must be fused with sodium hydrate to render it soluble. It is more convenient to fuse directly with sodium hydrate and separate iron by sulphurous acid and boiling.

While the process above outlined is not intended to replace those given for analytical research it requires less material, less skill to conduct it, less time, less costly apparatus and less expensive chemicals where zirconia is to be prepared in quantity than any we have found described or have experimented with.

Messrs. Mandel and Barnett kindly assisted in these experiments and in looking up the literature.

ABSTRACTS.

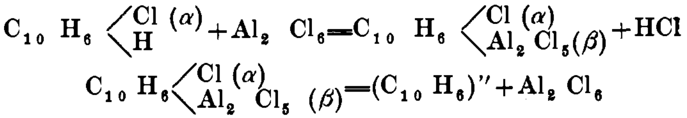
GENERAL CHEMESTRY.

Action of Aluminium Chloride upon Bromo-, Chloro- and Iodo-Naphthol. L. Roux.

Friedel and Crafts have studied the action of aluminium chloride on naphthalene ; the author has extended the study to the action of this salt (anhydrous) upon the derivatives of naphthalene.

α Monobromonaphthol.—This last body is prepared by the action of bromine on naphthalene dissolved in carbon disulphide. The action of the chloride is too violent if a temperature of 100° is reached; this is avoided by dissolving the monobromonaphthol in carbon disulphide, and heating slowly on the water bath. The product of the reaction is poured into cold water, and the products are separated by fractional distillation. The reaction gave: 1° Naphthalene.—2° α monobromnaphthol not decomposed.—3° β monobromonaphthol.—4° small quantities of dibromnaphthols.—5° black tar-like bodies not distillible. The author gives the results of the study of β monobromonaphthol. He was unable to obtain the β derivative directly by the action of bromine on naphthalene in the presence of aluminium chloride.

α Monochloronaphthol.—This last body has been prepared by the action of chlorine on naphthalene slightly heated. This body is dissolved in carbon disulphide, then boiled for two hours with aluminium chloride. The product is heated with water and fractionally distilled; β chloronaphthol results according to the following equations:



$$C_{10}H_6\left\langle\begin{array}{l}Cl\ (\alpha)\\H\end{array}\right. + Al_2Cl_6 = C_{10}H_6\left\langle\begin{array}{l}Cl\ (\alpha)\\Al_2Cl_5(\beta)\end{array}\right. + HCl$$

$$C_{10}H_6\left\langle\begin{array}{l}Cl\ (\alpha)\\Al_2Cl_5\ (\beta)\end{array}\right. = (C_{10}H_6)'' + Al_2Cl_6$$

The diatomic radical $(C_{10}H_6)''$ combines with the elements of HCl to form a β compound.

$$(C_{10}H_6)'' + HCl = \beta\, C_{10}H_6HCl.$$

The author also studies the action of aluminium chloride on the α moniodonaphthol. No molecular transformation was observed. The action of aluminium chloride on a mixture of α bromonaphthol and toluol yields a mixture of naphthalene and bromotoluols; by using benzol instead of toluol the author obtained similarly a bromo-derivative boiling at 160°. (*Bul. Soc. Chim.*, **45**, *511.*)

M. L.

On the Action, in the Cold, of the Alcoholic Chlorides on Ammonia and on the Methylic Amines. C. VINCENT & J. CHAPPIUS.

The authors first describe their apparatus for experiments of this class; the results are as follows:

1. Methyl chloride and ammonia gas.—The mixture compressed at the ordinary temperature gives a liquid that soon yields a white deposit. Treated with boiling absolute alcohol this deposit is found to be ammonium chloride, while the alcohol dissolves chlorhydrate of mono- and trimethylamine. The equation is:

$$4\ NH_3 + 4\ CH_3Cl = 2\ NH_4\ Cl + NH_2CH_3.\ HCl + N(CH_3)_3\ HCl.$$

2. Methyl chloride and monomethylamine.—The crystals obtained are entirely soluble in alcohol; they are composed of hydrochloride, monomethylamine and of tetramethylammonium chloride; no di- nor trimethylamine are formed. The reaction is:

$$3\ NH_2\ CH_3 + 3\ CH_3\ Cl = 2\ NH_2,\ CH_3,\ HCl + N\ (CH_3)_4\ Cl.$$

3. Methyl chloride and dimethylamine.—Equal volumes of both gases are compressed to 25 atmospheres. The crystals produced contain no ammonium chloride; they are formed of tetramethylammonium chloride and of dimethylamine hydrochloride. The reaction is given by the formula:

$$2\ NH\ (CH_3)_2 + 2\ CH_3\ Cl = NH\ (CH_3)_2\ HCl + N\ (CH_3)_4\ Cl.$$

4. Methyl chloride and trimethylamine.—The crystals are formed of one kind of salt only, viz., tetramethylammonium chloride. The reaction is :

$$N\ (CH_3)_3+CH_3\ Cl=N\ (CH_3)_4\ Cl.$$

Similar experiments with ethyl and propyl chloride give no results.

