from the equation of Ault and Brown[5] as follows:

$$\text{Percent methyl arachidonate} = \frac{\text{Polybromide No. Esters} \times 100}{86.5}$$

It is to be noted that the content of arachidonate is essentially the same for esters prepared either with HCl or H_2SO_4.

Melting Points and Bromine Analyses of Octabromides

In Table II are to be found the melting points of the various ester bromides; also their bromine content determined by the peroxide bomb method. The propyl, butyl and amyl compounds have not been previously described.

SUMMARY

(1) Direct alcoholysis of beef suprarenal phosphatides has been accomplished with methyl, ethyl, n-propyl, n-butyl and n-amyl alcohols, using 5% hydrochloric acid and 7.5 and 12.0 % sulphuric acid as catalysts.

(2) Propyl, butyl and amyl octabromo-arachidates have been prepared and described.

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REVIEW OF SCIENTIFIC LITERATURE ON FATS AND OILS FOR 1937

PART III

By M. M. PISKUR

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New data on butter included the butyric acid index of Indian butters which was reported by N. N. Godbole [*Milch. Zentr.* **66,** 93] and A and B values of Norwegian butter taken at different seasons of the year which was recorded by S. Schmidt-Nielsen and A. Asted [*Kgl. Norske Vegenskab. Selskabs Skrifter No.* **7,** 30 pp.]. The latter authors recommend the A and B determinationsas tests for adulteration. This recommendation was criticized by T. Sunberg [*Swensh. Kem. Tids* **49,** 185-94] who praised the Polenske value. A semimicro method for the butyric acid value determination was devised by T. T. van Voorst [*Chem. Weekblad* **33,** 742-3]. A new characteristic for butterfat proposed by V. Venkatachalam [*Current Sci.* **5,** 477-8] was computed by the equation: R-M. value $+ (n - 1.4000)\ 1000 + (n - 1.4440)\ 1000$ where n equals the Abbe refractometer reading at 45°. The values for butters were between 84 and 86.

Methods for determining diacetyl and acetylmethylcarbinol in butter were described by H. Schmalfuss and H. Werner [*Fette u. Seifen* **44,** 509-14], R. Dehove and L. Dessirier [*Ann. fals.* **30,** 288-91] and A. F. Langlykke and W. H. Petersen [*Ind. Eng. Chem. Anal. Ed.* **29,** 163-6]. J. D. Wildman [*J. Assoc. Off. Agr. Chem.* **20,** 93-100] described microscopic and macroscopic methods for determining mold in butter. For the microscope, one gram of butter was heated with 7 cc. of 0.75 per cent solution of carob-bean gum containing 2 per cent formaldehyde and the liquid was decanted. Estimation of the mold was by the Howard method. For macroscopic determniation, 5 grams samples of butter, 15 cc. of hot methyl blue-borax solution and ten methylene blue tablets were agitated and poured through a perforated funnel cone. The mold may be measured in the filter cone.

Committees of the Deutsche Gesellschaft fur Fettforschung and the American Oil Chemists' Society prepared progress reports on collaborative work on analytical methods. These were published in their respective official journals, Fette und Seifen and OIL & SOAP. A new committee of the American Oil Chemists' Society intends to collect available data on a few oils from time to time and then analyze a few type samples as completely as possible. Work of the Association of Official Agricultural Chemists was reported by G. S. Jamieson [*J. Assoc. Off. Agr. Chem.* **20,** 418-21]. It was recommended that the Fitelson method for determining tea seed oil in olive oil and the refractometric method for determining oil in flax be made official. Slight changes in some analytical procedures were made. It was suggested that a collaborative study on the Kaufmann thiocyanogen method be made.

The color reaction of oils with acetic anhydride and with arsenic trichloride was the subject of a polemical discussion between H. Heller [*Angew. Chem.* **50,** 752-3] and H. Jesser and E. Thomae [*Agnew. Chem.* **50,** 573]. Heller reported a change from green to emerald green to deep green on treating soybean oil with acetic anhydride, and a green to violet to red reaction with arsenic trichloride. Jesser and Thomae reaffirmed an earlier report that the color change was a development of blue which changed to greenish-brown with acetic anhydride and red to green with arsenic trichloride. The Carr-Price color reaction for determining vitamin A was suggested as a means of identifying certain oils by F. Provvedi [*Olii, minerali, olii e grassi, colori vernici* **16,** 103-4] and S. H. Bertram [*Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 8, 102]. Provvedi reported that the color reaction with cottonseed oil was dark reddish-brown, olive oil light green, sesame oil light pink-yellow, peanut oil pink, etc. The results indicated that rancid olive oil can be distinguished from the nonrancid oil because the reagent caused a development of opalescence in the rancid samples. In nonrancid oils the test could be used to identify cottonseed oil. Bertram published similar data. He suggested that the test could be used for the detection of adultering peanut oil with soybean oil. According to A. E. Gillam *et al* [*Nature* **140,** 233] fresh water fish liver oils and marine fish liver oils can be distinguished by the absorption spectra of their Carr-Price reaction. The former have a considerably larger absorption at 693 *mu.*

H. Thaler [*Fette u. Seifen* **44,** 38-42] described chromographs obtained by passing samples of several oils dissolved in benzene through a column of aluminum oxide and "clarite" (an acidic bleaching clay). The chromographs of fats and of their natural coloring matter were easily distinguished from synthetic coloring matter, thus giving a method for detection of artificial coloring matter. H. A. Boekenoogen [*Verfkroniek* **10,** 143-6] applied the above method to linseed oil. The presence of α- and β-carotene in the linseed oil was identified by passing a petroleum ether solution of its unsaponifiable fraction through the aluminum oxide column; a broad yellow band

