9. Olcott, H. S., Ind. Eng. Chem., 33, 611-615 (1941).
10. Olcott, H. S., Cotton and Cotton Oil Press, 43, (7), 22-25 (1942).
11. Pope, A. L., *A Literature Survey of Solvent Extraction, Vegetable Oil Seeds: Cottonseed,* Report No. 3, Blaw-Knox, Philadelphia, 1944.
12. Boatner, C. H., Hall, C. M., O'Connor, R. T., and Castillon, L. E., Bot. Gaz., in press.
13. Boatner, C. H., Oil & Soap, 21, 10-15 (1944).
14. Boatner, C. H., Hall, C. M., O'Connor, R. T., Castillon, L. E., and Curet, M. C., J. Am. Oil Chem. Soc. 24, 97-106 (1947).
15. Boatner, C. H., Caravella, M., and Samuels, C. S., J. Am. Chem. Soc., 66, 838 (1944).
16. Boatner, C. H., O'Connor, R. T., Samuels, C. S., and Curet, M. C., J. Am. Chem. Soc., 69, 1268-1271 (1947).
17. Podolskaya, M. Z., Vsesoyuz. Nauch. Issledovatel. Inst. Zhirov., 1939, 83-94 (In English 94); C. A., 36, 7064 (1942).
18. Podolskaya, M. Z., Masloboina Zhirovoe Delo, 13, 8-9 (1937); C. A., 32, 4366 (1938).
19. Boatner, C. H., Samuels, C. S., Hall, C. M., and Curet, M. C., J. Am. Chem. Soc., 69, 668-672 (1947).
20. Smirnova, Bull, App Bot., Gen., and Plant Breeding (U.S.S.R.), Series III, No. 15, 227-240 (1936); C. A., 31, 5482 (1937).
21. Schwartze, E. W., and Alsberg, C. L., J. Agr. Res., 25, 285-295 (1923).
22. Goldovski, A. M., Vsesoyuz. Nauch. Issledovatel. Inst. Zhirov., 1936, 5-30 (In English 28-30); Chem. Zentr., I, 3425 (1937).
23. Podolskaya, M. Z., Vsesoyuz. Nauch. Issledovatel. Inst. Zhirov., 1939, 61-72 (In English 71-72); C. A., 36, 7064 (1942).
24. Podolskaya, M. Z., Masloboina Zhirovoe Delo, 15, 9-10 (1939); C. A., 34, 1355 (1940).
25. von Bretfeld, Jour. für Landw., 35, 29-56 (1887).
26. Hanausek, T. F., and Wiesner, J., *Die Rohstoffe der Pflanzenreiches,* Vol. II, Second Edition, Leipzig, p. 754-759, 1903.
27. Hanausek, T. F., *Microscopy of Technical Products,* English translation by A. L. Winton from the German, Wiley, p. 362-368 (1907).
28. Winton, A. L., and Winton, K. B., *Structure and Composition of Foods,* Vol. I, Wiley, New York, 1933, p. 552-556.
29. Stanford, E. E., and Viehoever, A., J. Agr. Res., 13, 419-437 (1918).
30. Carruth, F. E., J. Am. Chem. Soc., 40, 647-663 (1918).
31. Boatner, C. H., and Hall. C. M., Oil & Soap, 23, 123-128 (1946).
32. Boatner, C. H., Hall, C. M., Rollins, M. L., and Castillon, L. E., Bot. Gaz., 108, 484-494 (1947).
33. Markley, K. S., J. Am. Soc. Agron., 20, 1102-1107 (1928).
34. Gill, A. H., and Greenup, H. W., Oil & Fat Ind., 5, 288-294 1928).
35. Rosenthal, H., U. S. Patent 2,254,245 (1941).
36. Vix, H. L. E., Pollard, E. F., Spadaro, J. J., and Gastrock, E. A., Ind. Eng. Chem., 38, 635-642 (1946).
37. Harris, W. D., Agri. Mech. Coll. Tex., Bull. 12 (1941).
38. Boatner, C. H., Caravella, M. C., and Kyame, L., Ind. Eng. Chem., Anal. Ed., 16, 566-572 (1944).
39. Goldovski, A. M., and Podolskaya, M. Z., Masloboina Zhirovoe Delo, 14, (5), 9-12 (1938); C. A., 33, 5688 (1939).
40. Goldovski, A. M., and Podolskaya, M. Z., Vsesoyuz. Nauch. Issledovatel. Inst. Zhirov., 1939, 72-83 (In English 83).
41. Williams, P. A., private communication.
42. Royce, H. D., Oil & Soap, 10, 183-185 (1933).
43. Royce, H. D., and Lindsay, Jr., F. A., Ind. Eng. Chem., 25, 1047-1050 (1933).
44. Podolskaya, M. Z., Fettchem. Umschau., 42, 96-100 (1935).
45. Podolskaya, M. Z., Vsesoyuz. Nauch. Issledovatel. Inst. Zhirov., 1936, 62-70 (In English 69-70); C. A., 32, 1127 (1938).
46. Podolskaya, M. Z., and Tobler, L., Masloboina Zhirovoe Delo, 16, 5-7, (1940); C. A., 35, 924 (1941).
47. Fontaine, T. D., Detwiler, S. B., and Irving, Jr., G. W., Ind. Eng. Chem., 37, 1232-1236 (1945).
48. Vix, H. L. E., Spadaro, J. J., Westbrook, R. D., Crovetto, A. S., Pollard, E. F., and Gastrock, E. A., J. Am. Oil Chem. Soc., 24, 228-236 (1947).