This difference of action of methyl chloride and ethyl and propyl chloride on the amines finds an explanation, according to the authors, in the difference between the constitution of carbinol and the other alcohols. (*Bul. Soc. Chim.*, 45, *496.*) M. L.

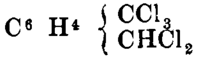
A New Ureometer. G. FRUTIGER.

The author describes an apparatus on the principle of Yvon's apparatus, but not requiring the use of a mercury trough. The description cannot be given without a cut. (*Bul. Soc. Chim.* 45, *504.*)
M. L.

On some Xylenic Derivatives. A. COLSON AND H. GAUTIER.

The authors have described in a previous paper the action of phosphoric chloride on the methyl benzols, an action that yields bi- and tetrachlorides of xylols. They have obtained products of greater chlorination, and converted these chlorides into the corresponding oxides.

With the orthoxylol heated at 200° with a great excess of phosphoric chloride they obtain orthoxylenic pentachloride

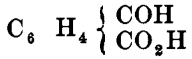


$$C^6\ H^4 \left\{ \begin{array}{l} CCl_3 \\ CHCl_2 \end{array} \right.$$

This compound melts at 53°6.

With paraxylol the xylenic hexachloride, $C_6\ H_4\ (CCl_3)_2$ is obtained. The metaxylol gives also a hexachloride; this body is converted by boiling alkaline water into complex acids containing Cl.

By a saponification with boiling water in a reflux apparatus, the authors converted the tetra-substituted bodies into the xylenic dialdehydes and into the acid orthoxylenic aldehyde $C_6\ H_4 \left\{ \begin{array}{l} COH \\ CO_2H \end{array} \right.$



These different aldehydes are described and the mode of their preparation is given.

Instead of the sealed tubes vertical refrigerators are employed to boil together the hydrocarbon and the phosphoric chloride. (*Bul. Soc. Chim.*, **45,** *506.*) M. L.

On the Bitter Principles of Hops. H. Bungener.

The author denies the assertion that the bitter principle of hops is the resinous matter abundant in the flowers. He treats *lupuline* (the dust obtained by the heating of hops) with petroleum ether, which leaves the resinous matter undissolved ; the residue after evaporation of the solvent is principally an acid named by the author *lupulic acid.* This when pure melts at 92°–93° ; is very soluble in alcohol, ether, benzol, chloroform, carbon disulphide, and in oil of hops ; insoluble in water. The composition is probably represented either by $C_{25}H_{35}O_4$ or by twice this formula. It gives with copper a crystallizable salt. This acid is very alterable in air ; the product of oxidation is partly soluble in water and the solution is very bitter. The conclusion of the author is that the active bitter principle of hops is nothing else than the product of oxidation of lupulic acid. (*Bul. Soc. Chim.*, **45,** *484.*) M. L.

Some Peculiarities of Commercial Orpine and on Depilation of Hides.—H. Terreil.

Orpine is quite different from orpiment ; the first is arsenic disulphide, and is red like realgar, whereas orpiment is arsenic trisulphide and is yellow. When the hair is to be used the mixture of lime and orpine is applied on the inner side of the hide or skin ; otherwise the whole hide is bathed in tanks containing milk of lime mixed with the arsenic sulphide. The author gives some directions relating to the appearance of dark spots, after this operation, where the hides may have touched surfaces of iron, or when the preservating substances, alum, salt, etc., are too rich in iron. Tanners attribute these accidents to impurity in the orpine ; the author denies the action of the impurities that he found in commercial orpines. The dark spots isolated from the treated hides were found to be ferrous sulphide. (*Bul. Soc. Chim.*, **45,** *484.*)

M. L.

ABSTRACTS
RELATING TO FATS AND ALLIED SUBSTANCES.

By R. W. Moore.

Further Notes on the Méthods of Examining and on the Chemistry of Fixed Oils. A. H. Allen.

For the determination of the specific gravity, the author uses Westphal's hydrostatic balance with very satisfactory results. Notice is directed to the advantage of taking the specific gravity at about 100° C. since the densities of waxes, etc., can be readily compared with those of fats and oils. The following figures were obtained partly by the Sprengel tube and partly with the Westphal balance, which two methods gave very concordant results :

Oil.	Sp. Gr. at 15.5° C.	Sp. Gr. at 98°-99° C.
Arachis	922.	867.3
Rape	915.	863.2
Neatsfoot	914.	861.9
Cottonseed	925.	872.5
Sesame	921.	867.9
Cocoanut Olein	926.2	871.
Niger seed	927.	873.8
Linseed	935.	880.9
Castor	965.5	909.6
Whale	930.7	872.5
Porpoise	926.	871.4
Seal	924.	873.3
Cod Liver	927.5	824.2
Menhaden	932.	877.4
Sperm	883.7	830.3
Doegling (bottle nose)	880.8	827.4

The specific gravity in the case of the following fats, solid at ordinary temperatures, was taken at two points by means of the plummet :