CHARACTERISTICS REPORTED FOR VARIOUS FATS AND OILS

Oil or Fat Source	% of oil or fat	Density	Refractive Index	Acid No.	Sapon. No.	Iodine No.	R-M No.	Polenske No.	Acetyl No.	% Unsap.	Thiocyanogen No.	Titer
Acorn[1]												
Quercus palustris	13.40	$0.9158^{25}/_{25}$	$1.4647^{40°}$	.....	192.85	99.4	.....	....	6.9	1.11	.....	25.9
Acorn[2]												
Quercus ruba	11.03	0.9141^{25}	$1.4725^{20°}$	4.5	195.3	100.1	1.1	0.8	5.3	0.9	.....	13.1°
Ailanthus glandulosa seed[3]	22	0.9211	1.4780	1.06	.....	121.43	.....	....	.....	.....	.....	.....
Alligator[4]	....	0.8645^{100}	....	.....	.....	.....	.....	....	.....	.....	.....	.....
Apricot seed[5]	....	0.9162	1.463-1.477	4.5	.....	.....	.....	....	.....	.....	.....	.....
Banana (dried fruit)[7]	0.72-0.8	.....	$1.4648^{40}/\mathrm{D}$	.....	.....	82	.....	....	.....	14.4	.....	.....
Blepharis edulis seed[9]	3.8	$0.9332^{28}/_{4}$	$1.4846^{30}/\mathrm{D}$	11.85	186.5	90.8	.....	....	11.54	2.5-3.0	.....	.....
Coconut (of Ceylon)[10]	....	.....	....	.....	259.1	8.16	.....	....	.....	.....	.....	.....
Coconut (of Brazil)[11]	....	.....	1.4505	.....	.....	16.2	.....	....	.....	.....	.....	.....
Fish Oils:												
Bonito fish[12]	....	$0.9295^{15}/_{4}$	$1.4878^{20}/\mathrm{D}$	25.6	182.1	209.7	.....	....	.....	.....	.....	.....
Dog fish liver												
Scyllium stellare[14]	44	0.9291^{15}	$1.4815^{20}/\mathrm{D}$	.....	185	178	.....	....	47.6	0.90	.....	.....
Galega officinalis[15]	....	0.9303^{21}	1.4759^{21}	23.1	195.0	119.8	.....	....	.....	2.50	.....	.....
Grape pomace[16]	8.45	0.917	1.4691	26.8	182	118	.....	....	28.6	5	.....	.....
Hackberry seed												
Celtis occidentalis[17]	....	$9204^{25}/_{25}$	1.4794^{25}	.....	191.1	150	0.0	0.3	4.9	1.35	81.97	.....
Hazelnut kernel												
Corylus avellana[18]	54	$0.9144^{20}/_{20}$	1.4691^{28}	.....	192.0	86 8	.....	....	.....	0.35	.....	.....
Iguape walnut kernels												
Aleurites moluccana[19]	60	0.9275^{15}	$1.4731^{20}/\mathrm{D}$	2.8	192.11	160.2	0.78	0.35	.....	.....	.....	20.6
Kabaragoya (a Ceylon lizard) body												
Varanus salvator[36]	....	.....	....	4.5	283.9	70.8	.....	....	.....	1.6	.....	.....
Kapok[20]	....	0.920^{15}	57.60^{48} (butyro)	.....	191.2	100.5	.....	....	26.8	0.53	70.95	35.4
Khasni seed												
Cichorium intybus[21]	4.72	0.9229^{22}	1.3795^{30}	11.2	193.1	95.6	.....	....	14.8	1.7	.....	35.8
Kukui nut[22]	....	$0.922^{20}/_{4}$	1.4784^{20}	.....	191.3	162.0	17.4	....	.....	.....	.....	.....
Lumbang nut kernels[23]												
Aleurites moluccana	69.2	$0.9233^{25}/_{25}$	1.4749^{25}	1.15	190.8	151.7	.....	....	0.30	.....	97.1	.....
Marine animal oils;												
Blue whale[24]	....	.....	......	.....	190-5	82.5-146	.....	....	.....	.....	.....	.....
Chelonia japonica body[25]	....	$0.9150^{15}/_{4}$	$1.4662^{20}/\mathrm{D}$	1.36	205.8	64.1	.....	....	.....	0 52	.....	28-9
Erimacrus isenbeck liver[25]	....	$0.9235^{15}/_{4}$	$1.4790^{20}/\mathrm{D}$	48.1	170.0	167.8	.....	....	.....	6.45	.....	20-1
Gonshika shark liver[25]	....	$0.8836^{15}/_{4}$	$1.4795^{20}/\mathrm{D}$	0 24	97.9	199.3	.....	....	.....	44 60	.....	27-28
Reinhardtius suurae liver[25]	19	$0.9224^{15}/_{4}$	$1.4740^{20}/\mathrm{D}$	12.6	179.9	94.2	.....	....	.....	6.83	.....	26-7
Mold fat												
Citromyces sp.[26]	....	.....	....	72.4	170.0	125.8	0.8	0.8	.....	9.9	.....	.....
Mouse body												
Mus musculus albinus[27]	....	.....	$66.1^{40°}$ (Butyro)	24	221.4	60.3	5.72	1.1	13.4	0.31	.....	.....
Nageshwar or Nahar or												
Iron wood seed[28]	....	$0.922^{32°}$	1.4674^{32}	10	196	90	1.26	0.6	0	3.2	.....	.....
Olives (of Palestine)[29]	34.7-40.8	$0.911\text{-}0.918^{15}$	$1.4670\text{-}1.4680^{25}/\mathrm{D}$	.....	183.7-193.5	81 0-84.7	0.77-0.99	....	.....	.....	.....	.....
Onguekoa gore seed kernel[30]	60	$0\ 973^{20}/_{4}$	....	2.2	189	184	.....	....	.....	1.1	.....	.....
Passion fruit seed[31]	22.4	$0.9261^{15.5}/_{15.5}$	1.4761^{20}	0.3	190.9	141.2	.....	....	.....	0.8	.....	.....
Papaya seed												
Carica papaya[32]	25.29	$0.9091^{20}/_{20}$	1.4666^{20}	3.05	189.5	72.5	1.05	0.20	3.8	1.32	.....	.....
Physic nut												
Jatropha Curcas[33]	....	$0.982^{30}/_{40}$	1.4665^{30}	5.1	192.4	94.8	.....	....	.....	0.45	.....	.....
Pinipig (or glutinous) rice[34]	....	0.9238	1.4693	.....	186.85	100.5	.....	....	.....	2.85	.....	.....
Poppy seed												
Papaveris somniferi[35]	....	$0.9232^{20}/_{4}$	....	13.05	188-9	135	.....	....	1.2	.....	.....	.....
Rice bran												
Oryza sativa[37]	....	$0.9178^{26}/_{25}$	1.4659^{40}	.....	187.1	106.1	0.11	0.05	8.3	2.9	69.7	26.9
Sake cake (a by-product from rice vinegar manuf.)[38]	46	0.8879-0.8885	....	.....	220.2	34.2	.....	....	.....	40	.....	.....
Sheep tail (Fat tail sheep)[39]	....	.....	....	.....	198.8	53.0	.....	....	.....	0.105	47.7	.....
Siene bean Daubentonio												
Daubentonio longifolia[40]	3.8	$0.9209^{25}/_{25}$	$1.4730^{25}/\mathrm{D}$	4.5	194.2	97.3	.....	....	6.9	3.0	.....	.....
Silk worm moth (male)[41]	20.5-22.9	0.921-3	27-28	.....	189-192	110-116	1.2-1.4	....	31.7	0.5-1.6	.....	36-38
Skunk body Sample 1	....	$0.9020^{40}/_{4}$	1.4612^{40}	0.75	193.7	77.5	1.9	3.0	9.2	0.40	.....	.....
Conepatus suffocans[42] Sample 2	....	0.9010	1.4626	0.75	194.4	81.0	2.7	4 6	3.8	0.44	.....	.....
Tobacco seed (of Philippine)[44]	....	$0.9130^{30}/_{40}$	1.4714^{30}	16.8	190.5	135.8	.....	....	.....	1.41	.....	.....
Tung (of Japan)[46]												
Aleurites cordata	....	$0.9313^{25}/_{25}$	1.5059^{25}	0.60	190.2	209.6 (calc'd)	.....	....	.....	0.57	80.9	.....
Tung (of Kenya) Av. 1931	35.3	0.9361^{25}	1.5181^{25}	0.6	192.6	167.7	.....	....	.....	.....	.....	.....
Aleurites fordii[47] Av. 1932	36.3	0.9358^{25}	1.5181^{25}	0.4	194.4	168.0	.....	....	.....	.....	.....	.....
Tung (of Dutch-Indian)	....	0.9421	1.52-	6.7-	194.7	166.9	.....	....	.....	1.05-	.....	.....
Aleurites montana[48]	....	$0.936^{15}/_{15}$	1.486^{25}	0.2	190.2	160.3	.....	....	.....	0.41	.....	.....
Valerianella olitores seed kernel[51]	38.7	$0.8830^{76}/_{4}$	1.4575^{20}	1.2	192.6	145.2	.....	....	.....	.....	84.2	.....
Ximenica Americana seed kernel[50]	49	$0.9262^{20}/_{15}$	1.4710^{20}	2.3	169.2	82.5	0	....	.....	1.7	.....	.....
Yeast												
Saccharomyces species[51]	....	.....	....	108.4	156.6	130.4	7.4	3.4	.....	19.6	.....	.....

SUPPLEMENT TO CHART ON CHARACTERISTICS

	Melting Point	Solidification Point	Hexabromide No.	Smoke Test	Crismer Test	Hehner No.
Acorn[1]						
Quercus palustris	.....	.....	0	180	68.8	.....
Acorn[2]						
Quercus ruba	.....	6.2	.....	...	.....	90.6
Alligator[4]	34-5	25-7	.....	...	.....	.....
Apricot seed[5]	.....	18.1	.....	...	75.4	.....
Blepharis edulis seed[9]	.....	.....	.....	...	.....	91.65
Hackberry seed						
Celtis occidentalis[17]	.....	.....	0	...	.....	.....
Iguape walnut kernels						
Aleurites moluccana[19]	.....	.....	.....	...	.....	94.08
Kapok[20]	.....	.....	.....	...	.....	94.3
Khasni seed						
Cichorium intybus[21]	-11	.....	.....	...	.....	93.9
Lumbang nut kernels[23]						
Aleurites moluccana	.....	.....	19.3	...	.....	.....
Onguekoa gore seed kernel[30]	.....	.....	trace	...	.....	.....
Papaya seed[31]						
Carica papaya[32]	.....	.....	.....	...	.....	95.9
Rice bran						
Oryza sativa[37]	.....	.....	.....	330° F.	.....	95.25
Sheep tail (Fat tail sheep)[39]	41.8	.....	.....	...	.....	.....
Siene bean						
Daubentonio longifolia[40]	7-9°	3-5°	.....	...	.....	.....
Silk worm moth (male)[41]	.....	.....	.....	...	.....	95.1-95.4
Skunk body Sample 1	32	28.3	.....	...	.....	.....
Conepatus suffocans[42] Sample 2	38	26.5	.....	...	.....	.....