Effect of Ultrasonic Waves On Oils

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ULTRASONIC waves have already found some important applications in science besides their well known development in the field of detection. One of their interesting effects is the possibility of heating bone marrow without affecting the bone. That suggested to the writer the idea of trying ultrasonic waves for the possible control of the silk worm pebrine, a parasite found in the eggs of the silk worm. With the help of K. Alexopoulos and D. Mannessis of the Physics department of the University of Athens, Greece, a small source of ultrasonic waves was constructed in 1938 in Athens, using electric potentials of 21,000 to 36,000 volts.

Unfortunately, the occupation of Greece by the German and Italian troops made it impossible for the writer to complete the experiment on the silk worm eggs and the only fact that he has been able to report is the hastening of germination of silk worm eggs by the effect of ultrasonic waves. It has been possible for him however, in the meantime, to carry on some experiments on oils and to study the effect of ultrasonic waves upon their acid value. The data obtained from these experiments are shown in Table 1. The oils used were refined seed oils and raw olive oils from different localities in Greece. The effect of ultrasonic waves, as seen from the results of these experiments, varies with the condition of the oil treated. With refined seed oils, as well as with pure oleic acid, a decrease in acid value was always observed. But with raw olive oils, the results were different. In some cases, a decrease was found, but more often an increase occurred and, in one case, no change at all. It is known that ultrasonic radiation activates the oxygen dissolved in water with the formation of H_2O_2 (1) and O_3 (2). It is possible therefore that with refined oils, where no intermediary oxidation products of the fatty esters occur except for small amounts of free fatty acids, the oxidation which takes place there affects the acids present and results in a decrease of the acid value of the oil. According to the various theories developed for the mechanism of the oxidation of oils by the oxygen, the first step in the process is the formation of an oxide or peroxide. This primary product of oxidation either breaks down directly into aldehydes and acids of lower molecular weight or reacts with water to form substances containing hydroxyl and Keto groups (3).

When, in addition to fatty acids, other more oxidizable substances like aldehydes and ketones are

TABLE 1.
Effect of Ultrasonic Waves Upon Various Samples of Refined and Raw Oils. (Acid Value mg. KOH/1 g. Oil.)

Samples	Before treatment	After 30 min. treatment	After 15 min. treatment	Remarks
A. Refined Oils				
1. Cotton Seed Oil	0.498	0.355	0.431	
2. Cotton Seed Oil	0.649	0.593	....	
3. Soya Oil	0.244	0.184	0.187	
4. Sesame Oil	0.573	....	0.557	No sig-
B. Raw Olive Oils				nificant
1. Oil from the region of Crete	4.310	4.265	....	changes
2. Oil from the region of Kymi	4.782	4.491	4.592	in fluo-
3. Oil from the region of Argos	9.744	9.744	....	rescence
4. Oil from the region of Laconia	2.402	2.470	....	or iodine
5. Oil from the region of Laconia	2.643	2.962	....	number
6. Oil from the region of Laconia	2.452	2.632	....	were
7. Oil from the region of Corfu	3.589	4.228	....	observed.
8. Oil from the region of Corfu	2.111	2.038	....	
C. Oleic Acid	205.408	195.507	....	

present, as is the case with the raw olive oils; then oxidation takes place on them first and results obviously in a decrease or an increase of the acid value. The results naturally depend on the relative proportion of aldehydes, ketones and acids present, and probably on the intensity and the length of the treatment. The author believes that more work is needed along this line in connection with the study of changes occurring in the various rancidity tests of the oils.

REFERENCES

1. Loiseleur, Jean. Activation of oxygen by ultrasonic radiation. *Compt. rend. 218*, 876-8 (1944); *Chem. Absts. 40*, 42949 (1946).
2. Kling, Andre, and Kling, Roger. Action of ultrasonic waves on water. *Compt. rend. 223*, 33-4 (1946); *Chem. Absts. 40*, 59698 (1946).
3. Lea, C. H. Rancidity in edible fats. His majesty's stationery office, p. 83, London 1938, Chemical Publishing Co., Inc., N. Y., N. Y.

Abstracts

Oils and Fats

Edited by
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FATTY ACID PROCESSING. C. J. Marsel (New York Univ.) and H. D. Allen. *Chem. Eng. 54*, No. 6, 104-8 (1947).

