TABLE II

POLYMERS OBTAINED FROM BASIC BERYLLIUM CARBOXYLATES

Dibasic acid chloride	Time, hr.	Temp., °C.	$Be_4O(OCOR)_6$		Acid chloride,	Acid chloride,	Yield,	Carbon, %		Hydrogen, %		Vis-	Concn.,	Days[b,c]
			g.	mmoles	g.	mmoles	%	Calcd.	Found	Calcd.	Found	cosity[a]	g./100 ml.	
$RCOO = CH_3COO$														
Adipic	16	95	6.9510	1.7105	3.1309	1.7105	56	38.89	39.76	4.67	5.13	0.04	0.264	9(+)
Sebacic	16	95	5.4142	1.3323	3.0790	1.3323	25	44.26	44.89	5.79	6.31	..	Insol.	9(+)
Sebacic	20.5	65	5.7157	1.4065	3.2506	1.4065	49	44.26	43.98	5.79	6.05	.06	0.179	5(+)
β-Ethyladipic	16	80	6.0283	1.4834	3.1317	1.4834	56	...	...	..	..	.02	.256	1
Isophthalic	19.75	92	6.0110	1.4792	3.0033	1.4792	63	42.48	43.73	3.56	4.21	.02	.309	7(±)
Terephthalic	17.5	110	6.1265	1.5076	3.0607	1.5075	69	42.48	43.62	3.56	3.99	.01	.269	6(−)
$RCOO = CH_3CH_2COO$														
Adipic	20.5	65	9.1272	1.8609	3.4062	1.8609	25	44.26	43.91	5.79	5.72	..	Insol.	5(+)
Sebacic	16	95	7.2024	1.4685	3.3939	1.4685	22	48.52	49.19	6.68	7.08	..	Insol.	9(+)
β-Ethyladipic	16	95	7.3165	1.4915	3.1493	1.4918	30	...	...	..	..	..	Insol.	1
Isophthalic	19.75	95	7.4809	1.5253	3.0967	1.5252	63	47.24	47.40	4.78	4.77	0.04	0.269	7(±)
Terephthalic	17.5	108	7.3095	1.4904	3.0260	1.4904	58	47.24	46.80	4.78	4.62	.04	.326	6(−)
$RCOO = C_6H_5COO$														
Sebacic	17.5	93	3.3798	0.434	1.0023	0.434	47	62.36	61.84	4.93	4.72	0.02	0.280	10(−)[d]
Isophthalic	17.5	100	3.3702	0.304	0.6168	0.304	59	61.71	61.33	3.46	3.95	.02	.259	10(−)[d]

[a] Viscosities in toluene. [b] Days between preparation and viscosity determination. [c] (+) denotes that $Be_4O(RCO_2)_6$ could be sublimed out; (±) means that traces could be sublimed out; (−) means that none could be sublimed out. [d] No $Be_4O(C_6H_5CO_2)_6$ could be sublimed out of the polymers, but the sample had a viscosity of zero and was slightly less soluble after the treatment.

transferred to a melt polymerization apparatus, which is illustrated in Fig. 1. The apparatus was immersed in an oil-bath at 150–160°, and the system was purged with nitrogen. A vacuum (about 120 mm.) was applied in some cases. The mixture soon became a very viscous fluid, and eventually hardened into a glass. Heating was continued until no more bubbles were observed coming through the reaction mixture.

Samples of 4 g. of basic beryllium propionate were heated with molecular equivalent amounts of adipic acid, sebacic acid and terephthalic acid at pressures of 120 mm. and temperatures of 155, 160 and 200°, respectively, for times varying from 3 to 43 hours. All polymeric products thus obtained were insoluble and were not further characterized.

Free Radical Polymerization of Acrylate-containing Basic Beryllium Carboxylates. Basic Beryllium Acrylate.—Six-tenths of a gram (0.0013 mole) of basic beryllium acrylate was dissolved in 73 ml. of *n*-heptane and 5 ml. of toluene. Then 0.0017 g. (0.000007 mole) of benzoyl peroxide (0.5 mole per cent.) was added. After two hours of heating at reflux temperature, the mixture was filtered, and the residue washed with low boiling petroleum ether, then dried at reduced pressure. The yield was 0.5 g. or 80%.