COMPONENT FAT ACID CONSTITUENTS OF FATS AND OILS REPORTED 1937

<table>
<tr><th rowspan="2">Fat Source</th><th colspan="3">Saturated Acids</th><th colspan="3">Unsaturated Acids</th><th rowspan="2">Other Acids</th></tr>
<tr><th>Myristic</th><th>Palmitic</th><th>Stearic</th><th>Oleic</th><th>Linoleic</th><th>Linolenic</th></tr>
<tr><td>**Acorn
Quercus Palustris[1]</td><td colspan="3">15.07</td><td>57.01</td><td>27.92</td><td>.....</td><td></td></tr>
<tr><td>*Ailanthus glandulosa* seed[3]</td><td>.....</td><td>9.6</td><td>2.4</td><td>80</td><td>5-6</td><td>.....</td><td></td></tr>
<tr><td>*Asclepias cornuti*[6]</td><td></td><td colspan="2">11.14</td><td>35.32</td><td>57.5</td><td>.....</td><td></td></tr>
<tr><td>Bhatkatya or Kanta-Kari
Solanum Xanthocarpum seeds[8]</td><td>.....</td><td>5.37</td><td>9.77</td><td>42.93</td><td>36.18</td><td>.....</td><td>Arachidic 0.35</td></tr>
<tr><td>*Blepharis edulis* seed[9]</td><td colspan="3">12.38</td><td colspan="3">87.62</td><td></td></tr>
<tr><td>***Coconut (of Brazil)[11]</td><td>20</td><td>7</td><td>5</td><td>2</td><td>.....</td><td>.....</td><td>Lauric 45, Capric 10
Caprylic 9, Caproic 2</td></tr>
<tr><td>*Pilchard[13]</td><td>5.1</td><td>14.4</td><td>3.2</td><td colspan="3">17.7 (—3.29H)</td><td>C_{14}(—2H) 0.1; C_{18}(—2H) 11.8; C_{20}(—4.12H) 17.9; C_{22}(—8.47H) 13.8; C_{24}(—10.9H) 15.2</td></tr>
<tr><td>*Galega officinalis*[15]</td><td>.....</td><td>20</td><td>24.9</td><td>.....</td><td>30</td><td>16.1</td><td>Undetd. 9.0</td></tr>
<tr><td>Hazelnut
Corylus avellana</td><td colspan="3">8.0</td><td>78.2</td><td>9.1</td><td>.....</td><td></td></tr>
<tr><td>*Kabaragoya (a Ceylon lizard)
Varanus salvator[30]</td><td>4</td><td>29</td><td>10</td><td colspan="3">40 (—2.7H)</td><td>C_{16}(—2H) 12; C_{20}(—5.5H) 5</td></tr>
<tr><td>**Kapok[20]</td><td colspan="3">16.3</td><td>48.2</td><td>34.1</td><td>.....</td><td></td></tr>
<tr><td>Kukui nut[22]</td><td>.....</td><td>2.1</td><td>4.7</td><td>17</td><td>61.6</td><td>5.2</td><td></td></tr>
<tr><td>**Lumbank[23]
Aleurites moluccana</td><td>.....</td><td>4.59</td><td>4.10</td><td>27.41</td><td>41.20</td><td>21.54</td><td>Arachidic .08</td></tr>
<tr><td>Mold
Citromyces species[26]</td><td>.....</td><td>5.8</td><td>10.0</td><td>34.4</td><td>34.4</td><td>.....</td><td></td></tr>
<tr><td>Nageshwar or Nahar or
Iron wood seed[28]</td><td>.....</td><td>8.2</td><td>15.8</td><td>55.4</td><td>19.6</td><td>.....</td><td>Arachidic 1.0</td></tr>
<tr><td>Tung[45]</td><td colspan="3">3.3</td><td>8.0</td><td>9.7</td><td>.....</td><td>Eleostearic 74.5</td></tr>
<tr><td>Oiticica
Lucania rigida seeds[45]</td><td colspan="3">0.4</td><td colspan="3">15.2</td><td>Licanic 70.0</td></tr>
<tr><td>Papaya seed
Carica papaya[32]</td><td>.....</td><td>11.38</td><td>5.25</td><td>76.50</td><td>2.13</td><td>.....</td><td>Arachidic 0.31</td></tr>
<tr><td>**Physic-nut
Jatropha curcas[33]</td><td>0.45</td><td>11.84</td><td>5.07</td><td>61.86</td><td>18.65</td><td>.....</td><td>Arachidic 0.26</td></tr>
<tr><td>**Pinipig (or glutinous) rice[34]</td><td>0.2</td><td>17.3</td><td>1.8</td><td>45.6</td><td>27.7</td><td>.....</td><td>Lignoceric 0.7
Arachidic 0.7</td></tr>
<tr><td>**Rice bran
Oryza sativa[37]</td><td colspan="3">16.4</td><td>38.7</td><td>42.0</td><td>.....</td><td></td></tr>
<tr><td>Tall-oil fat acids[43]</td><td>.....</td><td>.....</td><td>.....</td><td>22.7</td><td>71.3</td><td>6.0</td><td></td></tr>
<tr><td>**Tobacco seed[44]</td><td>.05</td><td>7.03</td><td>3.04</td><td>26.37</td><td>60.23</td><td>.....</td><td>Arachidic 0.34</td></tr>
<tr><td>Tung (of Japan)
Aleurites cordata[46]</td><td colspan="3">6.2</td><td>18.5</td><td>.....</td><td>.....</td><td>Eleostearic 70.5</td></tr>
<tr><td>Valerianella olitores seed kernel[49]</td><td colspan="3">11.5</td><td>18.0</td><td>52.7</td><td>10.6</td><td></td></tr>
<tr><td>Ximenia Americana seed kernel[50]</td><td>.....</td><td>.....</td><td>1.2</td><td>60.8</td><td>6.7</td><td>.....</td><td>Cerotic 15.2, Ximenic 14.6, resin acids 1.5</td></tr>
<tr><td>Yeast
Saccharomyces species[51]</td><td>.....</td><td>9.5</td><td>5.9</td><td>47.6</td><td>2.9</td><td>.....</td><td>Steam volatile acids 5.2</td></tr>
</table>

*Unsaturation is indicated by the av. hydrogen lacking in the acids, i. e., 1 double bond av. (—2H).
**As glycerides. ***Volume per cent.

above a beautiful rose-red ring was observed. On evaporation of the petroleum ether from the chromographic filtrates it was possible to detect as little as 0.5 per cent mineral oil in linseed oil by the former's fluorescence.

Several new studies on olive oil appeared. J. S. van der Lingen [*S. African J. Sci.* **33,** 199-202] reported that the shifts in the position of the chlorophyll band at 0.665 μ in the absorption spectra of olive oil samples were indicators of the amount of adulteration of the oils. A modified Bellier test for detection of peanut oil in olive oil was described by N. Evers [*Analyst* **62,** 96-101]. G. Lucente and M. Barnaba [*Ann. Chim. applicata* **27,** 102-4] reported that when the Bellier test was applied to oils from unripe olives a reddish-violet coloration was obtained, similar to that given by rape oil although the oil was known to be absent. W. Cuisa [*Olii minerali olii e grassi, colori vernici* **16,** 97-103] contributed a study on the fluorescence of olive oil. Crude sulfur-olive oils have blue fluorescence masked by chlorophyll and other products, which was revealed by decolorizing and intensified by deodorizing. Pure pressed oils showed intense blue fluorescence after treatment with hydrosilicates. A publication by B. B. Cunningham and L. G. Saywell [*Food Research* **1,** 457-64] was a general discussion on virgin olive oils and a report of their methylene-blue induction period. The latter varied from 4 to 29 minutes.

Detection of adulteration of butter or determination of butter in fats interested several investigators. T. von Fellenberg [*Mitt. Lebensm. Hyg.* **27,** 133-7] used the Wiegner method of fractional distillation to determine the butter fat in mixtures with coconut fat or lard. A wide difference was shown for the soluble fat acids of the various fats; those of butter fat were hexoic and acetic. J. Grossfield [*Z. Untersuch. Lebensm.* **72,** 434-5] recorded the butyric acid value on prepared samples of cacao fat containing various percentages of butter. An equation for calculating the per cent of butter fat in cacao butter was developed. Adulteration of butter fat was detected by K. V. Giri and P. N. Bhargava [*Ind. Eng. Chem. Anal. Ed.* **9,** 395-6] by enzymic hydrolysis with pancreatic extract on melted agar. The butter fat gives a characteristic color. E. Tchetcheroff [*Ann. de Gembloux* **1936,** 204-5] recommended a method for determination of lauric acid as a means of detecting the presence of coconut and palm-kernel oils in butter fat. The method depended upon the solubility of magnesium laurate in certain solvents that were used to separate it by fractional crystallization from the magnesium salts of the other acids. The method of V. Venkatachalam [*Analyst* **62,** 732-3] for the detection of mutton or beef fat or hardened oil in butter comprised dissolving the fat in 65:100 solution of acetone and absolute alcohol and maintaining at 30° for three hours. A deposit indicates adulteration with the aforementioned fats. A. de Clercq's [*Natuurw. Tijdschr.* **19,** 27-9] attempts to detect adulteration of butter with other fat and oils by measuring the intensity of the reflected ultraviolet light were unsuccessful. M. Deribere [*Ann. hyg. publ. ind. sociale* **15,** 148-50] reported that the presence of 5-10 per cent of various animal or vegetable fats as adulterants can be detected by the bluish fluorescence in ultraviolet light which they impart to butter. Sweet butter was colorimetrically identified by J. Minut [*Ind. lechera* **17,** 66-75, 84] by the olive green color it gives with bromothymol blue. A. Chollet and A. Camus [*Lait* **17,** 135-41] suggested the use of the ratio of the insoluble volatile acids to soluble volatile acids in fat as means of detecting mixtures of cow butter fat from goat fat. For cow butter fat the ratio varied from 8 to 15 while in goat milk fat the variation in ratio was 36.5 to 43.1. According to M. Fouassier [*Ann. fals* **30,** 94-9] butter preserved with boric acid and borates turns brown when heated suddenly to high temperatures.

Torricelli [*Mitt. Lebensm. Hyg.* **28,** 36-40] modified the procedure for determination of nickel in hydrogenated fats, hence detection of hydrogenated fats. The nickel was extracted from the fats with hydrochloric acid, the solution evaporated, taken up with hydrochloric acid and made to a standard volume. The amount of nickel was evaluated by the shade of red produced when one drop of the solution was brought into contact with filter paper impregnated with a 1 per cent solution of methylglyoxime.

The determination of active oxygen in samples exposed to the sun was suggested by R. Strohecker *et al.* [*Fette u. Seifen* **44,** 246-50] as a means for detecting the presence of hardened fish oils in lard. The hardened fish oils acquire a much greater peroxide value than lard when exposed to the sun. R. Wait [*Pharm. Zentralhalle* **78,** 469-70] suggested that the Tortelli-Jaffe reaction was best suited to detecting marine oils. The sensitivity of the reaction was increased by substituting formic acid for the specified acetic acid. A. W. Bertram [*Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 2, 13-4] tested the use of several solvents for the Tortelli-Jaffe reaction. Several very pure solvents reduced the sensitivity or gave negative results when strongly positive results were expected. It was suggested that the suitability of the solvent used depended on the presence of small amounts of aldehydes which are usually impurities of the solvents. Trichloroethylene was used as the solvent in the procedure recommended by Bertram. An intense violet color was obtained with whale, seal, herring, pilchard, shark, and egg oils; the reaction was equally good for the partially hardened and unhardened oils. Beef fat, butter fat, sperm oil and horse fat gave weak reactions. Vegetable oils and hog fat yielded negative reactions.

