

Date : June 29, 2022

CERTIFICATE OF ANALYSIS – TOTAL FATTY ACIDS METHYL ESTERS (FAMES)

SAMPLE IDENTIFICATION

Internal code : 22F14-PTH06

Customer identification : Evening Primrose 9% GLA - EB0116R

Type : Vegetable oil & fats

Source : *Oenothera biennis*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-010 - Fatty acids profiling of a vegetable oil or a plant by hydrolysis and derivatisation (FAMES).

Analyst : Seydou Ka, Ph. D.

Analysis date : June 22, 2022

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow viscous liquid

Refractive index: 1.4776 ± 0.0003 (20 °C; method PC-MAT-016)

USP40-NF35 - EVENING PRIMROSE OIL

| Compound | Min. % | Max. % | Observed % | Complies? |
|-------------------------|---------------|---------------|-------------------|------------------|
| Palmitic acid | 4.0 | 10.0 | 7.2 | Yes |
| Stearic acid | 1.0 | 4.0 | 2.8 | Yes |
| Oleic acid | 5.0 | 12.0 | 8.9 | Yes |
| γ-Linolenic acid | 7.0 | 14.0 | 8.2 | Yes |
| Linoleic acid | 65.0 | 85.0 | 69.5 | Yes |
| Refractive index | 1.477 | 1.479 | 1.478 | Yes |

CONCLUSION

The oil features the expected fatty acids composition for evening primrose oil, based on the United States Pharmacopoeia's standard.

ANALYSIS DATA

| Fatty acids | | Shorthand formula | R.T | R.I | % | Type |
|---|---|-------------------|--------------------------------|------|-------|------|
| Common name | Systematic name | | | | | |
| Myristic acid | Tetradecanoic acid | C14:0 | 9.70 | 1396 | 0.05 | SFA |
| Palmitic acid | Hexadecanoic acid | C16:0 | 12.22 | 1600 | 7.24 | SFA |
| Hypogeic acid | (7Z)-Hexadecenoic acid | C16:1 n-9 c | 13.04 | 1654 | 0.02 | MUFA |
| Palmitoleic acid | (9Z)-Hexadecenoic acid | C16:1 n-7 c | 13.21 | 1663 | 0.06 | MUFA |
| Margaric acid | Heptadecanoic acid | C17:0 | 13.88 | 1701 | 0.08 | SFA |
| <i>cis</i> -9-Heptadecenoic acid | (9Z)-Heptadecenoic acid | C17:1 n-8 c | 15.04 | 1760 | 0.04 | MUFA |
| Stearic acid | Octadecanoic acid | C18:0 | 16.04 | 1804 | 2.82 | SFA |
| Octadecenoic acid isomer IV | Octadecenoic acid | C18:1 | 17.00 | 1845 | 0.02 | MUFA |
| Oleic acid | (9Z)-Octadecenoic acid | C18:1 n-9 c | 17.40 | 1860 | 8.89 | MUFA |
| <i>cis</i> -Vaccenic acid | (11Z)-Octadecenoic acid | C18:1 n-7 c | 17.60 | 1868 | 0.63 | MUFA |
| Linolelaidic acid | (9E,12E)-Octadecadienoic acid | C18:2 n-6 tt | 18.51 | 1903 | tr | PUFA |
| Nonadecylic acid | Nonadecanoic acid | C19:0 | 18.67 | 1909 | 0.01 | SFA |
| <i>cis,trans</i> -9,12-Octadecadienoic acid | (9Z,12E)-Octadecadienoic acid | C18:2 n-6 ct | 19.10 | 1925 | 0.08 | PUFA |
| Linoleic acid | (9Z,12Z)-Octadecadienoic acid | C18:2 n-6 cc | 19.77 | 1949 | 69.46 | PUFA |
| γ -Linolenic acid | (6Z,9Z,12Z)-Octadecatrienoic acid | C18:3 n-6 ccc | 21.32 | 2001 | 8.23 | PUFA |
| Arachidic acid | Eicosanoic acid | C20:0 | 21.50 | 2007 | 0.38 | SFA |
| α -Linolenic acid | (9Z,12Z,15Z)-Octadecatrienoic acid | C18:3 n-3 ccc | 22.42 | 2038 | 0.20 | PUFA |
| Gondoic acid | (11Z)-Eicosenoic acid | C20:1 n-9 c | 22.91 | 2054 | 0.02 | MUFA |
| Paullinic acid | (13Z)-Eicosenoic acid | C20:1 n-7 c | 23.09 | 2060 | 0.75 | MUFA |
| <i>cis</i> -15-Eicosenoic acid? | (15Z)-Eicosenoic acid | C20:1 n-5 c | 23.53 | 2074 | 0.02 | MUFA |
| Stearidonic acid | (6Z,9Z,12Z,15Z)-Octadecatetraenoic acid | C18:4 n-3 cccc | 24.25 | 2097 | 0.04 | PUFA |
| Heneicosylic acid | Heneicosanoic acid | C21:0 | 24.50 | 2105 | tr | SFA |
| <i>cis,cis</i> -11,14-Eicosadienoic acid | (11Z,14Z)-Eicosadienoic acid | C20:2 n-6 cc | 25.70 | 2144 | 0.06 | PUFA |
| Behenic acid | Docosanoic acid | C22:0 | 27.74 | 2211 | 0.15 | SFA |
| Erucic acid | (13Z)-Docosenoic acid | C22:1 n-9 c | 29.11 | 2262 | 0.38 | MUFA |
| Tricosylic acid | Tricosanoic acid | C23:0 | 30.25 | 2311 | 0.02 | SFA |
| Lignoceric acid | Tetracosanoic acid | C24:0 | 32.10 | 2399 | 0.04 | SFA |
| Total PUFA: 77.99% | | | Total identified 99.66% | | | |
| Total MUFA: 10.82% | | | | | | |
| Total SFA: 10.78% | | | | | | |

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index
PUFA: Polyunsaturated fatty acid
MUFA: Monounsaturated fatty acid
SFA: Saturated fatty acid