Anal. Calcd. for $C_{18}H_{18}O_{13}Be_4$: C, 45.19; H, 3.80. Found: C, 46.44; H, 4.48.

Basic Beryllium Pentapropionate Monoacrylate.—The procedure was the same as that described in the preceding experiment, using 1.9 g. (0.004 mole) of the basic carboxylate, 0.0126 g. (0.000005 mole) of the initiator (0.13 mole per cent.), and 25 ml. of *n*-heptane. The yield was 1.4 g. or 74%.

Anal. Calcd. for $C_{18}H_{28}O_{13}Be_4$: C, 44.26; H, 5.79. Found: C, 45.12; H, 5.69.

URBANA, ILLINOIS

[CONTRIBUTION FROM THE SCHOOL OF CHEMISTRY, RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY]

Studies on the Mechanism of the Wurtz Reaction. The Configurations of 2-Bromoöctane, 3-Methylnonane and 7,8-Dimethyltetradecane

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RECEIVED AUGUST 9, 1957

The absolute configurations of 3-methylnonane and 7,8-dimethyltetradecane have been determined by relating them to 2-bromoöctane. From this it is concluded that the reaction of 2-chloroöctane with sodium ethyl, although heterogeneous definitely proceeds by an S_N2 type of reaction. It also has been shown that the simple Wurtz reaction involving sodium and 2-chloroöctane involves an inversion of configuration of the carbon atom bearing the chlorine. This furnishes further evidence for the hypothesis that the Wurtz reaction proceeds predominantly through an intermediate sodium alkyl, the anion of which then attacks the alkyl halide in an apparent nucleophilic displacement reaction.

In the simple Wurtz reaction,[2] involving metallic sodium and an alkyl halide, presumably a sodium alkyl is formed first[3] and it subsequently reacts with additional alkyl halide to yield the coupled product

$$2Na + RX \longrightarrow RNa + NaX \qquad (1)$$

$$RNa + RX \longrightarrow R\text{—}R + NaX \qquad (2)$$

The mode of formation of the sodium alkyl,

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[1] Henry Rutgers Scholar, 1955–1956. Abstracted from a thesis submitted by E. LeGoff in partial fulfillment of the B.S. degree, June, 1956.

[2] For a succinct discussion of the mechanism of the Wurtz reaction, and for leading references see J. Hine, "Physical Organic Chemistry," McGraw-Hill Book Co., Inc., New York, N. Y., 1956, pp. 235–237.

[3] A. A. Morton, J. B. Davidson and H. A. Newey, THIS JOURNAL, **64**, 2240 (1942).

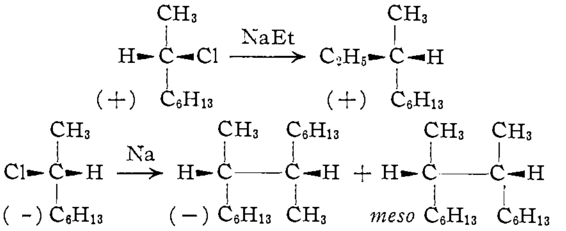
equation 1, is not entirely clear, but there is little doubt that step 2 proceeds predominantly by way of an ionic mechanism. It has been demonstrated[4] that in those cases where an optically active hydrocarbon has resulted from the action of a sodium alkyl (or alkaryl) on an optically active alkyl halide, the reaction displays characteristics of an SN2-type reaction,[5] *viz.*, inversion of configuration. In all the above cases, the sodium alkyl (or alkaryl) was preformed and then was allowed to react with the alkyl halide.

If reaction 2 displays the stereochemical characteristics of an SN2 reaction, then in those simple Wurtz reactions where the use of an optically active halide, RX, resulted in the production of an optically active product, R–R,[6] the configuration of the product must be inverted relative to the starting alkyl halide. In order to confirm this, it is necessary to relate configurationally the hydrocarbon product, R–R, to the alkyl halide, RX.

In the present investigation, experimental work has been performed relating 7,8-dimethyltetradecane to 2-bromoöctane, since previous work[4a,4d,6b] in this Laboratory and elsewhere had been carried out with 2-bromoöctane and 2-chloroöctane.