L. W. Greene [*Am. J. Pharm.* **109,** 67-71] reported that a saturated solution of potassium hydroxide in butyl alcohol appeared to be a specific reagent for the micro-identification of castor oil. A small drop of sample under examination was mixed with an equal quantity of the reagent and observed under the microscope at 430 times magnification. The reaction product always assumes the shape of small rosette-like aggregates with crystalline centers. A new characteristic for castor oil reported by W. Leithe and H. J. Heinz [*Fette u. Seifen* **44,** 33-4] was called the benzine point. A warm 6 to 10 solution of castor oil and benzine (d^{20} 0.706) was allowed to cool while shaking. The temperature at which turbidity appeared was defined as the benzine point. Twenty commercial samples gave figures between 32.2 and 34.0°. Adulteration with 5 per cent linseed, sunflower, peanut, soybean or rape oil reduces the figure 2.7 to 3.2°; 10 per cent adulteration caused a reduction of from 4.2 to 6.5°.

R. H. Fash [OIL & SOAP **14,** 241-2] reported that presence of fuel oil in cottonseed oil increases the color of the bleached oil and adds a fluorescent appearance to the oil. H. M. Ubrich [*Fette u. Seifen* **44,** 426] proposed a sensitive reaction for testing for mineral oil in oils of animal and vegetable sources. Procedure: Two drops of oil are placed in a test tube with 1 cc. of alcohol and warmed; 1 cc. of alcoholic solution of potassium hydroxide is added and the oil is saponified. After cooling alkannin solution (alkannin fat soluble red in alcohol) is added until the solutions turn blue and then 5 drops of sudan-7B solution are added. The solutions are poured out and the test tube rinsed and filled with distilled water. A red ring in the test tube indicates that mineral oil was present.

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DETERGENTS AND WETTING AGENTS

New information on soap appeared both in the journal literature and in patents, while the information on non-soap wetting agents, *i. e.*, sulfonates, and sulfates of organic compounds, amines, etc., was principally in patents. The scarcity of publications on the non-soap wetting agents is due in part to their limited applications.

A new book on soap making was prepared by C. G. Thomssen and C. R. Kemp [*MacNair-Dorland Co., Inc.*]. Notes on the manufacture of several types of soap were presented by K. Pfaff [*Reichstoff-Ind. Kosmetik* **11,** 162-5]. A. P. Lec [SOAP **13,** No. 9, 26-8, 41] reviewed the results of physicochemical studies on soap manufacture. Much of the work has not found practical application but has served to confirm technical procedures already in use.

A new soap manufacturing technic invented by H. W. F. Lorenz [*U. S.* 2,084,446] and H. W. F. Lorenz and F. W. Brown [*U. S.* 2,096,188] comprised heating a mixture of fat and caustic to saponify the fat and then distilling off the glycerine, and unsaponified portion. Distillation was accomplished by spraying the saponified mixture against a stream of super-heated steam. A. C. Brown [*U. S.* 2,-085,691] atomized a mixture of sodium carbonate solution and liquefied fat acids with steam; the amount of steam being sufficient to give saponification yet a dry product. The soap obtained was in the form of hard particles. R. H. A. Thomas [*Brit.* 458,782] fed the fatty constituents and the saponifying reagent under a succession of pressure impulses through separately heated conduits into a mixing chamber from which the soap was forced by the feeding pressure into a cooling stage. The usual boiling step was eliminated by the procedure. P. I. Smith [*Am. Perfumer* **35**, No. 1, 70] discussed the use of catalysts in soap boiling.

C. R. Kemp [SOAP **13**, No. 12, 23-6] briefly described methods of hydrogenating the fats intended for soap manufacture. V. C. Stebnitz and H. H. Sommer [OIL & SOAP **14**, 16-7] reported that oxidation of fats for soap making greatly decreased the time required for saponification and did not influence the cleaning power of the soap obtained. The color was impaired and the yield decreased. S. Schmidt-Nielson and A. Flood [*U. S.* 2,100,146] recommended heat treating of whale oil to decrease iodine number before converting the oil into soap.

Several organic materials have been suggested for replacing natural fats in soap making. J. P. Sisley [*Rev. gen. mat. color.* **41**, 66-77] reviewed the patent literature on manufacture of soap from hydrocarbons. The manufacture of hexalin for production of hexalin soaps by the hydrogenation of phenol was described by A. Bag *et al* [*Masloboino Zhirovoe Delo* **13**, No. 2, 27-8]. Monographs on using naphthenic acid as a fat substitute and on preparing fat substitutes from higher paraffins were prepared by A. Voigt [*Allgem. Oel- u. Fett-Ztg.* **34**, 157-60] and H. P. Kaufmann [*Fette u. Seifen* **43**, 178-83], respectively. A. Imhausen [*Fette u. Seifen* **44**, 411-5] discussed the conversion of coal to hydrocarbons and oxidation of these to fat acids for preparation of soap. Patents issued to I. G. Farbenindustrie A.-G. [*U. S.* 2,073,054; 2,095,473] describe methods of oxidizing paraffins and manufacture of soap from the oxidized product. J. B. Niederl [*U. S.* 2,082,459] prepared phenolic aliphatic acids by reacting unsaturated fat acids with phenols in the presence of glacial acetic and concentrated sulfuric acids. The product could be used for soap making.

K. L. Weber [*Seifensieder-Ztg.* **63**, 937-8, 958-60, 979-80] discussed technic for salting out a kettle of soap. R. H. Ferguson [OIL & SOAP **14**, 115-8] studied the effect of glycerol on the equilibria of the soap phase. The addition of glycerol did not produce a new phase. The glycerol behaved toward soap exactly as water. The effect of up to 9 per cent glycerol on the amount of electrolyte required to salt out soap was not great. At 100° C. an increase of 3 per cent glycerol required an additional 0.3 to 0.4 per cent electrolyte to salt out the soap.

The use of sulfite cellulose waste liquor in soap was fostered by R. Krings [*Seifensieder-Ztg.* **64**, 337-8; *Allgem. Oel- u. Fett-Ztg.* **34**, 192-6; *Öle, Fette, Wachse, Seife, Kosmetik* **1937**, No. 4, 9-10] and by K. Braun [*Seifensieder-Ztg.* **64**, 207-8; *Fette u. Seifen* **44**, 57-8]. According to patents issued to K. Braun and H. Plauson [*U. S.* 2,100,047; *Brit.* 470,254; *Fr.* 801,584] the sulfite cellulose lyes are purified by treatment with chlorine and filtering. They are oxidized with ozone or hydrogen peroxide and concentrated under vacuum before use for the manufacture of soap.

There were several innovations in equipment reported. I. Y. Klinov and D. Sychev [*Masloboino Zhirovoe Delo* **12**, 546-7] reported that the lead lining of saponification apparatus could be replaced by fused silicates, "Dibase," cemented with "Dibase" containing 2 to 3 per cent barium silicate. J. Schaal [*Seifensieder-Ztg.* **64**, 121-2, 627-8; *Fette u. Seifen* **44**, 55-7; *Öle, Fette, Wachse, Seife, Kosmetik* **1936**, No. 13, 7-8] made soap in a crutcher. The advantages of the process were less time was required for saponification and drying, and a good glycerol-water was obtained. A patent issued to Refining Inc. [*Brit.* 458,600] dealt with a method of heating to control moisture content of soap boiling charge. A. Imhausen and W. Porsch *Ger.* 635,091 *Cl. 23e*] recommended that equipment to remove carbon dioxide from air be used with spray drying soap processes. A. F. Thal [*U. S.* 2,087,788] designed apparatus for drying soap on rolls under vacuum. Modern methods of manufacturing soap flakes were described by J. M. Vallance [SOAP **13**, No. 1, 25-8; 37], H. Zilske [*Seifensieder-Ztg.* **64**, 741-2] and H. Gabler [*Seifensieder-Ztg.* **64**, 628-9]. Equipment for solidifying and molding soap were designed by the patent assignees of Swift & Company [*Ger.* 645,569 *Cl. 23f*], Fullerton, Hodgart and Barclay, Ltd. [*Brit.* 449,483], Baker Perkins, Ltd. [*Brit.* 452,287] and Safa Soap Co., Ltd. [*Brit.* 455,781], and by the inventor H. Gabler [*Brit.* 456,704].

The manufacture of soap in tablet form for single use was patented by F. Werth [*Brit.* 454,693] and G. V. Kereszty [*Brit.* 457,975]. Werth included wood pulp in the product while Kereszty suggested that the product could be filled with any of several germicides, emulsifiers or cleansers. K. Bolsoe and H. Stone [*U. S.* 2,092,047] patented a means of sealing cards in cakes of soaps. The card may contain advertising or other printed matter. According to C. T. Walter [*U. S.* 2,085,840] a glossy finish was imparted to tubular soap by applying heat to the outer surface of the tubes at the instant of extrusion. A. R. Griffiths [*Australian* 101,477] compressed a mixture of sand, powdered resin and soap powder into a block form. An absorbent cloth impregnated with detergent composition and a detergent pad comprising metal, wool and soap were the subjects of patents issued respectively to P. A. Woronoff [*U. S.* 2,093,824] and G. W. Brooks [*U. S.* 2,079,600].

