The Chemical Composition of Tunisian Olive Oil

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THE composition of California and Italian oils has been determined previously in this laboratory and reported in this journal (2, 40 and 110, 1925). Recently oil expressed from olives grown in the Sousse district of Tunis* has been examined so that a comparison can be made of the composition of oils obtained from olives grown in different parts of the world.

Chemical and Physical Characteristics: The more important chemical and physical characteristics are recorded in Table I and for comparison the characteristics of the other two oils also are given. The methods used were the same as those used for the other two oils.

* (The oil was kindly furnished by Mr. Nathan Musher).

Unsaturated Acids: The iodine number of the unsaturated acids (103.6) indicates that this fraction of the fatty acids consists of oleic acid (iodine number 90.1) and linolic acid (iodine number 181.4). The following percentages were calculated using these iodine numbers.

	Percentage composition of unsaturated acid fraction %	In original oil %	Glycerides in original oil %
Oleic acid..	85.21	66.12	69.1
Linolic acid	14.79	11.48	12.0
	100.00	77.60	81.1

Saturated Acids: The saturated acids were separated from a portion of the oil and were esterified with methyl alcohol. This mixture of methyl esters (140 g.) was fractionally distilled under diminished

TABLE I. Physical and Chemical Characteristics of Olive Oil

	Tunisian oil	Italian oil bitonto type	California oil
Specific gravity, 25°/25°	0.9131	0.9120	0.9119
Refractive index, 20° C	1.4700	1.4690	1.4690
Acid value	1.9	1.8	1.5
Iodine number (Hanus)	86.0	84.4	85.1
Saponification value	193.6	190.8	190.6
Unsaponifiable matter (%)	0.8*	1.1	1.0
Acetyl value	8.3	7.0	11.2
Saturated acids (determined) (%)	17.5†	....	....
Unsaturated acids plus unsaponifiable matter (determined) (%)	77.6	....	....
Iodine number of unsaturated acids plus unsaponifiable matter	103.8	....	....
Iodine number of unsaturated acids	103.6	94.2	94.8
Saturated acids (corrected) (%)	16.5	10.9	8.9
Unsaturated acids (corrected) (%)	77.6	83.3	85.2

*Iodine number 117.0.
†Iodine number 6.1.

TABLE II. Tunisian Olive Oil, Saturated Acids

	Percentage composition	Acids in original oil	Glycerides in original oil
	%	%	%
Myristic acid	0.82	0.13	0.1
Palmitic acid	83.44	13.77	14.4
Stearic acid	14.19	2.34	2.4
Arachidic acid	1.55	0.26	0.3
	100.00	16.50	17.2

pressure. The fractions were analyzed and their compositions were calculated in the same manner as described in the article on the California oil.

The results given in Table II were calculated from the analytical data obtained. The percentage composition of the saturated acid fraction is given in Column 1. These results are reduced to the basis of the original oil in Column 2 and the equivalent percentages of glycerides are given in Column 3.

The acids were recovered from some of these methyl ester fractions by saponifying with alcoholic potash and decomposing the resulting soap with hydrochloric acid. Palmitic, stearic and arachidic acids were isolated by fractional crystallization from alcohol the fatty acids obtained from various fractions. Their identity was established by their melting points and by observing whether or not these melting points were lowered when the substances were mixed with equal amounts of the respective acids which they were suspected of being and the purity of which had been established previously by elementary analyses. No acid with a molecular weight higher than that of arachidic acid could be detected. It was not possible to isolate pure myristic acid but after obtaining several crops of palmitic acid crystals from the lowest boiling fraction and reducing the volume of the mother liquor a small crop of crystals melting at 55°-56° C. was obtained. It is believed that it consisted of a mixture of myristic acid (m.p. 54° C.) and palmitic acid (m.p. 63° C.).

Discussion of the Results: The chemical compositions of the three oils are given in Table III.

An inspection of Table I will show that the specific gravities, refractive indices and saponification

TABLE III. Composition of Olive Oil

Glycerides of	Tunisian olive oil	Italian olive oil, Bitonto type	California olive oil
	%	%	%
Oleic acid	69.1	83.1	84.4
Linolic acid	12.0	3.9	4.6
Myristic acid	0.1	trace	trace
Palmitic acid	14.4	9.2	6.9
Stearic acid	2.4	2.0	2.3
Arachidic acid	0.3	0.2	0.1
Unsaponifiable matter	0.8	1.1	1.0
	99.1	99.5	99.3

values of the three oils lie close together. Also there is very little difference in the iodine numbers of the oils and the iodine numbers of the unsaturated acids fractions of the California and Italian oils are practically the same but the iodine number of the Tunisian oil unsaturated acids is higher. The Tunisian oil contains a considerably higher percentage of saturated acids and a lower percentage of unsaturated acids than the other two oils.

Lewkowitsch[1] states that the solid acids consist of palmitic acid and a minute proportion of arachidic acid but that Hehner and Mitchell did not detect stearic acid and therefore the absence of stearin must be taken as proven. Myddleton and Barry[2] give the composition of the acids in olive oil as palmitic 14.6 per cent; oleic 75.4 per cent, and linolic 10.0 per cent. Lapworth and Mottram[3] give oleic acid 72 per cent; linolic 12-13 per cent; higher saturated acids 14-15 per cent, and unsaponifiable matter 1.4 per cent. Eibner and Rasquin[4] report the composition of the oil as oleic acid 79.7 per cent; linolic acid 6.7 per cent; palmitic acid 5.5 per cent; stearic acid 3.4 per cent; and glycerol 4.2 per cent, while Taüfel and Saria[5] report the composition of Spanish oil as oleic acid 83.9 per cent, linolic 0.5 per cent, palmitic 7.5 per cent, stearic 2.3 per cent, glycerol 4.4 per cent and unsaponifiable 0.8 per cent.

Looking at Table III, the reader will observe that the composition of California and Italian oils is quite similar, the greatest difference being 2.3 per cent in the amounts of palmitic acid glyceride present. But the Tunisian oil composition is much different. It contains 14-15 per cent less of oleic acid glyceride than the other two and about three times as much linolic glyceride. It has twice as much palmitic glyceride as the California oil. The content of stearic acid and arachidic acid glycerides is about the same in all three samples.

[1] (Chemical Technology and Analysis of Oils, Fats and Waxes, Ed. 6, *1*, p. 362).
[2] Fats; Natural and Synthetic, page 107.
[3] J. Chem. Soc., 127, 1628 (1925).
[4] Chem. Umschau, *33*, 29-38 (1926).
[5] Anales soc. espan. fis quim., *24*, 25-40 (1926).

WESSON OIL BAROMETER INDICATES FAIR WEATHER

Definite proof that the cotton oil industry is on a sound basis and that the outlook is favorable for some time to come was furnished by the announcement late in January that Wesson Oil & Snowdrift Company had placed its common stock on a regular dividend basis. Holders of Wesson Oil Common will receive their first dividend on April 1st.

This action can be noted with considerable interest by the trade. In the short period of its history, Wesson Oil & Snowdrift has established a record for conservative management. Since its organization nearly two years ago, the company has consistently followed a policy of plowing back its earnings into the business, and its profits have not been dissipated by large disbursements to stockholders. On the other hand, a large block of preferred stock was acquired on the open market by advantageous purchases, and this stock has been cancelled.

In addition to placing the common stock on a regular dividend

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