Chart I summarizes the reactions which were carried out previously[4d,6b] for obtaining optically active 3-methylnonane and 7,8-dimethyltetradecane from 2-chloroöctane.

CHART I



The projection formulas[7] in Charts I and II represent absolute configurations if the correct absolute configuration of D(+)-glyceraldehyde is accepted.[8]

Results

From Chart II it is seen that (−)-3-methylnonane (I) is configurationally the same as (+)-2-bromoöctane when the halogen is replaced by ethyl, since in the first of the series of reactions an inversion undoubtedly has taken place.[9] Since (+)-2-bromoöctane and (+)-2-chloroöctane are configurationally the same[8h] and (+)-2-chlorooctane yielded (+)-3-methylnonane when the former was treated with sodium ethyl (Chart I), it follows that an inversion of configuration has taken place in this last step. This confirms the statement made by Brink, Lane and Wallis[4a] that (−)-2-octanol very probably possesses the same configuration as (+)-3-methylnonane.

CHART II

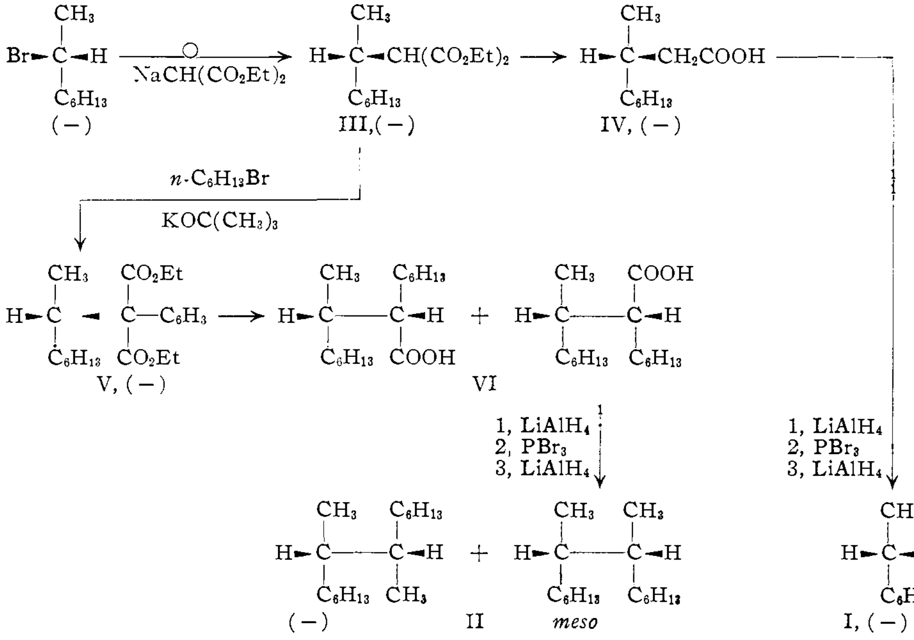


Chart II summarizes the reactions which were carried out in this investigation to relate 3-methylnonane (I) and 7,8-dimethyltetradecane (II) configurationally to 2-bromoöctane.

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(4) (a) N. Brink, J. Lane and E. Wallis, THIS JOURNAL, **65**, 943 (1943); (b) R. L. Letsinger, *ibid.*, **70**, 406 (1948); (c) R. L. Letsinger and J. G. Traynham, *ibid.*, **72**, 849 (1950); (d) S. E. Ulrich, F. H. Gentes, J. F. Lane and E. S. Wallis, *ibid.*, **72**, 5127 (1950); (e) R. L. Letsinger, L. G. Maury and R. L. Burwell, Jr., *ibid.*, **73**, 2373 (1951).

(5) C. K. Ingold, "Structure and Mechanism in Organic Chemistry," Cornell University Press, Ithaca, N. Y., 1953, p. 380 and p. 386.

(6) (a) E. Ott, A. Behr and R. Schröter, *Ber.*, **61**, 2124 (1928); (b) J. F. Lane and S. E. Ulrich, THIS JOURNAL, **72**, 5132 (1950).

(7) The usual convention is used, *viz.*, heavy lines represent bonds projecting out of the plane of the paper toward the observer.