Patents on incorporating definite mixtures of certain alkali phosphates in soaps were issued to I. G. Farbenindustrie A.-G. [*Brit.* 451,342], Rumford Chemical Works [*Fr.* 810,958], B. O. Crites [*U. S.* 2,065,117], Procter and Gamble Co. [*U. S.* 2,093,827; 2,093,928], F. E. Guillard [*Fr.* 802,782], F. Draesbach [*U. S.* 2,081,617] and A. H. Fiske [*U. S.* 2,092,913]. These particular phosphates prevent the precipitation of lime salts when preparing soap solutions with hard water. A. Hellstrom [*Swed.* 87,675] added phosphates to prevent oxidation and darkening of soaps. A patent assigned to Kalle and Co., A.-G. [*Brit.* 465,688] dealt with the use of water soluble esters of cellulose, starch, xylose, or other starch-like substances in soaps. L. Kacser [*Hung.* 115,451] patented the use of water glass, glycerol, sand and limestone powder in potassium soaps. W. Lübbert and W. J. Kaiser [*Ger.* 633,871 *Cl. 23e*] used esters of lower aliphatic or hydroaromatic hydroxycarboxylic acids and higher alcohol as super-fatting agents for soap. Dodecyl ester of lactic acid was one of the examples given.

According to C. H. Haurand [*U. S.* 2,078,726] the yellowing tendency of cold process soap was considerably inhibited by partially hardening the soap stock used for its production. J. Schaal [*U. S.* 2,087,267] produced a satisfactory cold process soap from soap stock that was treated with hydrogen peroxide. The necessary heat for the saponification was obtained with appropriate technic by utilizing the exothermic reactions occurring on dissolving the required caustic and the heat of the saponification reaction. B. Uecher [*Seifensieder-Ztg.* **64,** 228-9] reported that soap of low alkalinity and salt free can be prepared from fat acids. The soap from fat acids does not have as great a tendency to crack as the soaps from saponification of glycerides.

Soaps containing various organic solvents were patented by W. Blech [*U. S.* 2,064,725; 2,083,821], C. Ellis [*U. S.* 2,058,781; 2,084,632], A. Ruppert [*Ger.* 639,583; 639,733; 640,405 *Cl. 23e*], K. Buchheim and W. F. C. Brehmer [*Ger.* 639,071 *Cl. 22g*] and J. Halden & Co. [*Brit.* 460,839]. The soaps were recommended for removal of grease, cellulose lacquer, paint, or like material. K. Stickdorn [*U. S.* 2,089,305] added potassium methyl-adipinate to liquid soaps. This and similar compounds tended to maintain the fluidity of the soap and allowed preparation of liquid soap with a greater fat acid content. A special textile soap prepared by W. P. Davey [*U. S.* 2,073,464] contained at least 50 per cent α-terpineol.

Soap made from blown castor oil and ricinoleic acid has special uses in the textile industry for dyeing according to patent of I. M. Colbeth [*U. S.* 2,090,909]. H. J. Nicholls [*U. S.* 2,070,308] subdivided soap in an atmosphere of ozone. The inventor stated that the new surfaces absorbed ozone, and soap of this type restored the brightness to colored fabrics, softened woolens and deodorized linens.

Shaving creams patented by Procter and Gamble Co. [*Brit.* 454,658; 454,660] and J. C. Bird [*U. S.* 2,085,733] contained sulfonated or sulfated oils together with perfume, fat acids, glycerol, etc. Preparation of shaving cream per patent by A. D. Dexter and T. D. Traders, Ltd. [*Brit.* 458,601] comprised heating a mixture of petrolatum, water, ammonium hydroxide, and stearic acid.

A disinfecting soap patented by W. Schulenburg [*Ger.* 632,825 *Cl. 23e*] contained insoluble subhalides or thiocyanates of silver and oxygen-yielding agents such as sodium peroxide and sodium pyro-phosphate.

Cleansers containing various detergents and abrasives were patented by B. M. Pitman [*Brit.* 460,942] and M. E. Rockhill [*U. S.* 2,093,660]. A detergent patented by F. H. Guernsey [*Can.* 361,834] contained glycerol, sodium carbonate, soap and sodium aluminum silicate. Special alkali metal silicate detergent compounds were patented by Electric Smelting Aluminum Co. [*Brit.* 461,013; 462,591].

New and unusual uses for wetting agents were reviewed by P. E. Hattinger [*Chem. Industries* **11,** 63-4]. Among the uses mentioned were: Promotion of chemical reaction between organic compounds by lowering interfacial tension, in acid foam fire extinguisher mixtures, to improve swelling and spreading power and prevent mold in adhesives, to assist in laying dust to prevent dust explosions, and for roads, etc. Information on use of soap in insecticide sprays, in flotation and in the metal industries was presented respectively by J. M. Ginsburg [*J. Econ. Entomol.* **30,** 583-90], R. S. Dean *et al* [*U. S. Bureau Mines Rept. Invest. No.* **3333,** 3-20] and B. Levitt [*Chem. Industries* **10,** 57-8].

Metallic soaps for lubricating use patented by E. N. Klemgard [*U. S.* 2,085,533; 2,085,534] contained natural uncoagulated rubber. Data on gelatinizing capacity of sodium, aluminum, zinc, lead, iron and calcium soap of linoleic and stearic acids in presence of mineral oil was recorded by G. S. Levant [*Colloid J. (U. S. S. R.)* **3,** 143-50]. E. Neyman [*Kolloid Z.* **77,** 270-2] reported that nickel and cobalt palmitates form gels in petroleum which can be liquefied by shaking. Stable jellies of naphthenates were formed in light petroleum. Barium soaps prepared with 66 per cent of the necessary barium hydroxide was patented as a constituent for water proofing compound or paint by C. Deguide [*Brit.* 450,288].

Communications on detergents and wetting agents that contained general information, formulas or reviews listed according to subject material were as follows:

Detergent action: A symposium by various authors [*Textile Mfr.* **63,** 160], I. Davidsohn and A. Davidsohn [*Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 3, 1-6; *Mat. grasses* **28,** 10913-5, 10937-8, 10965-6] and N. K. Adam [*J. Soc. Dyers Colourists* **53,** 121-9].

Grained soap: H. Manneck [*Fette u. Seifen* **44,** 202-5].

Soap powders: J. M. Vallance [Soap **13,** No. 5, 28, 30, 33, 103].

Saponification with sodium carbonate: G. Böhm [*Fette u. Seifen* **44,** 20-1], J. Schaal [*Seifensieder-Ztg.* **64,** 627-8] and R. L. Datta [*Dept. Ind., Govt. Bengal India Bull. No.* **72**].

Potash or soft soaps: J. Hetzer [*Seifensieder-Ztg.* **64,** 227-8], R. Krings [*Allgem. Oel- u. Fette-Ztg.* **33,** 576-8] and J. M. Vallance [Soap **13,** No. 13, 31-33, 121].

Toilet soaps: K. L. Weber [*Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 5, 1-7], C. Dittler [*Seifensieder-Ztg.* **64,** 101-2], K. L. Weber [*Seifensieder-Ztg.* **64,** 316-7], Hermada [*Seifensieder-Ztg.* **64,** 353-6, 375-6] and Welwart [*Seifensieder-Ztg.* **64,** 263-4].

Liquid soaps: R. H. Auch [Soap **13,** No. 10, 23-5] and Oculus [*Seifensieder-Ztg.* **64,** 512-3].

Twitchell reagent: K. Nishizawa *et al* [*J. Soc. Chem. Ind. Japan* **39,** 293-4B, 360-1B, 488-90B] and H. Zilske [*Seifensieder-Ztg.* **64,** 528-30, 548-51, 569-70, 589-90, 609-11].

Fat acids: Margaret J. Hausman [Soap **13,** No. 6, 26-30, 73].

Cold-process soaps: K. L. Weber [*Seifensieder-Ztg.* **64,** 23-4], A. R. Krings [*Seifensieder-Ztg.* **63,** 1017-9], Oculus [*Seifensieder-Ztg.* **64,** 193-4] and Lorgus [*Seifensieder-Ztg.* **63,** 944, 1004].

Shaving soaps: H. I. Henk [*Seifensieder-Ztg.* **64,** 25-6], K. Pfaff [*Reichstoff-Ind. Kosmetik* **11,** 110-1] and Oculus [*Seifensieder-Ztg.* **64,** 264-5].

Composition of some foreign soaps: W. A. Mott [Soap **13,** No. 7, 33, 73], J. M. Vallance [Soap **13,** No. 10, 27-9, 73] and S.-S. Ueno and Y. Hayashi [*J. Soc. Chem. Ind. Japan* **40,** 294-6B].

Medicinal soaps: Margaret J. Hausman [Soap **13,** No. 9, 23-5], H. J. Henk [*Seifensieder-Ztg.* **64,** 153, 265], J. Augustin [*Seifensieder-Ztg.* **64,** 251-3, 536-7, 575-7, 596-7] and Oculus [*Seifensieder-Ztg.* **64,** 590-1].

Soaps containing organic solvents: C. Pyhälä [*Öle, Fette. Wachse, Seife, Kosmetik* **1937,** No. 4, 1-5] and H. Zilske [*Seifensieder-Ztg.* **64,** 55-7, 70-3, 85-6, 214].

Preservation of soap: P. I. Smith [Soap **13,** No. 4, 2-13, 30], Ekschnam [*Reichstoff Ind. Kosmetik* **12,** 113-6], H. Braun [*Reichstoff Ind. Kosmetik* **12,** 124-5] and K. J. Partisch [*Seifensieder-Ztg.* **64,** 226-7].

