

INDUSTRIAL OIL AND FAT PRODUCTS

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Butyric and *caproic* acids are found in appreciable quantity only in milk fats, where each may occur to the amount of 2-4% by weight of the total fatty acids. *Caprylic* and *capric* acids occur in milk fats and in coconut and palm kernel oils to the extent 1 to 8% each. *Lauric* acid constitutes 40-50% of the total fatty acids of coconut and the various palm kernel

TABLE 2
THE NATURALLY OCCURRING SATURATED FATTY ACIDS, THEIR MOLECULAR WEIGHTS,
AND CERTAIN OF THEIR CALCULATED CHARACTERISTICS

Common name	Systematic name	Number of C atoms	Molecular weight of the acid	Molecular weight of its triglyceride	Neutralization value of the acid	Saponification value of the triglyceride
Butyric	Butanoic	4	88.10	302.4	636.8	556.6
Caproic	Hexanoic	6	116.16	386.5	483.0	435.5
Caprylic	Octanoic	8	144.21	470.7	389.0	357.6
Capric	Decanoic	10	172.26	554.8	325.7	303.4
Lauric	Dodecanoic	12	200.31	639.0	280.1	263.4
Myristic	Tetradecanoic	14	228.36	723.1	245.7	232.8
Palmitic	Hexadecanoic	16	256.42	807.3	218.8	208.5
Stearic	Octadecanoic	18	284.47	891.5	197.2	188.8
Arachidic	Eicosanoic	20	312.52	975.6	179.5	172.5
Behenic	Docosanoic	22	340.57	1059.8	164.7	158.8
Lignoceric	Tetracosanoic	24	368.62	1143.9	152.2	147.1
Cerotic	Hexacosanoic	26	396.67	1228.0	141.4	137.1

TABLE 3
BOILING POINTS OF THE SATURATED FATTY ACIDS AND MELTING POINTS
OF THE ACIDS AND THE CORRESPONDING SIMPLE TRIGLYCERIDES

Acid	Boiling point, °C. at 16 mm.	Melting point of acid, °C.	Melting point of triglyceride, °C. ^a
Butyric	163 (at 760 mm.)	-8	—
Caproic	107	-1	—
Caprylic	135	16	—
Capric	159	31.3	31.5
Lauric	182	43.5	46.4
Myristic	202	54.4	57.0
Palmitic	222	62.9	65.5
Stearic	240	69.6	71.5
Arachidic	—	75.4	—
Behenic	—	80.0	—
Lignoceric	—	84.2	—

^a Melting point of the highest melting, most stable crystal modification.

oils, and is found in small amounts, *i. e.*, 2-6%, in milk fats. *Myristic* acid is a minor constituent (2% or less) of many common seed oils, fruit coat oils, and animal fats. It occurs in milk fats to the extent of 8-12%, and in coconut and palm kernel oils to the extent of 15-30%. It is a major component of seed fats of the *Myristicaceae* family (nutmeg butter, ucuhiba butter, etc.), where it may constitute 70-80% of the total fatty acids.

such an acid in quantity in pilchard oil. A tetracosapentaenoic acid (24 C atoms, 5 double bonds) has been found in fish oil by Ueno and Iwai,⁴³ and a tetracosahexaenoic acid (24 C atoms, 6 double bonds), with double bonds probably in the 4:5, 8:9, 12:13, 15:16, 18:19, and 21:22 positions has been

TABLE 4
MOLECULAR WEIGHTS AND RELATED CHARACTERISTICS OF UNSATURATED FATTY ACIDS

Fatty acid	Number of C atoms	Number of double bonds	Molecular weight of the acid	Molecular weight of its triglyceride	Neutralization value of the acid	Saponification value of the triglyceride	Iodine value of the acid	Iodine value of the triglyceride
Decenoic	10	1	170.24	548.8	329.6	306.7	149.1	138.77
Dodecenoic (lauroleic)	12	1	198.29	632.9	282.9	265.9	128.0	120.32
Tetradecenoic (myristoleic)	14	1	226.34	717.1	247.9	234.7	112.1	106.20
Hexadecenoic (palmitoleic)	16	1	254.39	801.2	220.5	210.1	99.78	95.04
Octadecenoic (oleic, etc.)	18	1	282.44	885.4	198.6	190.1	89.87	86.01
Eicosenoic (gadoleic)	20	1	310.50	969.5	180.7	173.6	81.75	78.54
Docosenoic (erucic, etc.)	22	1	338.55	1053.7	165.7	159.7	74.98	72.27
Tetracosenoic (selacholeic)	24	1	366.60	1137.9	153.0	147.9	69.24	66.93
Octadecadienoic (linoleic)	18	2	280.43	879.3	200.0	191.4	181.04	173.21
Hexadecatrienoic	16	3	250.36	789.2	224.1	213.3	304.17	289.48
Octadecatrienoic (linolenic, etc.)	18	3	278.41	873.3	201.5	192.7	273.52	261.61
Octadecatetraenoic	18	4	276.40	867.3	203.0	194.1	367.35	351.21
Eicosatetraenoic (arachidonic, etc.)	20	4	304.45	951.4	184.3	176.9	333.51	320.17
Eicosapentaenoic	20	5	302.43	945.3	185.5	178.1	419.67	402.79
Docosapentaenoic	22	5	330.49	1029.5	169.8	163.5	384.04	369.85
Docosahexaenoic	22	6	328.47	1023.5	170.8	164.4	463.68	446.42
Tetracosapentaenoic	24	5	358.54	1113.7	156.5	151.1	353.99	341.89
Tetracosahexaenoic	24	6	356.52	1107.6	157.4	152.0	427.20	412.52
Hexacosapentaenoic	26	5	386.59	1197.8	145.1	140.5	328.31	317.88
Hexacosahexaenoic	26	6	384.57	1191.8	145.9	141.2	396.04	383.38

reported by Toyama and Tsuchiya.⁴⁴ These acids have been given the respective names *scoliodonic* and *nisinic*.

The occurrence in certain fish oils of traces of hexacosapentaenoic acid (26 C atoms, 5 double bonds), and hexacosahexaenoic acid (26 C atoms, 6 double bonds) has been reported.⁴⁵

The molecular weights and certain related characteristics calculated for

⁴³ S. Ueno, and M. Iwai, *J. Soc. Chem. Ind. Japan*, **37**, 251-255B (1934).

⁴⁴ Y. Toyama and T. Tsuchiya, *Bull. Chem. Soc. Japan*, **10**, 539-543 (1935).

⁴⁵ S. Ueno and C. Yonese, *Bull. Chem. Soc. Japan*, **11**, 437-442 (1936). S. Ueno and M. Iwai, *ibid.*, **11**, 643-649 (1936).