(8) (a) J. M. Bijvoet, A. F. Peerdeman and A. J. van Bommel, *Nature*, **168**, 271 (1951); (b) J. F. Lane, *Science*, **113**, 577 (1951); (c) J. M. Bijvoet, *Endeavour*, **14**, 71 (1955); (d) K. Freudenberg, *Ber.*, **47**, 2027 (1914); M. L. Wolfrom, R. U. Lemieux, S. M. Olin and D. I. Weisblat, THIS JOURNAL, **71**, 4057 (1949); (e) P. A. Levene and A. Rothen, *J. Org. Chem.*, **1**, 76 (1936); K. B. Wiberg, THIS JOURNAL, **74**, 3891 (1952); (f) W. von E. Doering and R. W. Young, *ibid.*, **74**, 2997 (1952); (g) A. J. H. Houssa, J. Kenyon and H. Phillips, *J. Chem. Soc.*, 1700 (1929).

(9) J. A. Mills and W. Klyne in "Progress in Stereochemistry," edited by W. Klyne, Butterworths Scientific Publications, London, 1954, p. 197.

Also, from Chart II, it is seen that (−)-7,8-dimethyltetradecane[10] (II) is configurationally the same as (+)-2-bromoöctane when the halogen is replaced by *sec*-octyl. Therefore, since (+)-2-bromoöctane is configurationally the same as (+)-2-chloroöctane,[8h] an inversion of configuration of the carbon atom bearing the chlorine must have taken place in the Wurtz reaction when (−)-2-chloroöctane was allowed to react with sodium to yield (−)-7,8-dimethyltetradecane (Chart I). Thus, further credence is given to the hypothesis[3,4d] that the Wurtz reaction proceeds by way of an intermediate sodium alkyl, the anion of which then attacks the alkyl halide in a typical nucleophilic substitution process.

Whether the sodium alkyl reacts with the alkyl halide to give inverted or extensively racemized product depends both on the nature of the sodium alkyl and of the alkyl halide. For example, sodium ethyl reacts with optically active 2-chloroöctane to yield optically active 3-methylnonane (20% racemization)[4d] while the same sodium alkyl reacts with optically active 2-bromoöctane to yield essentially inactive hydrocarbon (97% racemization).[4a] On the other hand, sodium allyl reacts with optically active 2-bromoöctane to yield optically active 4-methyl-1-decene (13 to 21% racemization).[4c] A plausible explanation for this behavior is given by Lane and Ulrich.[6b]

The percentage of racemization in the reaction of sodium with (−)-2-chloroöctane is unknown since the maximal rotation of optically active 7,8-dimethyltetradecane is unknown. Work is now being carried out in this Laboratory to prepare the pure *meso* and optically active forms of this hydrocarbon to determine the extent of this racemization.

Acknowledgment.—The generous help afforded by grants of the Research Council of Rutgers, The State University of New Jersey, is gratefully acknowledged.

Experimental[11]

(−)-**2-Bromoöctane.**—(−)-2-Bromoöctane ($[\alpha]^{20}_{D}$ −31.8° (homogeneous), b.p. 80° (19 mm.), n^{20}_{D} 1.4506) was prepared from (+)-2-octanol[12] ($[\alpha]^{20}_{D}$ +8.13° (homogeneous), n^{20}_{D} 1.4235) and phosphorus tribromide.

(−)-**Diethyl** *sec*-**Octylmalonate** (III).—Twelve and four-tenths grams (0.54 mole) of freshly cut sodium was added to 150 ml. of absolute ethanol (distilled from sodium and diethyl phthalate directly into the reaction flask). After the sodium had dissolved, 167 ml. (1.09 moles) of diethyl malonate (Fisher) was added and this was followed by the addition of 102.3 g. (0.53 mole) of (−)-2-bromoöctane at 55° over a 30-minute period. The reaction mixture was then heated for 24 hours at 74°, 110 ml. of ethanol was removed by distillation, and the residual material was poured into 600 ml. of water acidified with 4 ml. of acetic acid. The organic layer was separated and combined with two 100-ml. ether washings of the aqueous layer. The solution was dried with sodium sulfate and then the ether was flash distilled. Vacuum distillation of the residual oil yielded 116 g. (80%) of (−)-diethyl *sec*-octylmalonate, b.p. 124–133° (2.3 mm.), n^{25}_{D} 1.4316, n^{20}_{D} 1.4338, d^{20}_{4} 0.945, $[\alpha]^{20}_{D}$ −0.25° (homogeneous).

