadienoic Acids. The presence of appreciable amounts of linoleic acid in butter fat has been reported only once (10) and has not since then been confirmed. The present work offers conclusive evidence for the presence of linoleic acid. On the basis of the results, the approximate composition of octadecadiene in the concentrates was calculated and is given in Table VII.

In explanation, the calculation of the composition of one of the fractions (C′) may be described as follows: fraction C′ contained 4.6% preconjugated diene (Table I) and 48% non-conjugated diene (obtained by adding the non-conjugated diene in all the fractions in Table II). These values were converted to percentage of total diene. About 73% of the non-conjugated diene was linoleic acid (from bromination and lipoxidase enzyme methods), the remainder of the non-conjugated diene being isomers of linoleic acid. The *trans* diene percentage represented 30% of the non-conjugated diene.

The *trans* diene percentages were slightly higher than those of isomeric linoleic acid. This was probably caused by a combination of two factors. The *trans* diene values are undoubtedly subject to error since several assumptions were made in their calculation. A major error is probably caused by assuming that all the *trans* content in fractions 8 and 9 was due to diene whereas in fact some triene seemed to have *trans* configuration. The percentages of linoleic acid were obtained by bromination and lipoxidase enzyme methods which are semi-quantitative. Actually the difference was amplified by expressing them as percentage of total diene. For example, in C′ the total *trans* diene amounted to 15% whereas the percentage of isomeric linoleic acid could be calculated to be 13.

The isomeric linoleic acid is composed of *cis,trans* or *trans,cis* isomers of linoleic acid and geometrical isomers with widely separated double bonds, the former amounting to only a minor proportion of the total isomers. Isomers with widely separated double bonds should have a *cis,trans* type of configuration since the *cis,trans* isomer of linoleic acid as estimated by the procedure of Jackson *et al.* did not account for all the *trans* diene. It is possible, however, for one half the positional isomers to have a *trans,trans* configuration, the other half having an all-*cis* configuration.

Since a considerable proportion of the non-conjugated diene of butter fat consists of positional isomers of linoleic acid with widely separated double bonds, further work should be done to isolate these acids, to determine the position of the double bonds, and to study the nutritional significance, if any, of these acids.

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• *Erratum*

JAOCS, *39*, 278 (1962), MORREN ET AL.: CONTINUOUS ONE-STEP REFINING-WATER WASHING OF CRUDE COCONUT OIL. Delete line six of the introduction, first column. The first paragraph, second sentence should read:

"... Commercial installations have demonstrated good performance of these machines in continuous processes for degumming, alkali refining, and water washing of a variety of oils (2,3)."