	Sp. Gr.		Diff. for 1° C.
Palm Oil	893.0 at 50° C.	858.6 at 98° C.	.717
Cacao Butter	892.7 at 50°	857.7 at 98°	.717
Japan Wax	901.8 at 60°	875.5 at 98°	.692

	Sp. Gr.		Diff. for 1° C.
Tallow	895.0 at 50°	862.6 at 98°	.675
Lard	898.5 at 40°	860.8 at 98°	.650
Butterine	898.2 at 40°	859.2 at 98°	.672
Butter Fat	904.1 at 40°	867.7 at 99°	.617
Cocoanut Oil	911.5 at 40°	873.6 at 99°	.642
Palm Nut Oil	911.9 at 40°	873.1 at 99°	.657
Spermaceti	838.5 at 60°	808.6 at 98°	.716
Beeswax	835.6 at 80°	822.1 at 98°	.750
Carnaüba Wax (commercial)	850.0 at 90°	842.2 at 98°	.975
Stearic Acid (commercial)	859.0 at 60°	830.5 at 98°	.750
Oleic Acid	903.2 at 15.5°	848.4 at 99°	.656
Paraffin Wax	780.5 at 60°	753.0 at 98°	.724

Coefficients of expansion of oils. From the following figures it will appear that the difference in the rates of expansion are not sufficient to distinguish between oils, and that (with the exception of whale oil) the correction in density for the following oils may be taken as .64 for 1° C. or .35 for 1° F.

Oil.	Correction for 1° C.	Observer.
Sperm	.648	A. H. Allen.
Bottle nose	.643	"
Whale	.697	"
"	.722	C. M. Wetherill.
Porpoise	.654	A. H. Allen.
Seal	.615	"
Cod liver	.646	"
Menhaden	.654	"
Neatsfoot	.625	"
Lard oil	.658	C. M. Wetherill.
Olive	.629	C. M. Stillwell.
Arachis	.655	A. H. Allen.
Rape	.626	"
Sesame	.624	"
Cottonseed	.629	"
Nigerseed	.637	"
Linseed	.649	"
Castor	.653	"

A comparison of the bromine absorption method of Mills with the absorption of Hübl, *Dingl., 253, 281,* is also given the bromine absorptions of the former chemist being multiplied by $\frac{127}{80}$ so as to give the iodine equivalent. (*Jour. Soc. Chem. Ind., 2,-435 and 3, 366.*)

Oil.	Mill's Bromine Absorption.	x127/80=Iodine Absorption.	Hübl's Iodine Absorption.
Almond	26.3	41.8	98.4
Peach Kernel	25.4	40.4	....
Apricot Kernel	....	....	100.0
Olive Kernel	....	....	81.8
Olive	54.0-60.6	85.9-96.4	82.8
Earthnut	46.2	73.3	103.0
Rape	69.4	110.4	100.0
Sesame	47.4	75.2	106.0
Cottonseed	50.0	79.5	106.0
Poppyseed	56.5	89.9	136.0
Hempseed	....	....	143.0
Linseed (raw)	76.0	120.8	158.0
Linseed (boiled)	102.4	162.8	....
Castor	58.3	92.7	84.4
Cod Liver	83.9	133.4	....
Ling Liver	82.4	131.0	....
Shark Liver	84.4	134.2	....
Seal	57.3-59.0	91.2-95.3	....
Whale	50.9	80.9	....
Bottlenose	48.7	77.4	....
Palm	34.8-35.4	55.3-56.3	51.5
Cocoanut	5.7	9.1	8.9
Cacao Butter	....	....	34.0
Japan Wax	1.5-2.3	2.4-3.7	4.2
Butter	24.5-27.9	38.9-44.4	31.0
Butterine	36.3-39.7	57.7-63.1	55.3
Lard	37.3	59.3	59.0
Tallow	....	....	40.0
Beeswax	0.0-0.54	00-0.86	....
Carnauba Wax	33.5	53.3	....

The author suggests in regard to the high figures obtained in some of the non-drying oils, that the methods of operation have not entirely prevented the formation of bromo- and iodo- substitution compounds.

Valenta's Acetic Acid Test.

For this purpose 3 c.c. of the oil and 3 c.c. of acetic acid (1056,2 sp. gr.) were taken, the mixture heated to transparency and the temperature at which turbidity began to appear noted.

Oil.	Temperature of Turbidity C O.	Observer.
Green Olive Oil	85	Valenta.
Yellow “ “	111	“
Almond Oil	110	“
Arachis Oil	112	“
“ “	87	Allen.
Apricot Kernel Oil	114	Valenta.
Neatsfoot Oil	102	Allen.
Sesame Oil	87	“
“ “	107	Valenta.
Melonseed Oil	108	“
Cottonseed Oil	110	“
Nigerseed Oil	49	Allen.
Linseed Oil	57	“
Menhaden Oil	64	“
Cod Liver Oil	101	Valenta.
“ “ “	79	Allen.
Shark Liver Oil	105	“
Rapeseed Oil	Not completely dissolved at the boiling point of the acid	Valenta.
Mustardseed Oil		
Wild Radishseed Oil		
Palm Oil	23	Valenta.
Laurel Oil	26–27	“
Nutmeg Butter	27	“
Cocoanut Oil	40	“
Palmnut Oil	48	“
Bassia Oil	64.5	“
Butter Fat	61.5	Allen.
Porpoise Oil	40	“
Palm Oil	83	“
Butterine	98	“
Lard	96.5	“

