The Composition of Porpoise Jaw Oil

Valuable Lubricant Shown to Consist of Mixture of Fatty Oil and Liquid Wax

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AS IS well known, this oil is used chiefly for the lubrication of the finest machinery—as chronometers and clocks. Owing to increasing demand, it is becoming scarcer and much more expensive—(present price about $60.00 per gallon). Chevreul worked upon the blubber oil and reported the presence of iso-valeric acid or "acide phocenique"*, the name indicating the source, as is customary with fatty acids. He found also stearic, palmitic and oleic acids, and supposed the oil—like others—to be a glyceride. Lewkowitsch thought it should be reinvestigated and suggested that it might be a mixture of an oil and liquid wax—which it is. In view of this fact and with the thought that it might possibly be synthesized, it was subjected to examination.

The sample was furnished by Mr. Wordell of the William F. Nye Company of New Bedford, who vouched for its genuineness, and was from the head of the porpoise (*tursiops truncatus*) a fish about eight feet long, caught off Hatteras.

The characteristics of the oil were as follows:

Sp. Gr. 0.9241 at 15.5°C.
Saponification value 293
Refractive index 1.4519 at 20.5°C.
Iodine No. (Hanus) 28.3
Reichert Meissl No. 139
Acid value 2.88
Cold Test — 19°C.
Viscosity 101 sec. at 100° F. Saybolt
Rotation +0.3° 1 dm. tube (20.46 centipoise)

The oil was saponified with a measured quantity of N/2 alcoholic potash at a return flow condenser, and the result neutralized with a known amount of N/2 hydrochloric acid. The alcohol and water were evaporated upon the water bath. The residue was dissolved in water. The unsaponifiable matter was dissolved out with ether† the remaining solution evaporated to dryness at 105°, and weighed. This contains the potassium soaps, excess potassium chloride, glycerine and water. The latter was determined by distilling with toluene by Dean's method. The potassium chloride was calculated from the acid used. The glycerine was determined by the acetin method, using a fresh sample. The potassium soaps of the fatty acids were therefore determined by difference, and the weight of potassium in them being known, the weight of the fatty acids themselves was determined. The fatty acids on steam distillation showed themselves to be 96.8% volatile (iodine value 3.1) and 3.2% non-volatile (iodine value 32.6). Of the mixed acids, 89.6% came over between 170° and 171°, the iodine value was 0 and neutralization equivalent 104 (theory for valeric acid 102). Their ethyl esters boiled between 133° and 145°. The boiling points of the valeric esters vary from 144.6° for the normal to 133.5°. The presence of the valeric acids can therefore be considered as proven, but sufficient material was not at hand to determine which of the four isomers was present.

Mixed Acids

OF THE mixed acids 89.6% came over below 17.2°, leaving 10.4% difficulty volatile or non-volatile: there were 96.8% of volatile acids and 32% non-volatile or 86.7% (96.8 x 89.6=86.7) volatile acids. The neutralization equivalent of the non-volatile acids is 266 which corresponds to a mixture of palmitic and oleic acid. The iodine number of these acids is 32.6, corresponding to 36.2% $\left\{\frac{326}{900}\right\}$ oleic acid in the 10.4 non-volatile acids. This means there are in the non-volatile acids 100—86.7=13.3%; 36.2% or 4.8% oleic acid and 8.5% palmitic acid. This gives a neutralization value of 264.9 compared with 266 found: The acids would then be isovaleric 26.7, palmitic 8.5, oleic 4.8.

[1] Presented at Third Fall Meeting of American Oil Chemists' Society.

*From Delphinus phocoena, Latin name of the dolphin.

† Ether is found to be better as to forming emulsions than petroleum ether, benzol or chloroform; the mixture should be shaken with a rotary motion.

The unsaponifiable matter reacts with sodium and dissolves completely when treated with acetic anhydride showing the presence of higher alcohols. It becomes solid at 0° and distills between 300° and 310° with but little decomposition.

An ultimate analysis of this portion gave carbon 77.7%, hydrogen 13.5. Theory for dodecyl alcohol requires 77.4 and 13.97. A molecular weight determination in benzene gave 394.2 as against 392 for the double molecule. Doubling of the molecule in benzene is not unusual.

There is also present in the unsaponifiable matter a small quantity of a substance melting at 61°, the melting point of tetradecyl alcohol. The purification and separation of these alcohols is not easy, on account of their ready solubility in all the solvents in the laboratory. Distillation is the only method left and this with such small quantities is very unsatisfactory.

The analysis figures out somewhat as follows:

Dodecyl alcohol $C_{12}H_{25}IH$	13.7	per cent
Glycerol	18.5	" "
Fatty Acids	72.2	" "

made up of 62.6 per cent iso-valeric; 6.1 palmitic and 3.5 oleic. It will of course be remembered that these figures represent glycerol, alcohols and acids, contained in the oil, carrying OH and H groups, whereas in the oil itself these products are combined as esters.

The oil in question, would seem to be made up about as follows:

Free isovaleric acid	2.9	per cent
Mono di or tri isovalerin	59.9	" " by difference (Actually found 57.7)
Tri-Palmitin	6.4	" "
Tri-olein	3.6	" "
Dodecyl valerate	27.2	" "

It is assumed that the palmitic and oleic acids are present as the tri-glycerides: inasmuch as there is an excess of glycerine to form tri-valerin, it would seem to indicate that a mono- or di-valerin was present in the oil. No cholesterol was found.

In conclusion, the writers wish to acknowledge their indebtedness to Messrs. S. M. Thronson, E. L. Mitlying and L. N. Leum, assistants of the senior author, for careful work in checking up some of the results obtained.

