Waters
Lab Highlights
An Internal Communication of Applications and Techniques
LAH 0145 12/83
AN/FA/QC/CA/FT
YB 83-0489

USING WATERS FATTY ACID ANALYSIS™ COLUMN TO DETERMINE FATTY ACID COMPOSITION OF EVENING PRIMROSE AND SOYBEAN OIL (1)

Evening primrose oil (EPO) is often confused with other oils that contain alpha-linolenic acid (e.g. soybean oil, linseed oil, walnut oil) (2). The gamma-linolenic acid (18:3ω6) content of evening primrose oil was reported by Riley in 1949 (3). EPO is the only seed oil which is rich in the 18:3ω6 linolenic acid (9%) as compared to soybean oil, corn oil or linseed oil which contain 18:3ω3. Therefore, the distinction in isomers is the key to the identification of EPO. The present report shows that the Waters Fatty Acid Analysis™ column can rapidly distinguish between these two fatty acid isomers on the saponified oil (1).

A typical separation of the saponified EPO is shown in Figure 1.

FIGURE 1

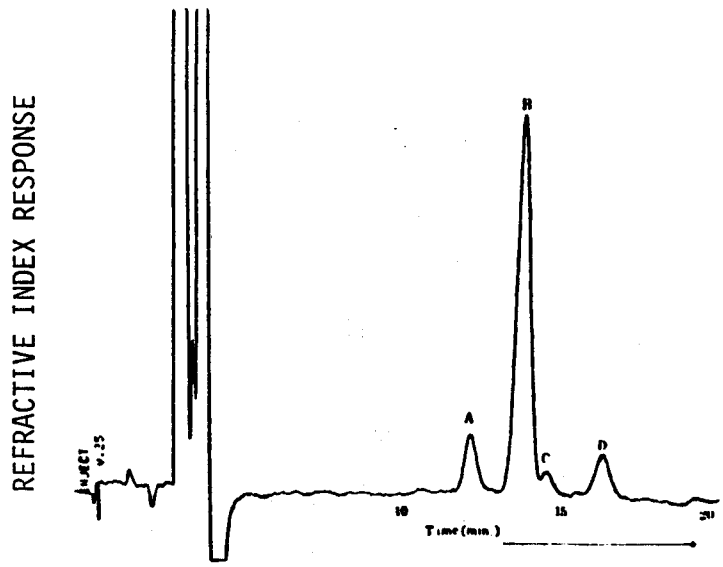

FIGURE 1. Separation of saponified primrose oil using free fatty acid analysis column. Identification of acids: (A) linolenic 18:3ω6, (B) linoleic 18:2ω6 and palmitic 16:0, (C) stearic 18:0, (D) oleic acid 18:1ω9. Mobile phase: water:acetonitrile:tetrahydrofuran:acetic acid (50:40:25:0.1) by volume. Flow rate: 1 ml/min.

Waters
Division of MILLIPORE 34 Maple St. / Milford, MA 01757 / 617-478-2000
Brian Bidlingmeyer

Table 1 summarizes the linolenic acid composition of saponified free acids from evening primrose oil (EPO) and soybean oil (SOY) on the Fatty Acid Analysis™ column and the composition of the esters of the linolenic acids in esterified oils on a capillary gas chromatography column.

TABLE 1

COMPOSITION OF LINOLENIC ACID ISOMERS USING GC AND LC

	EPO		SOY	
Fatty Acid	GC	LC	GC	LC
18:3ω6	9.5	10.3	not detected	not detected
18:3ω3	not detected	not detected	8.5	8.2

LC gave results similar to capillary GC for this separation. Both methods distinguish between the two oils, based upon the isomer content.

It is refreshing to know that LC and GC give similar results for fatty acid analysis. In fact, the two separation techniques are complementary. For instance, if both LC and GC are used for fatty acid analysis, the impact of the esterification method on polyunsaturated fatty acids may be accessed (4,5), since the LC analysis is made on the free fatty acids while the GC analysis is run on the esterified sample.

1. M. S. Manku, J. Chromatog. Sci., 21,367 (1983)
2. N. O. V. Sonntag. In Bailey's Industrial Oil and Fat Products, 4th ed. D. Swern, ed. John Wiley & Sons, Inc., New York, 1979, p. 424.
3. J. P. Riley, J. Biol. Chem, 2728-731 (1949).
4. A. J. Sheppard and J. L. Iverson, J. Chromatogr. Sci., 13, 448 (1975)
5. R. G. Ackman and R. D. Burgher. Cod liver oil: J Fish Res. Bd., Canada, 21, 2 (1964).