Oil.	Temperature of Turbidity C O.	Observer.
Beef Tallow	95	Valenta.
Pressed Tallow	114	"
Cacao Butter	105	"
Olive Kernel Oil	Complete soluble at the ordinary temperature.	Valenta and Allen.
Castor Oil		
Colophony		
Stearic Acid (commercial)	36	"
Oleic Acid (commercial)	27	"

Glycerol.—The determination of glycerol can now be satisfactorily conducted by the method suggested by Wanklyn and Fox (*This Journal 8, 27*), and worked out by Benedikt and Zsigmondy (*Chem. Zeit. 9, 975*). On account of the fact that ethyl alcohol yields a considerable and variable amount of oxalic acid with potassium permanganate, the latter chemists used methyl alcohol. On account of the difficulty of procuring sufficiently pure methyl alcohol, Allen proceeded as follows : 5 grms. of the oil are placed in a securely closed bottle with 2 grms. KOH in 12 c.c. of water. The whole is then heated in the water bath, with frequent shaking. until saponification is complete. The figures starred were obtained by the use of methyl alchohol.

Oil.	Per Cent. Glycerol.	
	Bededikt.	Allen.
Bottlenose	....	3.10*
Northern Whale	....	11.96
Porpoise	....	11.09
Menhaden	....	11.10
Lard	....	10.83
Tallow	9.94–9.98	....
Butter Fat	10.21–11.59	11.06
Olive	10.15–10.38	....
Rape	....	9.82*
Sesame	....	9.94*
Linseed	9.45–9.97	9.39
Castor	....	9.03–9.13
Oat Fat	....	8.35
Cocoanut Oil	13.3–14.5	12.11
Palmnut Oil	....	11.70
Palm Oil	....	9.71
Beeswax	none.	

Chevreul (1823), by purifying the glycerine with alcohol, drying in a vacuum, igniting and subtracting the ash, obtained the following figures:

Fat.	Glycerine	Non-Volatile Fatty Acids.	Ba. Salts of Volatile Fatty Acids.
Human	9.66	96.18	trace
Pork	8.82	95.90	trace
Beef	8.60	96.00	trace
Mutton	8.00	96.50	.30
Butter	11.85	88.50	5.00 = 2.83% butyric acid.
Porpoise Oil	14.00	82.20	16.0 = 9.63% valeric acid.

The results above given confirm the ordinary views of the composition of natural fats. In the case of butter they negative the iso-glycerine theory of Wanklyn and Fox, and in the case of oat fat the results of Konig, who could obtain no glycerine on saponification; also the statement of Hammerbacher and Lehman that cocoanut oil is mainly composed of free fatty acid is negatived. (*Jour. Soc. Chem. Ind.*, **5**, *65*.)

Supplementary Notes on the Methods for Examining fixed Oils. A. H. Allen.

VALENTA'S ACETIC ACID TEST.

	Turbidity Valenta.	Temperature °C Allen.
Whale Oil 1	....	38
" " 2	....	86
Bottlenose Oil	....	102
Sperm Oil	....	98–103
Seal Oil	....	72
Linseed Oil 1	....	57
" " 2	....	74
" " 3	....	73
Cottonseed Oil	110	90
Rape Oil	insoluble	insoluble
Blown Rape Oil	....	52
Cocoanut Oil	40	7.5
Palmnut Oil	48	32
Laurel Oil	26–27	40
Nutmeg Butter	27	39
Cacao Butter	105	insoluble

The whale oil marked 1, contained glycerides corresponding to 5.1% valeric acid, that marked 2 only 1.5%. The most satisfactory results were obtained with butter and butterine.

DETERMINATION OF GLYCEROL.

Pure methyl alcohol gives very satisfactory results. The oxidation of acids of the acrylic series in some cases form oxidation-products capable of yielding oxalic acid on further oxidation. This was noticed in connection with a sample of genuine linseed oil which gave 9.94% glycerol by the permanganate process against 8.78 actually isolated, but on exposure to the air until completely dried, the impossible figure of 15.52% glycerol was obtained against only 6.4% isolated. (*Jour. Soc. Chem. Ind.*, **5**, *282*.)

Action of Sodium Chloride on Solutions of Soaps. T. N. Whitelaw.

Six grms. of the fatty acids from tallow and palmnut oils were saponified, separated with excess of caustic soda from solution and the curds, after cooling, allowed to drain. They were then dissolved in 100 c.c. of water and a weighted quantity of pure NaCl added in sufficient quantity to obtain the separation of the soap in small curds. The whole was there brought to a boil and water carefully added from a burette. With a certain strength of salt the grains of soap remained distinct and separate ; on addition of more water they became softer and a thin layer of fluid formed under them ; on still further addition this layer increased until the whole liquid became clear.

