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ON THE EXAMINATION OF OLIVE, LINSEED, AND OTHER OILS.

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HAVING seen reason, after careful investigation, to adopt Wijs' method of determining the iodine value of oils in place of the Hübl method, we have made an examination of various oils of undoubted genuineness, and propose in the present paper to describe the results. As we have stated before, there is an element of uncertainty and unreliability in the Hübl method, and in any event the Wijs and Hübl results cannot be depended on as being interchangeable. It is therefore of importance that a fresh series of iodine values by the Wijs method should be constructed, and this we have done for several oils in the present paper, and embodied the results, along with those of other constants, in Tables I. and II., p. 282.

In the case of the olive oils prepared from the olives by ourselves, those extracted by carbon bisulphide were from the residue left after pressing out the bulk of the oil, and it will be observed that there is little difference between the two varieties. It is evident from these results that a genuine olive oil may vary in iodine value from 81 to 89, and may be regarded as such if the other constants are normal. There is a peculiarity with regard to the Mogador oil, which has an extremely high iodine value, while the refractometer reading is lower than would be expected. We have found with regard to linseed and fish-liver oils that the iodine value and refractometer reading practically rise and fall simultaneously, but olive oil appears to be quite erratic in this respect, as will be seen by an inspection of the tables. This difference is no doubt partly due to the influence of the free fatty acids, which, it has been stated, lower the refractive power; and this is undoubtedly the case, as will be seen from Table III., p. 283.

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TABLE I.

Oils extracted by ourselves from the Seed or Fruit, so that their Genuineness can be absolutely depended upon.

	Iodine Value (Wijs).	Zeiss Refracto- meter at 25° C.	Saponifi- cation Value. Per Cent.	Unsa- ponifiable Matter. Per Cent.	Specific Gravity, 60° F.	Free Acid. Per Cent.
Olive oil (Spanish, green, by pressure)	83.20	61.2	19.56	1.25	—	1.28
Olive oil (Spanish, green, by CS ₂)	83.20	61.2	19.21	1.62	—	0.90
Olive oil (Spanish, ripe, by pressure)	88.95	61.3	19.28	1.34	0.9156	0.51
Olive oil (Spanish, ripe, by CS ₂)	88.15	62.2	19.14	1.52	—	0.36
Olive oil (Turkish, very ripe)	89.1	61.2	19.21	1.24	0.9156	9.37
Linseed oil (Riga seed)	205.4	85.5	19.21	1.25	—	—
Linseed oil (St. Peters- burg)	200.0	84.2	19.28	1.23	—	—
Linseed oil (North American)	194.6	83.2	19.21	1.10	—	—
Linseed oil (Calcutta) ...	188.6	81.7	19.28	0.88	—	—
Linseed oil (River Plate)	185.5	81.0	19.14	1.25	—	—
Ravison oil	118.1	71.0	18.13	1.65	—	—
Jamba oil	98.3	67.2	17.53	1.02	—	—
Rape oil (East India) ...	104.5	68.0	17.53	1.02	—	—
Almond oil	98.1	64.3	—	—	—	—
Castor oil	85.6	78.3	18.16	0.60	—	—

TABLE II.

Oils obtained from Reliable Sources.

	Iodine Value (Wijs).	Zeiss Refracto- meter at 25° C.	Saponifi- cation Value. Per Cent.	Unsa- ponifiable Matter. Per Cent.	Specific Gravity, 60° F.	Free Acid. Per Cent.
Olive oil (Crete)	81.2	60.2	19.14	—	0.9155	9.40
„ (Italian)	83.5	59.7	19.21	—	0.9157	16.61
„ (Sicilian)	84.1	60.0	19.07	—	0.9144	11.50
„ (Levant)	84.4	61.0	19.21	—	0.9159	9.32
„ (Algerian)	85.1	60.7	19.14	—	0.9150	5.62
„ (Syrian)	85.3	60.1	19.14	—	0.9145	11.76
„ (Spanish)	86.6	61.2	19.21	—	0.9161	7.27
„ (Mogador)	94.3	60.5	19.07	—	0.9150	24.72
Poppy-seed oil	140.0	71.0	19.28	0.52	0.9243	1.62
Sunflower oil (Russian) (by Hübl's method) ...	131.3	70.0	18.93	0.70	0.9220	1.21
Arachis oil	87.5	62.6	19.14	—	0.9164	—

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TABLE III.

Showing the Effect of Free Fatty Acids on the Refractive Power of Olive Oil.

	Olive Oil (Mogador).	Olive Oil (Italian).
Iodine value before removal of free acid	94.30	83.50
Iodine value after removal of free acid	93.45	80.45
Zeiss refractometer, 25° C. before removal of free acid	60.50	59.70
Zeiss refractometer, 25° C. after removal of free acid	63.40	61.00
Free oleic acid, per cent. before removal of free acid	24.72	16.61
Free oleic acid, per cent. after removal of free acid	0.32	0.27

TABLE IV.

Comparison of Iodine Value and Refractive Power of Linseed and certain Fish-liver Oils.

	Iodine Value.	Zeiss Refractometer at 25° C.
Linseed oil (Riga)	205.4	85.5
„ (St. Petersburg)	200.0	84.2
„ (North America)	194.6	83.2
Skate-liver oil	191.1	82.5
Linseed oil (Calcutta)	188.6	81.7
Haddock-liver oil	186.4	81.0
Linseed oil (River Plate)	185.5	81.0
Whiting-liver oil	184.2	81.0

The differences referred to cannot, however, be entirely explained by the influence of the free acid, as will be apparent from an examination of the results in Tables I. and II., and especially of those of the two oils extracted from the same Spanish ripe olives, where the oil with the lower iodine value shows the higher refractive power, the free acids being practically the same.

The different samples of linseed from which we prepared the oils were carefully examined, and any foreign seeds removed, so that only the genuine linseed was employed. It will be observed that the iodine value for the oil extracted from the Riga seed is, we believe, the highest on record, while that from the River Plate has an iodine value much higher than what was recorded by one of us some years since. There can be no doubt, however, that these high figures are due partly to the use of the Wijs in place of the Hübl method, and where the former is employed any iodine value below 180 should lead to a more searching examination of the oil.

As regards the other oils of which the constants are included in the tables, it is scarcely necessary to make any remarks, except that the jamba oil cannot be distinguished from rape oil by ordinary means, and that in some few cases the

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employment of the refractometer along with the iodine value may be useful, although the former is of no independent importance.

In conclusion, we would draw particular attention to the peculiar similarity between various linseed oils and certain fish-liver oils as regards iodine value and refractive power, as shown in Table IV., p. 283.

Of course, linseed oils have a distinctly higher specific gravity than the fish-liver oils, but the saponification value and unsaponifiable matter are much the same in each.