(−)-**3-Methylnonoic Acid** (IV).—To a hot solution of 35 g. of potassium hydroxide in 80 ml. of water, there was added in portions 60 g. (0.22 mole) of (−)-diethyl *sec*-octylmalonate. When the reaction mixture had cleared (*ca.* 30 minutes), it was cooled and poured carefully into 200 ml. of 12 *N* hydrochloric acid. The resulting organic material was extracted with four 100-ml. portions of ether. The combined ether washings were dried with sodium sulfate and the ether was removed by distillation. The residual oil was heated on a steam-bath overnight and then heated for 2 hours at 125–140°, one hour at 140–155°, and 15 minutes at 185–195°. Vacuum distillation of the remaining liquid gave 32.7 g. (86%) of product, b.p. 115–123° (2.4 mm.), n^{25}_{D} 1.4321, n^{20}_{D} 1.4340, d^{20}_{4} 0.893, $[\alpha]^{20}_{D}$ −4.20° (homogeneous). Previously reported constants[13] for 3-methylnonoic acid are b.p. 133° (8 mm.), d^{26}_{4} 0.899, n^{25}_{D} 1.4339, $[\alpha]^{26}_{D}$ +0.78°.

The amide was prepared in the usual manner, m.p. 93.8–94.8°.

Anal. Calcd. for $C_{10}H_{21}ON$: C, 70.12; H, 12.36; N, 8.18. Found: C, 70.34; H, 12.08; N, 8.08.

(−)-**3-Methyl-1-nonanol.**—Under nitrogen atmosphere, 10.0 g. (0.26 mole) of lithium aluminum hydride was added to 150 ml. of sodium-dried ether. To this was added with stirring 29.6 g. (0.17 mole) of (−)-3-methylnonoic acid dissolved in 100 ml. of sodium-dried ether over a period of 90 minutes at room temperature. After it had been allowed to stand for 17 hours at room temperature, the reaction mixture was carefully poured into an ice and sulfuric acid mixture. The mixture was washed with two 100-ml. portions and one 50-ml. portion of ether and the combined ether washings were dried with sodium sulfate and the ether flash distilled. The residual liquid was then vacuum distilled. There resulted 22 g. (82%) of product, b.p. 88–89° (2.5–3.0 mm.), n^{20}_{D} 1.4372, d^{20}_{4} 0.829, $[\alpha]^{20}_{D}$ −3.42° (homogeneous). Previously reported constants[13] for (+)-3-methyl-1-nonanol are b.p. 122° (24 mm.), d^{25}_{4} 0.837, n^{25}_{D} 1.4348, $[\alpha]^{23}_{D}$ +0.43°.

The naphthylurethan was obtained as white needles from alcohol–water in the usual manner, m.p. 65.1–66.1°. A previously reported value[14] for the naphthylurethan of racemic 3-methyl-1-nonanol is m.p. 49°.

Anal. Calcd. for $C_{21}H_{29}O_2N$: N, 4.28. Found: N, 4.35.

(+)-**1-Bromo-3-methylnonane.**—To 19.2 g. (0.12 mole) of (−)-3-methyl-1-nonanol, cooled in a Dry Ice–ethanol-bath, was added 5.7 ml. (0.06 mole) of phosphorus tribromide in several small portions. The reaction mixture was allowed to warm to room temperature, stand overnight, and finally it was heated for one hour on the steam-bath. It was then poured into 200 ml. of cold water and 10 ml. of chloroform was added. The organic layer was separated, combined with two 20-ml. chloroform washings of the aqueous layer and dried over phosphorus pentoxide. The chloroform was removed by distillation and the residual liquid vacuum distilled. There was obtained 23 g. (88%) of product, b.p. 67.5–69° (1 mm.), n^{20}_{D} 1.4568. d^{20}_{4} 1.069, $[\alpha]^{20}_{D}$ +4.90° (homogeneous). The literature values[4c] are b.p. 100° (9 mm.), d^{25}_{4} 1.070, n^{23}_{D} 1.4558, $[\alpha]^{25}_{D}$ +4.35°.