	Tallow Soap.	Palmnut Oil Soap.
Separates in distinct grains NaCl%	6.5	18.0
Clear hot solution (100 °C) NaCl%	3.0	13.0

The tallow soap was nearly as soluble in the cold as in the hot solution of salt ; the palmnut oil soap, while it is soluble in a boiling solution of 13% NaCl, is insoluble in a cold 3% solution.

The following results were obtained by boiling soap solutions with saturated salt solution:

	Olive Soap. 30 min.	Olive Soap 60 min.	Tallow Soap. 30 min.	Palm-nut Soap. 30 min.	Cotton Oil.	Castor Oil.
Fatty Anhydride..	67.9	67.38	64.49	66.4	62.4	31.3
Na_2O............	7.8	7.75	7.64	9.9	6.4	3.7
H_2O..............	19.1	19.41	16.94	18.8	17.2	48.3
NaCl..............	5.2	5.46	10.93	4.9	14.0	16.7
	100.0	100.00	100.00	100.0	100.0	100.0

Prolonged boiling in the above case did not reduce the quantity of water in soap.

If the salt is considered to be mechanically mixed the soap is composed as follows :

	Soap.	Water.
Tallow Soap...................	80.9	19.1
Olive Oil Soap.............. ..	79.8	20.2
Palmnut Oil Soap.............	80.2	19.8
Cotton Oil Soap.....	80.0	20.0

The author also made a number of experiments on the viscosity of soap solutions. The lubricating qualities are important as wear of the fabric is prevented.

The points at which the soaps given below ceased to form a jelly and the time a 50 c.c. pipette was emptied by allowing the solution to flow therefrom are here given :

(*a*.)	Green Olive (sulpho-carbon).....	1 in.	18 water.
	Olive Oil, cold..................	1 "	50 "
	Cotton Oil......................	1 "	100 "
	Palmnut......................	1 "	200–250 "
	1 resin ; 3 tallow..............		
	Palm Oil..		

(*b*.)	Green Olive (sulpho-carbon)........	1 in	30 water	took under	30	sec.
	Green..............	1 "	120 "	"	28.4	"
	Cotton Oil.....	1 "	320 "	"	30.4	"
	Palmnut Oil.......	1 "	320 "	"	29.5	"
	" "	1 "	700 "	"	28.5	"
	Pale Soap.........	1 "	700 "	"	28.5	"
	" "	1 "	600 "	"	30.2	"
	Tallow....	1 "	700 "	"	29.5	"
	Palm Oil....	1 "	700 "	"	29.8	"

(*Journ. Soc. Chem. Ind.*, **5**, *90.*) R. W. M

On the Oxidation of Oils. A. LIVACHE.

The method designed to bring the drying properties of oils to a maximum which gave the best results, consists in agitating the sample with a mixture of finely divided lead (obtained by precipitation) and nitrate of manganese, next in shaking the sample after decantation with oxide of lead to remove the excess of manganese salt whose tendency to deliquesce would be objectionable.

In the case of linseed oil, a thin layer thus prepared will dry in less than four hours at ordinary temperatures.

The following oils were treated and exposed to the air in watch glasses.

DRYING OILS.

OIL.	INCREASE IN WEIGHT.		FINAL STATE OF SAMPLE.
	After 1 year.	After 2 years.	
Linseed	10.3	7.0	At first dry, became slightly viscous.
Nut	9.4	7.6	" " " " "
Poppy	8.0	5.3	" " Liquified sensibly.
Cottonseed	6.3	4.5	" " " "
Beech Nut	6.1	5.0	" " Stuck to the finger.

NON-DRYING OILS.

OIL.	After 1 year.	After 2 years.	FINAL STATE OF SAMPLE.
Colza	6.0	5.3	Solidifies transparent, stuck to finger.
Sesame	5.2	4.8	" " " "
Arachis	5.7	5.6	Thickens much but viscous.
Rapeseed	5.8	5.4	Solidifies transparent. stuck to finger.
Olive	5.3	5.7	Thickens much but viscous.

In the above samples after one year, and after two years the fatty acids were estimated by saponification and decomposition with sulphuric acid. For greater accuracy the soluble acids were also collected and estimated as well as the insoluble.

OIL.	INSOLUBLE FATTY ACIDS.		SOLUBLE FATTY ACIDS.	
	After 1 year.	After 2 years.	After 1 year.	After 2 years.
Linseed	44.3	38.2	40.9	50.2
Nut	44.3	45.4	40.9	37.6
Poppy	51.4	44.4	33.0	42.3
Cottonseed	61.7	57.6	30.9	31.9
Beech Nut	64.4	55.2	25.6	39.1
Colza	76.7	69.1	25.6	26.1
Sesame	76.8	68.7	22.2	25.0
Arachis	72.5	66.6	24.5	29.7
Rapeseed	77.2	75.8	15.6	19.4
Olive	73.1	66.2	15.6	28.9

The author draws the following conclusions from the above experiments.