Williams Sealing Corp., Decatur, Ill., makers of Kork-N-Seal caps, have started a new type of advertising in the *Saturday Evening Post*, supplementing the column announcements which have been running during the past several months and which have been designed to impress consumers with the desirability of products capped with the Williams seal. The new advertising, which is being done on smaller space, offers 50 special high pressure Kork-N-Seals for $1, suggesting the use of the cap in connection with ginger ale type bottles. The idea behind this advertising is to get the general public better acquainted with the features of the Williams cap.

Grocers Attack Margarine Tax

Repeal of federal and state license taxes on retail grocers who sell margarine will be sought by the National Association of Retail Grocers. The Association representing 80,000 retail grocery establishments in the United States regards as an "unjust discrimination against both grocers and consumers," according to C. H. Janssen, of St. Paul, secretary. A committee to undertake a definite national program to obtain relief from the margarine license taxes has been appointed.

"The retail grocer's tax on margarine places a burden of millions of dollars a year on the consuming public," declared Mr. Janssen. "The National Association of Retail Grocers opposes the levy of this tax on margarine and similar taxes on food and grocery products as an unjust discrimination against both grocers and consumers. Margarine is a wholesome food product manufactured under the strict supervision of the United States Food Inspection service of the Department of Agriculture and the product itself complies with all the regulations of the Food and Drugs Act. The ingredients of which margarine is composed are produced on American farms and the manufacture of margarine contributes materially to the prosperity of American farmers and consumers. The tax is an expense which the retail grocer can ill afford at present. Moreover it makes it difficult for the consuming public to obtain a useful, necessary and wholesome article of food."

New Oil Plant in Mexico

The Bureau of Foreign and Domestic Commerce reports that the Explotadora de Acietes Vegetales, capitalized at $150,000, at Mazatlan, Mexico, began construction in October last and is now starting business. All of the machinery, valued at $60,000, is of American manufacture and is of strictly modern design. This concern plans to import copra from Tahiti via San Francisco and to export copra meal and cottonseed meal. It plans also to handle coquita nuts from Sinaloa and Nayarit and cottonseed from Sonora.

Spanish Producers to Organize

According to recent advices from the Consular Office at Madrid, the Spanish Press is inclined to attribute the high price of olive oil to consumers to the operations of an excessive number of middlemen. The oil is purchased by commission merchants employed by the men who supply the retailers. According to local opinion, it is not exaggerating to say that the olive oil reaching the consumer through these regular channels increases in price from 30 to 40 percent. The belief has been expressed by some authorities that if the producers were to organize on a solid basis the natural result would be to reduce the number of middle men because they would take over the problem of distribution collectively. The cooperative idea has also been reported as having been accepted in the Assembly, in the Ateneo of Madrid of Olive Oil Exporters, and in the Congress of Olive Oil Producers and Exporters, which has been recently held in Seville. Granted that the producers did organize either by towns, regions, or on a national basis, they would not only control the domestic market, but would be in a more favorable position to regulate exportation.

Although olive oil exportation from Spain has averaged around a half million quintals annually over the period of the last 28 years, it is not consistent from season to season. This is due to various influences, among them being principally the demand for olive oil in the intermediary countries which re-export it. If there is a good crop in the producing countries, the intermediary countries reduce their purchases in Spain accordingly, and vice-versa. On the other hand, if the crop in Spain is light, the producers are not able to attend to the demands from the outside. In other words, the Spanish market is not under the control of the producers. The only solution to this question would be in the formation of an organization of the producers with a view to maintaining regularity in exportation. To accomplish this, however, and to eliminate such countries as France and Italy from acting as intermediaries in the sale of Spanish olive oil, it would be necessary to have disposable stocks on hand at all times. This is said to be impossible at the present time.

The successful organization of producers appears difficult in view of the fact that out of 400,000 here are only 10,000 associated commercially.

Soy Bean Trade

(*From Page* 98)

Imports Into the United States

PRODUCTION has not kept pace with the demand, however, and the United States is still a large importer, not only of the beans, but also of the cake and oil. Imports of cake and meal for the first nine months of 1928 approximated 40,000 short tons.

Soy-Bean-Oil Industry and Trade of the U. S.

SOY-BEAN oil, the product of the soy bean, is perhaps one of the most versatile of the great varieties of vegetable oils in world commerce to-day. Its most extensive use as an edible oil is in the manufacture of lard compounds and oleomargarine, and a small amount in salad oil. In addition to its uses as an edible product, it has the properties of a drying oil, which lends itself to the paint and varnish industry, the soap kettle, and the manufacture of linoleum and oilcloth, while small amounts are used for illuminating and lubricating purposes in its native country.

Soy-bean oil is obtained by two methods—pressure and solvent. The oil content of soy beans ranges from 12 to 23 per cent, depending on the locality of production and the efficiency of the presses—many of the bean mills in China and Manchuria being so primitive that they get only about 8 to 10 per cent of oil.

Imports of soy-bean oil into the United States fluctuate considerably, and at present are extremely small as compared with the period during and immediately following the World War, when so much shipping was diverted from European trade.

Soy-Bean Cake and Meal

OWING to its high protein content, ranging from 46 to 52 per cent and from 5 to 8 per cent oil, soy-bean meal is in great demand as cattle feed and commands a considerably higher price than either cottonseed meal or linseed meal. Soy-bean meal at Portland, Ore., one of the principal markets, has ranged from $50 to $60 per ton in the past five years.

Dr. William H. Nichols, Chairman of the Board of the Allied Chemical and Dye Corporation, Founder of The General Chemical Company and The Nichols Copper Company, one of America's best known chemists, died at Honolulu, T. H. on February 21, 1930, aged 78. Dr. Nichols, an outstanding figure in the country's chemical industry, will be mourned by hosts of friends and business associates.