Soap fillers: C. Bergell [*Seifensieder-Ztg.* **64,** 173-6], G. Knigge [*Seifensieder-Ztg.* **64,** 208-9], Cellin [*Allgem. Oel- u. Fett-Ztg.* **33,** 522-5], H. Henk [*Seifensieder-Ztg.* **64,** 588-9], C. Bergell [*Seifensieder-Ztg.* **64,** 629], C. Bauschunger [*Fette u. Seifen* **44,** 202-5, 352-5, 394-7], A. N. Ghose [*Indian Soap*

J. **3**, 204-9] and Frima [*Seifensieder-Ztg.* **64**, 607-8].

Soap perfumery: A. Wagner [*Seifensieder-Ztg.* **64**, 595-6, 615], I. Herold [*Fette u. Seifen* **43**, 67-8, 156-9], F. Schulz [*Seifensieder-Ztg.* **64**, 517-8] and R. L. Datta and T. Basu [*Seifensieder-Ztg.* **61**, 1021-3].

New wetting agents: H. W. Rose [*Am. Dyestuff Reporter* **26**, 825-7], R. W. Boedecker [*Laundry Age* **17**, No. 3, 168-72, 222], C. E. Mullin [SOAP **13**, No. 11, 30-3, 74; No. 12, 27-30, 73; *Textile Colorist* **59**, 531-3, 558, 599-602, 695-6, 708] and J. Nusslein [*Melliand Textilber.* **18**, 248-52].

Chemical control and calculations in soap making: M. Singer [*Seifensieder-Ztg.* **64**, 783-4, 803-5, 824-5], F. Wittka [*Seifensieder-Ztg.* **63**, 1774-96] and K. L. Weber [*Öle, Fette, Wachse, Seife, Kosmetik* **1937**, No. 1, 1-5].

Data on dialysis of potassium soaps of several fat acids through a cellophane membrane was reported by H. Kroper [*Fette u. Seifen* **44**, 298-300]. There was greater penetration of the lower saturated fat acids than of the higher members. Double bonds and hydroxyl groups favored wandering through the membrane. The method yielded information on hydrolysis of soaps. The hydrolysis was higher for the higher fatty acids. Kroper, therefore, suggested that hydrolysis could not be responsible for skin irritation caused by low molecular weight fat acid soaps. P. N. Das Gupta [*Indian Soap J.* **3**, 200-3] and B. Lustig and F. Schmerda [*Dermatol. Wochschr.* **104**, 607-3] devised methods for determining hydrolysis of soaps. Their conclusions as to the hydrolysis of various soaps agreed with those of Kroper. In addition, Lustig and Schmerda reported that the addition of unsaturated acid soaps to saturated acid soap solutions reduces the hydrolysis in the soap solutions.

The theory that alkalinity or hydrolysis to yield free alkali causes skin reactions, eczema or other dermatitis was attacked in a review and an investigation on the subject by L. Goldman [*J. Am. Med. Assoc.* **108**, 1317-20]. Test showed that of the pure soap coconut oil soaps gave skin reactions most frequently. No significant reactions were obtained with 0.1 N sodium hydroxide. Several of the papers reviewed attributed the reactions to material incorporated in soap. Sodium perborate was the commonest eczematogenic agent, others were benzaldehyde, terpenes, cresols and tar.

The bactericidal action of various detergents was studied by M. Bayliss [*J. Lab. Clin. Med.* **22**, 700-4], M. Belin and J. Ripert [*Compt. rend. soc. biol.* **124**, 612-4] and W. L. Mallmann [*Am. J. Public Health* **27**, 464-70]. Bayliss reported that sodium lauryl sulfate in dilute solutions clears cultures of gram-negative organisms grown on liquid media. Belin and Ripert reported the activity of various sodium soaps on several organisms. Mallmann found that the addition of sodium hexametaphosphate to detergent mixtures, aids in the removal of bacteria.

A. S. C. Lawrence [*Trans. Faraday Soc.* **33**, 325-30] peptized soap solutions with several alcohols, phenols and amines. The viscosity rises sharply on addition of small amounts of the compounds and after passing a maximum it usually decreases below the original value. Viscosity data of various concentrations of sodium oleate at several temperatures were recorded by W. Philippoff and K. Hess [*Ber.* **70**B, 1808-14].

K. Lindner [*Fette u. Seifen* **43**, 214-8, 253-6; **44**, 47-51] reviewed the literature on colloidal chemical and technical washing properties of hydrated colloids and also reported a new investigation on the subject. The viscosities and surface tension of several colloids at .02-1.0 per cent concentration were tabulated. Washing tests on wool with solutions containing gelatin, casein peptized with sodium hydroxide, hemoglobin, sodium protalbinate and gum tragacanth together with sodium carbonate and both with and without addition of sodium oleate showed that gum tragacanth not only had no washing power but decreased that of sodium oleate, while the proteins have washing power both when used alone and in combination with the soap. The peptized casein and sodium protalbinate were superior to gelatin in this respect. The information is of value in selection of fillers for soap.

F. A. Long, C. C. Nutting and W. D. Harkins [*J. Amer. Chem. Soc.* **59**, 2197-2203] reported that the surface tension of sodium laurate and sodium nonylate was high in basic and low in neutral solutions. The presence of neutral salts greatly lowered the surface tension of the solutions.

According to H. L. Cupples [*Ind. Eng. Chem.* **29**, 924-6] the wetting power of soap solution as measured by its spreading coefficient on mineral oil, was related to its foam-producing power, dirt-suspending power and efficiency as a detergent. The method for determining the spreading properties of aqueous solutions and data on several soaps are presented. E. Kneen and W. W. Benton [*J. Phys. Chem.* **41**, 1195-1203] described a technic for determining contact angles in solid-liquid-air systems. The procedure can be used to evaluate the wetting capacity of soaps. J. Hetzer [*Fette u. Seifen* **44**, 54-5] recommended using the time required for 10 per cent solutions of washing agents to run out of a Traube stalagmometer as a criterion for their value. P. Schwartz [*Seifensieder-Ztg.* **64**, 69-70] devised an apparatus for determining foam number of soap solutions. Agitation was by a motor driven stirrer, which obviated the disturbing effect of carbon dioxide as with the usual air agitated methods.

A. Laptev and V. Moldavskii [*Masloboino Zhirovoe Delo* **13**, 30-3] compared the action of soaps from fats with those from fat substitutes. The detergent properties of soaps from naphthenic acids, resin acids and liquid synthetic acids were lower than those prepared from natural oils. Of the soap substitutes, the resinates were most effective; those of liquid synthetic acids were weakest. All the soap substitutes caused discoloration, graying or yellowing of cotton washed in tap water. The fat soaps were most harmful to human skin. Resinates caused sticking of hair and were difficult to remove. The soaps from liquid synthetic acids and naphthenic acids were less sticky, but imparted to hair a persistent, unpleasant odor. N. N. Godbole and P. D. Srivastava [*Indian Soap J.* **3**, 203-4] reported that potassium resinates exhibit a higher lathering number than the corresponding sodium resinates.

The "sweating" of soaps seems to be a problem during the rainy reason in India. According to N. N. Godbole and P. D. Srivastava [*Indian Soap J.* **3**, 176-83, 245-50; *Kolloid Z.* **78**, 348-53] the presence of free alkali increases moisture absorption but the presence of free acids retards it. Soaps of the fat acids of high molecular weight absorb less moisture than those of low molecular weight. An increase in double bonds increased the hygroscopic capacity of the soap.

A method of determining free alkali in soap by H. E. Cox *et al* [*Analyst* **62**, 36-41] comprised determining (1) total free alkali by adding an alcoholic solution of the soap to mineral acid and titrating back with alkali, (2) free sodium hydroxide by dissolving soap in 10 times the amount of neutral alcohol, adding a hot solution of barium chloride and titrating with acid to a phenolphthalein end point and (3) carbonate alkali by difference. W. C. Preston [Oil & Soap **14,** 289-95] discussed the limitations of the colorimetric, ultrafiltration and electrometric (with quinhydrone, antimony, glass and hydrogen electrode) methods for determining the alkalinity of soap solutions. Various instruments and methods for determination of pH of soap were described by A. Karsten [*Reichstoff Ind. Kosmetik* **12,** 131-4; *Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 11, 14-8].

A new method for determining the water content of soap by N. Spasskii [*Seifensieder-Ztg.* **63,** 795-6] comprised heating weighed samples of soap in definite amounts of stearic acid at 140-5° for 45 minutes and determine the loss in weight. E. Randa [Oil & Soap **14,** 7-10] described a rapid dichromate method for determining glycerol in soap. Methods for determining fat acids in soaps by G. Knigge [*Chim. & industrie* **36,** 981] and N. Spasskii [*Seifensieder-Ztg.* **64,** 282-3] comprised treatment with acid and separation of fat acids. The latter recommended extracting the separated fat acid with ether and filtering when analyzing filled soaps. Committees of the American Oil Chemists' Society [Oil & Soap **14,** 19-20] recommend acceptance of the soap analysis methods proposed October, 1933, and selected tentative methods for determination of hydrocarbons, water insoluble alkali, and moisture in soap.