1. Oxygen acting on drying oils to solidify or on non-drying oils to rancidify changes a portion of the insoluble to soluble fatty acids; in time this change, which is proportional to the drying qualities of the oil, increases continuously, the higher fatty acids splitting up into lower homologous acids.

2. In the course of two years the non-drying oils are in nearly the same condition as the drying oils after one year. (*Comptes Rend.* **102**, *1170.*)

Studies on Butter. E. Duclaux.

The author criticises the method of Hehner and Angell on account of the variation in the proportions of the insoluble fatty acids and, on theoretical grounds, on account of its considering only that part of butter which is the least important as influencing the taste and which is the least affected by rancidity.

The author then applies his method of fractional distillation which gives the composition of a mixture of two volatile acids. Of the four volatile acids in butter, capric acid is soluble with difficulty in water, sublimes in a solid form on the walls of the condenser and does not influence the distillation. It is also present in very small quantity and can be neglected. Caprylic acid is present in larger quantity and influences the distillation.

The butters used were of known purity and were produced under nearly equal conditions of breed, fodder, &c.

In the following table the capric acid is reckoned as non-volatile and the caprylic acid is reckoned with the butyric and caproic acids.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Water	12.40%	13.36%	12.28%	10.72%	13.34%	11.62%	14.00%	13.03%
Fat	86.71	85.48	86.76	88.30	86.01	86.52	85.31	86.33
Milk Sugar	0.16	0.20	0.17	0.13	0.20	0.30	0.20	0.11
Casein and Salts	0.73	0.96	0.79	0.85	0.45	1.56	0.49	.53
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Caproic Acid	2.10	2.18	2.17	2.23	2.26	2.00	2.08	2.19
Butyric Acid	3.55	3.52	3.53	3.60	3.65	3.38	3.52	3.46
Total	5.65	5.70	5.70	5.83	5.91	5.88	5.60	5.65
Relation of the two Acids	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0

The above figures indicate a remarkable uniformity of composition and point to the identity of the constitution of the glycerides of volatile acids in butter. (*Comptes Rend.* **102**, *18*, *1020.*)

On the Rancidity of Butter. E. Duclaux.

The composition of Butter may be taken as :

Olein Margarin, Stearin	93.0%
Butyrin	4.4
Caproine	2.5
Caprylin and Caprin	.1
	100.0

Chevreul pointed out the presence of free butyric acid in rancid butter, and rancidity is generally explained by a butyric fermentation due to the mutual action of ferments and the nitrogenous constituents. The water in butter contains no microbes on account of the large proportion of salt.

In the opinion of the author, the rancidity is due to a spontaneous decomposition of the glycerides. It is increased by the presence of water, and the influence of air and light, and the presence of microbes also by an acid state, more than by an alkaline. Salt and borax retard it to some extent. The lower glycerides are the first to undergo decomposition.

The change in taste is very marked and the author suggests the washing of the butter with water charged with CO_2 in order to prevent the first stages of the decomposition.

Sunlight causes a tallowy odor to appear in an hour. (*Comptes Rend.* **102**, *1077.*)

On Maumene's Test for Oils. J. Ellis.

The author has applied the test to drying and fish oils. If these oils are treated alone a very violent reaction takes place accompanied by evolution of gas so that an exact determination of the temperature is impracticable. Ellis has therefore modified the test by mixing the drying oils with one which is but slightly affected by sulphuric acid. For this purpose he used mineral lubricating oil of sp. gr. 0.915, the effect of which on sulphuric acid has been previously determined. The action being so sluggish colza oil previously tested was was substituted with satisfactory results. (*Journ. Soc. Chem. Ind.*, **5**, *150.*)

On Viscosimetry or Viscometry. B. Redwood.

The author uses an apparatus similar to that of Fischer and compares all figures obtained with those given by rapeseed oil; 50. cc. of rapeseed oil at 60° flow from the apparatus in 535 seconds. The figures for any given oil must, for the sake of comparison, be multiplied by 100 and divided by 535. Since the viscosity varies with the temperature, determinations should be made at two different temperatures. (*Journ. Soc. Chem. Ind.*, **5**, *121.*)

A New Agent for Thickening Mineral Lubricating Oils.

Dr. L. Marquadt.

Aluminium oleate is dissolved in mineral oils and sold under the misleading name of "liquid gelatin." Addition of water causes it to separate from the oil. It causes the oil to foam on heating, and if shaken with 95 % alcohol and ether gradually dropped into it, will separate out first in flocks, and finally in clots. It can be recognized by separating out the fatty acids with HCl and saponifying and also by determining the ash. Pure mineral oil does not give an ash higher than 0.058 %. (*Zeit. Anal. Chem.*, *25*, *pt. 2.*)

Method for Preparation of a Lubricant. A. Müller.