(−)-**3-Methylnonane** (I).—A slurry of 1.33 g. of lithium aluminum hydride and 50 ml. of tetrahydrofuran (distilled from lithium aluminum hydride) was prepared with stirring, and while the mixture was refluxing gently, 7.72 g. (0.035 mole) of (+)-1-bromo-3-methylnonane was added over a 15-minute period. The reaction mixture was allowed to stand at room temperature overnight and then an additional 0.57 g. of lithium aluminum hydride was added (total lithium aluminum hydride 0.05 mole). After the mixture was refluxed for 45 minutes, it was hydrolyzed with a tetrahydrofuran–water solution and the solid precipitate formed was dissolved with dilute sulfuric acid. The organic layer was separated, combined with two 40-ml. ether washings of the aqueous layer, and dried with sodium sulfate. The ether was removed and, after two distillations of the remaining

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(10) It should be noted that 7,8-dimethyltetradecane possesses two asymmetric centers. However, for the compound to be optically active, each center must possess the same configuration, otherwise the *meso* form will result (see H. Gilman, "Organic Chemistry, An Advanced Treatise," Vol. I, 2nd ed., John Wiley and Sons, Inc., New York, N. Y., 1943, p. 232). There undoubtedly is some of the *meso* form present but, since it is inactive, it doesn't influence the sign of rotation.

(11) Microanalyses were by W. Manser, Zurich, Switzerland. Melting points were determined by use of the Kofler hot-stage microscope and are uncorrected.

(12) J. Kenyon, "Organic Syntheses," Coll. Vol. I, John Wiley and Sons, Inc., New York, N. Y., 1943, p. 418.

(13) P. A. Levene and R. E. Marker, *J. Biol. Chem.*, **91**, 98 (1931).

(14) U. Cymerman, I. M. Heilbron and E. R. H. Jones, *J. Chem. Soc.*, 144 (1944).

liquid, there resulted 2.78 g. (56%) of a liquid, b.p. 58.5–59.0° (9 mm.), $n^{20}\text{D}$ 1.4123, $d^{20}{}_4$ 0.730, $[\alpha]^{20}\text{D}$ −7.52° (homogeneous).

Anal. Calcd. for $C_{10}H_{22}$: C, 84.41; H, 15.59; mol. wt., 142.3. Found: C, 84.30; H, 15.78; mol. wt. (cryoscopic, benzene), 152.

Previously reported values[4c] for (−)-3-methylnonane are b.p. 57° (16 mm.), $n^{24}\text{D}$ 1.4113, $d^{25}{}_4$ 0.731, $[\alpha]^{25}\text{D}$ −6.29. The infrared spectrum of this compound was identical to that of a sample of (+)-3-methylnonane prepared previously[4d] from (+)-2-chloroöctane and sodium ethyl.

(−)-Diethyl *sec*-Octyl-*n*-hexylmalonate (V).—One hundred ml. of *t*-butyl alcohol was distilled directly (from sodium) into a flask fitted with an air-cooled reflux condenser, stirrer, and addition funnel. To this was added 5.9 g. (0.15 mole) of clean potassium metal. When nearly all the potassium had dissolved, 40 g. (0.15 mole) of (−)-diethyl *sec*-octylmalonate was added over a period of 20 minutes at 70–75°. The reaction mixture was cooled to 50° and 25 g. (0.15 mole) of 1-bromohexane (Fisher) was added. The reaction mixture was then heated to 70° and maintained at that temperature for 4 hours with stirring, and allowed to stand at this temperature for 2 days without stirring. After the mixture was cooled, it was worked up in the same way as III to yield 41 g. (77%) of product, b.p. 131–150° (0.5 mm.), $n^{20}\text{D}$ 1.4438, $n^{25}\text{D}$ 1.4429, $d^{20}{}_4$ 0.923, $[\alpha]^{20}\text{D}$ −5.99° (homogeneous).

Anal. Calcd. for $C_{21}H_{40}O_4$: C, 70.74; H, 11.31. Found: C, 70.81; H, 11.24.