Qualitative tests for various washing and cleaning agents were described by A. Bohanes [*Chem. Obzor* **11,** 155-8]. Treatment of solutions with (1) 1 per cent acetic acid, (2) saturated calcium sulfate solution, (3) neutral lead acetate and (4) barium chloride identifies the product as (1) soaps, (2) sulfonated neutral fatty acids, (3) sulfonated fatty alcohols and (4) Igepones and Lamepones. Presence of free sulfates indicates Igepone A, free sulfates and nitrogen indicates Igepone T, and a biuret test in the absence of proteins or peptones indicates Lamepones. A refractometric method for determining fat acids in turkey red oil was described by W. Leithe and H. Lamel [*Fette u. Seifen* **44,** 111-3]. D. Burton and G. F. Robertshaw's method [*Fette u. Seifen* **43,** 152-5; *J. Intern. Soc. Leather Trades Chem.* **20,** 495-8; **21,** 366-9] for determining oily matter in sulfonated oils comprises hydrolysis with hydrochloric acid and extraction with carbon tetrachloride. R. Hart [Oil & Soap **14,** 71-5; *Ind. Eng. Chem. Anal. Ed.* **9,** 177-80; *Amer. Dyestuff Reporter* **26,** 634-8] presented committee reports on determining inorganic salts and unsaponifiable non-volatile matter in sulfonated oils and also a procedure for the quantitative fractionation or separation of various fatty components contained in sulfonated saponifiable oils. G. Parsy [*J. Intern. Soc. Leather Trades Chem.* **21,** 261-74] showed that the colorimetric method for determining pH of sulfonated oils was inaccurate; the use of the glass electrode method was recommended.

A. Lattermoser and H. Flammer [*Kolloid-Beihefte* **45,** 359-412] measured the dispersion of calcium soaps by alkyl sodium sulfate, Igepone T and sodium oleate. In a washing bath containing calcium soap and dispersion agent there was an increase in hydroxyl ion concentration with rising concentration of the dispersing agent. The increase of the hydroxyl ion was assumed to be due to hydrolysis of the dispersed calcium soaps. The increased hydrolysis paralleled detergent effect. The results of the experiments led to the development of combinations of soap and dispersion agents that prevent the deposition of calcium soaps and have satisfactory detergent effect. S.-S. Ueno [*J. Soc. Chem. Ind. Japan* **40,** 24B] discussed the properties of higher aliphatic sulfates. W. Schrauth [*U. S.* 2,079,228] patented the use of sulfated alcohols for oiling fibrous materials. A patent of A. M. Herbsman [*U. S.* 2,066,-778] describes the use of sulfonated oils for the grading of ores.

A monograph on triethanolamine soaps giving method of preparation, properties and uses was contributed by W. H. Dicken [*Soap, Perfumery and Cosmetics* **10,** 486-90]. S. Sabetay [*Bull. soc. chim* **3,** (5), 1918-9] described the derivatives of triethanolamine that foam in the presence of acids. According to A. Tettamanzi [*Ann. chim. applicata* **27,** 53-6] ethanolamine soaps and sodium chloride undergo double decomposition in solution to give sodium soaps and the ethanolamine chloride. D. Mann [*Seifensieder-Ztg.* **64,** 102] recommended the use of ethanolamine soaps together with a small amount of water in dry cleaning. Patents on the manufacture of alkylol amines or their esters were issued to L. Rosenstein and W. J. Hund [*Ger.* 639,954], R. R. Bottoms [*U. S.* 2,085,785], J. F. Olin [*U. S.* 2,042,621], J. W. Orelup [*Brit.* 450,672] and I. G. Farbenindustrie A.-G. [*Brit.* 455,310].

In addition to the information on non-soap wetting agents there appeared a large number of patents which are too numerous to discuss individually in this survey. Reference to these is made here by giving inventor or assignee and patent numbers with only slight effort toward classifying these inventions.

The patents on nitrogen containing derivatives — except ethanolamines — which includes amines, quaternary ammonia compounds, amides, etc., were as follows:

I. G. Farbenindustrie, A.-G.: Ger. 635,522 Cl. 8o; 639,082 Cl. 12o; 642,885 Cl. 12o; 648,793 Cl. 12q; U. S. 2,095,457; 2,095,814; Brit. 450,467; 459,791; 460,710; 461,972; 462,720; 464,657; 465,200; 466,270; 467,244; Fr. 805,768; 806,819; 807,280; 809,360.

E. I. du Pont de Nemours & Co.: U. S. 2,060,850; 2,060,851; 2,079,-613; 2,080,143; 2,090,595.

Imperial Chemical Industry, Ltd.: U. S. 2,075,013; 2,075,958; Brit. 452,139.

H. Dreyfus: U. S. 2,063,908; 2,-063,987; 2,067,176.

Rohm & Haas Co.: Brit. 468,399.

General Analine Works: U. S. 2,087,565; 2,089,569.

M. De Groote: U. S. 2,087,506.

E. Schirm: U. S. 2,067,463.

A. Wacker Ges. fur electrochemische Industrie G. m. b. H.: Fr. 806,112.

Böhme Fettchemie Ges. m. b. H.: Ger. 639,330 Cl. 12q; Brit. 457,391.

Soc. pour l'ind. chim. a Bale: U. S. 2,060,568; 2,089,602; Brit. 462,881; Fr. 46,914 Addn. to 754,-626; Swiss 186,737; 186,738; 187,319; 187,320; 189,302.

Girdler Corp.: U. S. 2,085,784; 2,085,785; 2,085,786; 2,085,787.

The patents on nitrogen compounds which also contained a sulfate group were:

I. G. Farbenindustrie, A.-G.: Ger. 635,241 Cl. 8o; 639,079 Cl. 8o; U. S. 2,063,963; Brit. 451,355; 455,379; 461,328; 464,657; 466,853; Fr. 803,550; 806,372.

Soc. pour l'ind. chim. a Bale: U. S. 2,076,217; Brit. 461,054; Fr. 808,270; Swiss 185,942; 187,421; 188,763; 188,764.

Imp. Chem. Industries, Ltd.: U. S. 2,062,958 2,079,347; Brit. 452,139.

E. I. du Pont de Nemours & Co.: U. S. 2,063,416.

Standard Oil Development Co.: U. S. 2,061,601.

General Aniline Works: U. S. 2,086,690.

Böhme Fettchemie G. m. b. H.: Ger. 634,759 Cl. 12o.

J. R. Geigy, A.-G.: Brit. 466,635.

E. Waldmann and A. Chwala: Brit. 460,858.

Patents dealing with sulfonation processes:

Böhme Fettchemie G. m. b. H.: Ger. 639,625 Cl. 12o; 642,829 Cl. 12o; 643,052 Cl. 12o.

Chemische Fabrik Stockhausen & Cie: U. S. 2,079,973; Ger. 631,910 Cl. 12o; 636,136 Cl. 12o.

Chem. Fab. R. Baumheier A.-G.: Ger. 636,136 Cl. 12o.

Wetting and detergent patents on sulfuric acid derivatives of fats, fat alcohols or esters of fat acids:

I. G. Farbenindustrie A.-G.: Ger. 644,131 Cl. 12o; Brit. 450,467; 452,577; 453,778; 461,614; 463,624; 463,644; 466,734; Fr. 809,373; 809,405.

Procter & Gamble Co.: U. S. 2,075,914; 2,091,704; 2,098,114; 2,099,214; Brit. 453,134; 457,873.

Oranienburger Chem. Fab. A.-G.: Ger. 642,414 Cl. 8o; 647,290 Cl. 12o; 649,156 Cl. 12o; 649,323 Cl. 12o.

Unichem. Chemikalien Handels A.-G.: U. S. 2,088,308; 2,094,489.

Chemische Fab. R. Baumheier A.-G.: U. S. 2,072,475; Brit. 454,183.

Soc. pour l'ind chim. a Bale: Ger. 645,608 Cl. 12o; 646,630 Cl. 12o.

Deutsche Hydrierwerk A.-G.: U. S. 2,066,542; Ger. 635,903 Cl. 12o.

N. V. Chemische Fab. "Servo" and M. D. Rozenbroek: Dutch 38,276; 38,445.

National Oil Products Co.: U. S. 2,093,576; 2,095,778.

Henkel & Cie G. m. b. H.: U. S. 2,084,253; Ger. 639,281 Cl. 12s.

Chemische Fab. Stockhausen & Cie: Ger. 636,259 Cl. 12o.

H. Bertsch: Ger. 640,997 Cl. 12o.

J. N. Wickert: U. S. 2,088,019.

Imperial Chem. Industries, Ltd.: U. S. 2,062,957.

E. I. du Pont de Nemours & Co.: U. S. 2,082,576.

Colgate-Palmolive-Peet Co.: Fr. 810,847.

A. W. Ralston: U. S. 2,089,154.

N. V. Chem. Fab. Servo and M. D. Rozenbroek: Brit. 452,508.

Chem. Fab. Grunau Landshoff & Meyer, A. G.: Ger. 644,686 Cl. 12o.

J. B. Niederl: U. S. 2,082,459.

P. W. Neber: Ger. 636,193 Cl. 12o.

F. Guenther and H. Haussman: U. S. 2,094,451.

Zschimmer and Schwarz Chem. Fab. Dölau: Ger. 634,951 Cl. 12o.

T. B. Unger: Norw. 57,389.

K. Wenzel: Ger. 640,681 Cl. 12o.

R. H. Marriot *et al*: Brit. 461,221.

G. H. Law and R. W. McNamee: Brit. 456,214.

Cie nationale de matieres colorantes, etc.: Brit. 450,579.

D. S. Chamberlain: U. S. 2,072,155.

Patents on wetting agents containing sulfate derivatives together with other material, such as sodium carbonate, phosphates, soap, solvents, etc.:

Standard Oil Development Co.: U. S. 2,066,208; 2,071,512; 2,084,483.