A mixture of 100 parts of mineral oil, with 25 parts of castor oil, is well mixed with 60–70 parts of sulphuric acid, and then worked with 2 to 3 volumes of water. The whole is allowed to stand, the watery layer is drawn off, and it is then allowed to stand for several days, when it is carefully neutralized with soda or potash. The product is termed "Bakurin." (Ger. Pat. Cl. 23, No. 35,141.) (*Ding. polyt. Jour.*, *260*, *240.*)

On Lanolin.

Suint consists, according to the investigations of Hartman and Schulze, essentially of cholestearin and isocholestearin, together with free fatty acids. Lately there has been prepared, perfectly neutral suint under the name of "lanolin," by Jaffe and Darmstadter in Charlottenburg. It is used for pomades, salves, and similar purposes.

If a sample is dissolved in acetic anhydride and a drop of sulphuric acid added, the solution shows a fine green coloration. (*Ding. polyt. Jour.*, *259*, *572.*)

Decomposition of Tartaric Acid in the Presence of Glycerol at a High Temperature. M. K. Jowanowitsch.

Eight parts of tartaric acid and ten parts of glycerine yield on distillation at 180° a small quantity of acrolein; at 200° an oily liquid yielding crystals and at 260° oily products, with very penetrating odor. During the whole operation CO_2 is given off. The crystals on purification are found to be pyruvic glyceride, cannot be distilled without decomposition, are easily soluble and yield, on boiling with water and $CaCO_3$, glycerol and calcium pyruvate. Treated with sodium amalgam, lactic acid is obtained.

The mother liquor of the crystals is a mixture of water, glycerol, acrolein and pyruvic acid. (*Monatshefte für Chémie, 6, 467.*)

An Irvingia from Cochin China, and the Fatty Matter Contained. J. Léon Soubeiran.

The fat is soluble in hot alcohol, ether and carbon disulphide; melts at 38° and solidifies at 34°. It contains 30.2 % of oleic acid and 38.5 % of other fatty acids, and has an offensive odor. (*Journ. de Pharm. et de Chim.* [6], **13,** *No. 6.*)

On the Presence of a Pimelic Acid in the Oxidation Products of Castor Oil. F. Gantter and C. Hell.

Castor oil on oxidation with nitric acid yields suberic and azelaic acids on diluting the mother liquor and neutralizing with chalk. The calcium salts when treated with hydrochloric acid yield an oil more dense than water. On purification with water and ether suberic, adipic, succinic and azelaic, acids are obtained. The purification is complete when the pimelic acid obtained, when dissolved in water, crystallizes in large plates.

$$6C_7{=}2O_4$$

The pimelic acid obtained in this manner from arachis oil crystallizes in transparent plates melting at 105–106°. The authors have studied the barium lead, silver and copper salts, but have not yet fixed the constitution of this pimelic acid, which differs in its fusing point from the known pimelic acids. (*Ber. d. d. chem. Ges.,* **17,** *22, 12.*)

Abstracts of American Patents Relating to Chemistry.

(*From the Official Gazette of the U. S. Patent Office.*)

(*April 13th, 1886.*)

339,673.—Manufacture of cement. H. Mathey.

The cement rock is crushed, calcined in revolving cylinders and pulverized.

339,681.—Apparatus for treating crude alkaline material. R. G. Neuenschwander.

339,686.—Process of manufacturing ale, beer and porter. N. Pigeon and W. L. Flanagan.

Barley is prepared for use by mashing it with barley malt.

339,726.—Composition for building purposes. J. Wurzner.

Consists of pulverized brick, stone or gravel, vegetable fiber, slaked lime and salt.

339,727.—Art of manufacturing soap. E. C. Atkins.

A current of electricity is passed through the soap while in the process of manufacture.

339,748.—Apparatus for the manufacture of illuminating gas. H. H. Edgerton.

339,777.—Composition to be used for insulating wires. J. Howe.

Consists of cottonseed oil, asphaltum, rosin. paraffin wax aud Venetian turpentine.

339,778.—Process of treating silk fiber. C. Huggenberg.

The silk is first subjected to the action of a solution of a tin salt, and then of a solution of sodium stannate.

339,787.—Composition of matter for electrical insulation. E. D. Kendall.

Consists of the so-called "wax tailings," *chicle*, sulphur and oil.

339,810.—Anti insect fabric. J. P. Regan.

A fabric treated with tobacco and cascarilla bark to protect it against moths, etc.

339,935.—Disinfectant. F. L. Sarmiento and W. G. Grimm.

Consists of dry hypochlorites with phenol or its compounds.

339,970.—Cement for roofing. E. J. Burchell.

Consists of coal tar, water lime, coal ashes, plaster of paris, oil solution and soda solution.

339,974.—Producing sulphite or bisulphite of sodium. W. O. Crocker and W. P. Crocker.

Sodium sulphate is roasted with carbonaceous matter, and the resulting sulphide, oxidized by heating in contact with air or oxygen.

339.975.—Process of making bisulphites. W. O. Crocker and W. P. Crocker.

Calcium sulphite is suspended in a solution of sodium sulphate, and the solution charged with sulphur dioxide.

340,031.—Freezing or refrigerating machine. J. Csete.