RESPIRATION OF COTTONSEED. M. L. Karon and A. M. Altschul (U. S. Dept. Agr., New Orleans, La.). *Plant Physiol. 21*, 506-21 (1946). The pattern of respiration was determined for 17 lots of cottonseed with moisture contents ranging from 10-17%. The respiratory quotient of resting cottonseed was found to be unity. The average RI of cottonseed is an exponential function of the moisture content of the seed. The RI of flaxseed samples as calculated from the data of Larmour is very similar to that of the Coker's and Oklahoma Triumph varieties of cottonseed. COMPARISON OF RESPIRATION, FREE FATTY ACID FORMATION, AND CHANGES IN THE SPECTRUM OF THE SEED OIL DURING THE STORAGE OF COTTONSEED. L. Kyame and A. M. Altschul. *Ibid.* 550-61. Samples of cottonseed that were used in the respiration investigations reported in the above abstracts were analyzed for free fatty acid content, and the lipolysis-rate constant, k, was determined for each of the samples. k could be converted into a linear function of the moisture content of the seed. The pattern of lipolysis of immature seeds was shown to be different from that for normal in that the rate of formation of free fatty acids decreased with length of storage. Respiration and lipolysis equally reflect the vigor of cottonseeds and is a fact of practical importance in commercial storage. EFFECT OF INHIBITORS ON THE RESPIRATION AND STORAGE OF COTTONSEED. A. M. Altschul, M. L. Karon, L. Kyame, and C. M. Hall. *Ibid.* 573-87. Treatment of mature cottonseed with NH_3 inhibited respiration and lipolysis and reduced the light absorption of the extracted oil at 360 mμ. Similar treatment of immature cottonseed inhibited respiration, but stimulated lipolysis, and light absorption of the extracted oil at 560 mμ was increased. The vapors of Nacconol NR and of 2′-Me-1-maleanil inhibited lipolysis in cottonseed under conditions where there was a stimulation of respiration. Fungicides and germicides such as Emulsol 607M, Emulsol 607, and butylmaleimide had no effect on the lipolysis rate of stored cottonseed; the last 2 substances stimulated respiration. Evidence has been presented to demonstrate that most of the deterioration which occurs in stored cottonseed is due to the action of enzymes in the seeds rather than to microbial activity. (*Chem. Abs. 41*, 1286-7).

INFLUENCE OF LECITHIN AND CHOLESTEROL ON THE DIFFUSIBILITY OF FAT ACIDS DISSOLVED IN BILE SALT SOLUTION. G. Quagliariello and D. Foscolo (Univ. Naples). *Boll. soc. ital. biol. sper. 19*, 37-8 (1944). The rate of diffusion through a cellophane membrane of oleic acid dispersed in a solution of Na glycocholate was not increased by addition of lecithin, cholesterol, or bile to the mixture. (*Chem. Abs. 41*, 1257.)

SYNTHETIC FATS. P. N. Williams. *Chemistry & Industry 1947*, 251-5. The subject is reviewed under the titles: re-esterification, synthetic fats, oxidation of hydrocarbons to fatty acids, synthetic fatty acid manufacture at Witten, manufacture of fat from synthetic acids, and economic aspects.

SUITABILITY OF SYNTHETIC FAT FROM COAL FOR HUMAN CONSUMPTION. K. Thomas and G. Weitzel (Univ. Leipzig Germany). *Deut. med. Wochschr. 71*, 18-21 (1946). By catalytic oxidation of paraffin from the Fischer-Tropsch synthesis a mixture of fat acids was obtained. The acids with 10-20 C atoms in the chain were esterified with glycerol, refined, and deodorized. The resulting fat is an odorless and tasteless white product; in appearance and consistency it is similar to lard. The fat is split by lipase in about the same way as natural fat and, at an intake of not more than 150 g. per day per person, almost completely reabsorbed. Clinical experiments however, indicated an impaired compatibility at an intake above 100 g. per day. The existence of acid slags in the body after the consumption of synthetic fat has been reported by F. who considered them as unessential. Th. and W. state that the quantities in which these acids appear in the urine approximate those which are given for therapeutic purposes, and that they do not cause an acute or chronical acidosis; however, the influence on the action of the kidney must be considered. It appears that the branched chains in the original Fischer-Tropsch paraffin are the cause of objectionable features of a synthetic fat, while normal paraffins give better products. The importance of using a biologically unobjectionable glycerol is also stressed because some synthetic glycerols were found to be very harmful to the liver. It is concluded that synthetic fats of suitable composition and free from isomono- and dicarboxylic acids may prove to be harmless, but the costs of their production make them impractical at the present time. (*Chem. Abs. 41*, 1342.)

LINSEED OIL FOR HUMAN CONSUMPTION. A. Schar. *Mitt. Lebensm. Hyg. 37*, 363-78 (1946). Pure linseed oil is not suited for edible purposes because of its varnish-like odor and its instability during storing. A mixture containing 20% linseed oil keeps for a sufficiently long time, is not objectionable in taste or odor, and is biologically satisfactory. Pure hydrogenated linseed oil ("Leinschmalz") cannot be used for human consumption. However, a mixture of 20% hydrogenated linseed oil and 80% other fats can be