G. A. Pickett and A. L. Osterhof: U. S. 2,097,737.

W. Schrauth: Ger. 648,869 Cl. 30i.

W. Kling: U. S. 2,061,468.

W. T. Reddish: U. S. 2,085,471.

L'Outillage pour tubes "Rotax": Gr. 802,506.

H. G. Vail and J. H. Brousseau: Can. 362,153.

T. R. Donlan: U. S. 2,079,793.

J. Alix: Fr. 805,062.

Wetting agent and detergent patents on sulfate derivatives of non-fat products and patents on preparing organic derivatives for sulfonation.

Union Carbide and Carbon Corp.: U. S. 2,088,014; 2,088,017; 2,088,018; 2,088,019.

I. G. Farbenindustrie A.-G.: U. S. 2,094,451; Ger. 630,679 Cl. 12o; Fr. 807,213.

Henkel & Cie G. m. b. H.: Fr. 801,683; 804,922.

Rohm & Haas Co.: U. S. 2,072,153; Brit. 463,991.

Böhme Fettchemie G. m. b. H.: Ger. 648,596 Cl. 12s.

E. I. du Pont de Nemours & Co.: U. S. 2,061,617.

National Oil Products Co.: U. S. 2,076,166.

General Aniline Works: U. S. 2,062,842.

National Aniline & Chemical Co.: U. S. 2,061,593.

Standard Oil Development Co.: U. S. 2,084,506.

Tretolite Co.: U. S. 2,081,795.

Hercules Powder Co.: U. S. 2,058,389.

E. A. Mauersberger: Fr. 801,106.

A. Ofner: Hung. 115,896; Fr. 809,342.

N. V. Bataafsche Petroleum Maatshappy: Brit. 459,078; 459,079; 459,080; 459,117.

Patents on purification of wetting agents prepared by the sulfonation of mineral oil or mineral oil fractions:

Standard Oil Development Co.: U. S. 2,092,943.

Standard Oil Co.: U. S. 2,059,838.

M. Blumer: U. S. 2,097,440.

Patents on wetting agents comprising organic derivatives containing phosphorus:

I. G. Farbenindustrie, A. G.: Ger. 646,480 Cl. 12o.

N. V. Chem. Fab. "Servo" and M. D. Rozenbroek: Dutch 39,171.

Bohme Fettchemie G. m. b. H.: Ger. 646,290 Cl. 12s.

Patents on miscellaneous wetting agents:

I. G. Farbenindustrie, A. G.: Ger. 630,526 Cl. 12o; U. S. 2,069,336; 2,095,814; Brit. 452,866; 456,142; 456,517; 459,040; 465,200; Fr. 801,499.

Henkel & Cie G. m. b. H.: Brit. 465,106; Fr. 801,292; 808,852.

Deutsche Hydrierwerke A.-G.: Brit. 450,515.

Bohme Fettchemie G. m. b. H.: Ger. 634,952 Cl. 12s.

A. Wacker: Brit. 460,140.

Review of literature on glycerine appropriately fits in this section of the review because it is a by-product of soap and detergent manufacture. Methods of recovering and refining glycerine were described by A. Guillaudeu [*Ind. Eng. Chem.* **29,** 729-33], H. Dorner [*Seifensieder-Ztg.* **64,** 225-6, 244-6, 261-2, 280-2, 288-9, 317-9], R. Krings [*Ibid.* **63,** 997-1000], Welwart [*Ibid.* **64,** 8], K. Krebitz [*Ibid.* 76], H. C. Keutgen [*Ibid.* 159-60], G. Buchner [*Fette u. Seifen* **44,** 147-9] and P. Naumanko [*Masloboino Zhirovoe Delo* **13,** No. 2, 18-19]. A new process patented by H. F. Lorenz [*U. S.* 2,084,446] comprises steam distilling the glycerine from soap. E. Erdheim [*Öle, Fette, Wachse, Seife, Kosmetik* **1937,** No. 8, 2-3] evaluated the bleaching activity of several bleaching earths for decolorizing glycerol. M. D. Merman [*Masloboino Zhirovoe Delo* **12,** 550-2] recommended bleaching glycerine at 65 to 70° for 50 minutes with 0.5 per cent activated carbon.

Wm. E. Shaefer [*Ind. Eng. Chem. Anal. Ed.* **9,** 449-50] determined glycerol and glycol in dilute solutions by evaporating the water and acetylating the residue. The amount of glycerol or glycol can be calculated from the amount of acetic anhydride used by the reaction. An electrometric titration with dichromate method for estimation of glycerol was described by the chemical division of Procter & Gamble Co. [*Ind. Eng. Chem. Anal. Ed.* **9,** 514-5].

Formulas for the use of glycerine

in windshield cleaners, frost formation preventives, automobile liquid polishes, solid abrasives, gasoline-proof lubricating greases, rug cleaners and for other miscellaneous uses were presented by M. A. Lesser and G. Leffingwell [*Chem. Industries* **39**, 617-9; **40**, 59-60].

Fermentation of cane juice with molasses yeast, *Saccharomyces formonensis*, in presence of sodium sulfite according to Y. Iwata [*Rept. Govt. Sugar Expt. Sta. Tainan, Formosa, No.* **3**, 76-92) yield 27.47 per cent glycerine on the basis of the fermentable sugar.

The committee that assisted the chairman in preparing this paper by reviewing and submitting additions, suggestions and corrections is composed of:

R. C. NEWTON
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ABSTRACTS

Oils and Fats

Edited by
M. M. PISKUR and RUTH LINDAHL

Collaborative work of the D. G. F. 8 meeting: Work program of the 9th session of International Commission for study of fatty materials, Rome, 1938. General analytical methods. *Fette u. Seifen* **45**, 232-8 (1938).—The articles give reports on the commission's work on polybromide no., hydroxyl no. and detn. of rosin acids in soap. Reports on (1) oxy-acids, (2) ash, (3) org., inorg., and volatile org. impurities, (4) total fat acids and (5) free alkali, carbonate alkali and bound alkali in soap are continued.

The chemistry of butter and margarine. L. Erlandsen. *Fette u. Seifen* **45**, 215-9 (1938).—General information on the compn., characteristics and properties of butter and margarines are presented. For systematically testing for butter in margarine: (1) Compare luminescence test on sample with standards contg. 10, 20 and 30% butter. (2) Try some of the identifying reaction, i.e., methods of Kolle. (3) Carry out the butyric acid no. and residue no. tests and apply formula of Grossfeld: % butterfat = 5.12 × butyric acid no. — 0.12 × residue no. (4) Det. B. value and when necessary also A value. Systematic testing for margarine in butter: 1. Luminescence analysis and qual. tests for coco fat and hardened fats are run. (2) Positive phytosterine reaction indicates vegetable fats and oils; positive Tortelli-Jaffe reaction indicates hardened train oils. (3) Det. butyric acid no., lauric acid no. and residue no. and calc.; % cocofat = 2.77 × residue no. — 2.63 × butyric acid no. or coco fat = 0.79 × (lauric acid no. — butyric acid no.). (3) Det. SCN no., partial I no. and amt. of iso-oleic acid.

Chemical microscopy of fats and waxes. IV. Cottonseed oil. L. W. Greene. *Cotton and Cotton Oil Press* **39**, No. 14, 3-4 (1938).—Investigation of 11 specimens of crude and refined cottonseed oil indicated that a satd. soln. of KOH in *n*-butyl alc. is suitable as a microreagent for differentiating between the two grades of oil. Refined oil gave characteristic cryst. rosettes with the reagent, while crude oil produced an amorphous soap. Satd. solns. of KOH in MeOH and EtOH formed cryst. soaps with cottonseed oil but these were not sp. Four sketches illustrate the cryst. reaction products. (*Chem. Abs.*)

Properties of mamey-oil. L. S. Malowan. *Seifensieder-Ztg.* **65**, 285 (1938).—The mamey tree is a tropical plant which grows to about 20 m. high. The fruit is 15 cm. dia. and has a peach-like taste. The characteristics of the seed oil are: sapon. no. 183-186, I no. 19.3-20.5, Pol. no. 0.7, R. M. no. 2.5, $D^{28}/_{15.5}$ 0.90981, n_D 1.4691. The oil is recommended for cosmetic uses.

The occurrence of traces of hexadecenoic (palmitoleic) acid in vegetable fats. T. P. Hilditch and H. Jasperson. *J. Soc. Chem. Ind.* **57**, 84-7 (1938).—Soybean, cottonseed and palm oil fat acids were fractionated. The compns. of the oils were tabulated. It was shown that hexadecenoic acid and possibly tetradecenoic acid were present in the oils. The small amounts present can have little influence on the general properties of the oils.

Hydrogenation of oils by the continuous process. I. Hydrogenation of groundnut oil by catalysts of nickel and its alloys. V. T. Athavale and S. K. K. Jatkar. *J. Indian Inst. Sci.* **20A**, 95-109 (1937).—The hydrogenation of groundnut oil by various catalysts prepd. from Ni wire and its alloys has been studied by the continuous flow method and it has been shown that the Ni wire catalyst is the easiest to be prepd. in a high state of activity. (*Chem. Abs.*)

Catalytic fat hydrogenation. II. Hydrogenation with copper-nickel catalyzers. H. F. Kaufmann and H. Pardun. *Fette u. Seifen* **45**, 223-8 (1938).—Cu catalyst is practically inactive. Mixts. of Cu and Ni give better results than Ni alone. Optimum results were obtained when the metallic catalyst was a mixt. of equal amts. of Ni and Cu. It is postulated that the catalyst forms a cubic crystal in which the position of the atoms on the face are an even distribution of Cu and Ni. This serves to make the Ni more active.

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