(*April 20th, 1886.*)

340,199.—Tanning hides and skins. S. J. Dobson.

The hides are first immersed in a strong solution of salt, then exposed to sulphurous acid gas and finally tanned.

340,221.—Carburetor. R. S. Lawrence.

340.231.—Process of converting natural gas into illuminating gas. J. McKay.

The gas is mingled, in a gas scrubber, with crude petroleum or naphtha and steam, and the product is passed through a bed of incandescent coal, and then to a superheater.

340,232.—Process of treating natural gas. J. McKay.

340.276.—Explosive compound. M. Bielefield.

Consists of nitrocellulose in a solution of ammonium citrate in ammonium nitrate.

340.282.—Gas making apparatus. E. S. Bryant.

340.290.—Apparatus for collecting and drying sedimentary matter of sewage. R. Corscaden.

340.314.—Water proof material for binding leather or cloth, or for leather for decorating, etc. J. Hofmeier.

Consists of a mixture of equal parts of albumen and glycerine, and about 10 per cent. (of the quantity of albumen) of a metallic salt, such as magnesium nitrate, sulphate of chloride, or calcium chloride, and about 5 per cent. of sodium borate.

340.357.—Manufacturing cement, etc. F. Ransome.

340,451.—Soap compound. M. S. Moot.

Rosin is dissolved in light hydrocarbon oil, and gradually mixed with soap at common temperatures, in the presence of a small quantity of water.

340,499.—Process of and apparatus for distilling hydrocarbon oil. H. Frasch.

340,522.—Process of preparing burning oil for lamps and resulting product. J. Roots.

From 8 to 15 per cent. of naphthalene are dissolved in the oil.

(April 27th, 1886.)

340,543.—Gas scrubber. W. R. Beal.

340,565.—Composition of matter for the manufacture of soap. J. Ericksen.

Consists of water, glue, unslaked lime, sal soda, tallow, rosin, benzine, linseed oil and borax.

340,634.—Gas generator. J. E. Smith.

340,640.—Process of treating vegetable substances for making paper stock. J. D. Tomkins.

340.642.—Apparatus for malting. C. Voelkner.

340,669.—Process of coloring tiles or equivalent porous pottery materials. F. Hengesbach.

The pottery is subjected to the action of steam and smoke while in a heated condition.

340,677.—Process of and apparatus for preparing grain or cereals to be used in brewing and distilling. A. Perry.

The grain is first treated with hot water, and then dried by commingling with hot sand in revolving cylinders.

340,705.—Process of treating and recovering the glutinous and fine nitrogenous matter resulting from the manufacture of starch. W. Duryea

The glutinous matter contained in the alkaline waste is precipitated by an acid.

340,747.—Pyrotechnic match. C. Weibach.

Consists of a stick, having an ignitable head, and an adjacent coating of different compounds producing colored lights when lit.

340,851.—Treating or refining porpoise oil. A. P. Ashbourne.

The oil is first washed with salt water, and then with water. It is next boiled with alum water, and finally bleached with dilute hydrochloric acid.

340,878.—Apparatus for distilling of refining mineral oil. N. M. Henderson.

(May 4th, 1886.)

340,998.—Scrubber for gas works. A. O. Granger.

341,012.—Apparatus for producing illuminating gas. E. J. Jerzmanowski.

Brief.—Illuminating gas is made by continuous decomposition of steam and hydrocarbon oil in contact with a body of heated lime contained in an externally heated retort or chamber.

341,072.—Manufacture of useful products from sea weed. E. C. C. Stanford.

Algic acid is prepared from sea weed, by treating with an alkali after having previously removed the salts by washing.

341,083.—Method of preparing paper for photographic printing. R. B. West.

Both surfaces of the paper are subjected to a bath composed of starch, glycerine, sodium citrate and water.

341,091.—Disinfectant. A. P. Bouton.

Consists of aluminium chloride, barium hydroxide and potassium permanganate.

341,155.—Process of making explosive compounds. M. F. Lindsley.

Wood fiber, charcoal, bituminous coal and starch are ground together to fine powder, and then formed into grains. The grains are treated with acids, and after removing the free acid, they are treated in a solution of potassium carbonate and potassium nitrate.

341,156.—Process of obtaining a lubricant from the cactus plant. E. S. Marshall and R. W. Savage.

341,157.—Plastic compound. H. W. Merritt.

Consists of pulverized magnesium silicate, solution of an alkaline silicate and silica.

341,173.—Compound for tempering steel. A. Schaefer.

Consists of rosin, glycerine, linseed oil and carbon.

341,239.—Fining composition. M. Herzog.

Consists of pulverized salep and a preservative acid.

341,282.—Manufacture of starch. J. C. Schuman.

341.283.—Manufacture of starch. J. C. Schuman.

341,285.—Method of working regenerative gas furnaces. F. Siemens.

341,294.—Mordant. C. N. Waite.

Consists of a solution of antimonious oxide in lactic acid.

341,299.—Carburetor. C. H. Wolford.

341,354.—Process of manufacturing gas. R. H. Smith.

W. R.