(−)-8-Methyl-7-tetradecoic Acid (VI).—A mixture of 36.5 g. (0.102 mole) of (−)-diethyl *sec*-octyl-*n*-hexylmalonate (V), 30 g. of potassium hydroxide, 100 ml. of ethanol and 75 ml. of water was refluxed with stirring for two days. Although two phases remained, the hydrolysis was complete since both phases were soluble in water. The reaction mixture was cooled and 300 ml. of water and 100 ml. of 12 *N* hydrochloric acid was added to it. The organic layer was separated and heated for 2.5 hours with 50 ml. of 12 *N* hydrochloric acid at reflux. The product was then extracted with 100 ml. of ether, the solution dried with sodium sulfate, and the ether evaporated off by a stream of air. Distillation of the residual oil yielded 16.7 g. (66%) of product, b.p. 130–145° (0.5–1.0 mm.), $n^{20}\text{D}$ 1.4415, $d^{20}{}_4$ 0.870, $[\alpha]^{20}\text{D}$ −4.77° (homogeneous).

Anal. Calcd. for $C_{16}H_{32}O_2$: C, 74.94; H, 12.58. Found: C, 74.87; H, 12.41.

The amide was prepared in the usual way and recrystallized from water–alcohol, m.p. 123–125°.

Anal. Calcd. for $C_{16}H_{33}ON$: C, 75.23; H, 13.02; N, 5.48. Found: C, 75.40; H, 13.24; N, 5.58.

(−)-2-Hexyl-3-methylnonan-1-ol.—From 4.0 g. (0.11 mole) of lithium aluminum hydride and 14.6 g. (0.057 mole) of (−)-8-methyl-7-tetradecoic acid, by a similar procedure used for (−)-3-methyl-1-nonanol, there was obtained 9.8 g. (71%) of product, b.p. 138–144° (1.5 mm.), $n^{20}\text{D}$ 1.4513, $d^{20}{}_4$ 0.841, $[\alpha]^{20}\text{D}$ −4.17° (homogeneous).

Anal. Calcd. for $C_{16}H_{34}O$: C, 79.26; H, 14.14. Found: C, 79.32; H, 14.07.

The following derivatives were prepared but could not be crystallized: α-naphthylurethan and 3,5-dinitrobenzoate. The adduct of the 3,5-dinitrobenzoate of the alcohol and α-naphthylamine was obtained, but because of its low m.p. (*ca.* 25°), an analytical sample could not be prepared.

(−)-7,8-Dimethyltetradecane (II).—Essentially the same procedure as in the preparation of 1-bromo-3-methylnonane was used to prepare (−) 1-bromo-2-hexyl-3-methylnonane. From 7.3 g. (0.03 mole) of (−)-2-hexyl-3-methylnonan-1-ol and 3 ml. (0.03 mole) of phosphorus tribromide, there was obtained 6.0 g. (66%) of the bromide, b.p. 129–132° (0.1 mm.), $\alpha^{20}\text{D}$ −1.56° (homogeneous). This product was used without further purification in the next step.

To a solution of 4.57 g. (0.015 mole) of (−)-1-bromo-2-hexyl-3-methylnonane in 65 ml. of tetrahydrofuran (distilled from lithium aluminum hydride) was added 0.65 g. (0.017 mole) of lithium aluminum hydride. The mixture was heated at gentle reflux for 90 minutes and then allowed to stand at room temperature for 1.5 days. This reaction mixture was processed in the same way as in the preparation of (−)-3-methylnonane. After one distillation, there was obtained 2.78 g. (82%) of product, b.p. 128–130° (6 mm.), $n^{20}\text{D}$ 1.4417, $d^{20}{}_4$ 0.783, $[\alpha]^{20}\text{D}$ −2.70° (homogeneous).

Anal. Calcd. for $C_{16}H_{34}$: C, 84.86; H, 15.14; mol. wt., 226.43. Found: C, 85.05; H, 14.84; mol. wt. (cryoscopic, benzene), 248.

The infrared spectrum of this compound was identical to that of a sample of (−)-7,8-dimethyltetradecane prepared previously[6b] from (−)-2-chloroöctane and sodium.

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