

13.1 Retention Times

Over time, the absolute values of retention times are subject to small variations, mainly due to aging of the capillary column. Hence, the values can deviate from those shown in the chromatograms that are depicted in this work.

13.1.1 Products in the Hydroconversion of n-Octane

Table 13.1: Retention times (t_{ret}) and products of the hydroconversion of n-octane. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
3.26	methane	19.10	1,2,3-trimethylcyclopentane
3.30	ethane	20.00	toluene
3.50	propane	20.65	2,3-dimethylhexane
3.75	iso-butane	20.80	3-ethyl-2-methylpentane
3.95	n-butane	21.35	2-methylheptane
4.70	iso-pentane	21.50	4-methylheptane
5.10	n-pentane	21.70	3,4-dimethylhexane
6.70	cyclopentane	22.25	3-methylheptane
6.85	2-methylpentane	22.35	3-ethylhexane
7.35	3-methylpentane	23.75	cis-1-ethyl-3-
8.03	n-hexane		methylcyclopentane
9.40	methylcyclopentane	24.00	trans-1-ethyl-3-
10.80	benzene		methylcyclopentane
11.90	2-methylhexane	24.15	1-ethyl-2-
12.05	2,3-dimethylpentane		methylcyclopentane
12.55	3-methylhexane	24.80	ethyl-methylcyclopentane
13.05	1,3-dimethylcyclopentane	25.10	C ₈
13.25	3-ethylpentane	25.45	C ₈
13.35	C ₇	25.60	n-octane
13.50	C ₇	26.30	C ₈
14.50	n-heptane	26.80	C ₈
16.25	methylcyclohexane	27.40	3-ethylhexene
17.45	2,5-dimethylhexane	28.00	1-ethyl-2-
17.75	2,4-dimethylhexane		methylcyclopentane
18.35	3,3-dimethylhexane	28.80	1,2-dimethylcyclohexane

Table 13.1 (continued).

t_{ret} / min	Product
29.50	propylcyclopentane and ethylcyclohexane (not separable)
32.30	ethylbenzene
33.55	m-xylene
33.70	p-xylene
34.10	bicyclo[3.3.0]octane
36.80	o-xylene

13.1.2 Products in the Hydroconversion of n-Decane

Table 13.2: Retention times (t_{ret}) and products of the hydroconversion of n-decane. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
11.95	methane	55.15	2,5-dimethylhexane
12.30	ethane	55.60	ethylcyclopentane
13.20	propane	55.80	C ₈
14.55	iso-butane	55.90	2,4-dimethylhexane
15.70	n-butane	56.95	1,2,4-trimethylcyclopentane
19.60	2-methylbutane	58.80	C ₈
21.55	n-pentane	60.60	2,3-dimethylhexane
24.95	2,2-dimethylbutane	60.95	3-ethyl-2-methylpentane
28.30	cyclopentane	61.55	2-methylheptane
28.75	2-methylpentane	61.85	4-methylheptane
30.60	3-methylpentane	62.40	3,4-dimethylhexane
32.90	n-hexane	62.70	C ₈
36.55	2,2-dimethylpentane	63.00	3-methylheptane
37.10	methylcyclopentane	63.25	3-ethylhexane
37.45	2,4-dimethylpentane	64.00	cis-1,3-
41.65	C ₇		dimethylcyclohexane
42.50	cyclohexane	64.35	1,4-dimethylcyclohexane
43.55	2-methylhexane	65.60	1,1-dimethylcyclohexane
44.00	2,3-dimethylpentane	66.55	1-ethyl-2-
44.70	1,1-dimethylcyclopentane		methylcyclopentane
45.10	3-methylhexane	67.15	1-ethyl-1-
46.45	trans-1,3-		methylcyclopentane
	dimethylcyclopentane	67.65	n-octane
46.90	cis-1,3-	67.80	trans-1,2-
	dimethylcyclopentane		dimethylcyclohexane
47.45	cis-1,2-	68.60	1,2,3,4-
	dimethylcyclopentane		tetramethylcyclopentane
49.25	n-heptane	68.75	C ₈
53.30	trans-1,2-	68.85	C ₈
	dimethylcyclopentane	71.65	2,2-dimethylheptane
53.50	methylcyclohexane	72.20	C ₉

Table 13.2 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
72.40	2,4-dimethylheptane	92.80	3,5-dimethyloctane
73.05	4,4-dimethylheptane	93.10	3,5-dimethyloctane
73.60	2,6-dimethylheptane	93.65	2,7-dimethyloctane
73.75	C ₉	93.85	1-ethyl-2-
74.85	2,5-dimethylheptane		methylcyclohexane
75.05	3,5-dimethylheptane	94.00	propylcyclohexane
75.20	3,5-dimethylheptane	94.15	OCD
75.65	C ₉	94.25	OCD
77.20	3-ethyl-2-methylhexane	94.40	RCP
78.40	3-ethyl-3-methylhexane	94.75	2,6-dimethyloctane
78.85	2,3-dimethylheptane	95.20	RCP
79.15	3-ethyl-4-methylhexane	95.70	RCP
79.30	3,4-dimethylheptane	95.80	RCP
79.45	3,4-dimethylheptane	96.55	OCD
79.65	4-ethylheptane	97.15	RCP
80.15	4-methyloctane	97.25	4-propylheptane
80.30	2-methyloctane	97.55	OCD
81.50	3-ethylheptane	98.25	RCP
81.70	3-methyloctane	99.50	4-ethyloctane
83.10	1,1,3,5-	100.45	5-methylnonane
	tetramethylcyclohexane	100.75	4-methylnonane
84.75	1,2,3-trimethylcyclohexane	101.15	2-methylnonane
85.00	1,1,3,5-	102.20	3-ethyloctane
	tetramethylcyclohexane	102.85	3-methylnonane
85.25	1-ethyl-4-	106.30	1-methyl-3-
	methylcyclohexane		propylcyclohexane
85.75	1,2,3,4,5-	107.15	tert-butylcyclohexane
	pentamethylcyclopentane	107.85	RCP
87.20	n-nonane	109.35	n-decane
89.15	C ₉	112.05	RCP
89.35	1-ethyl-2-	112.20	RCP
	methylcyclohexane	112.40	RCP
90.15	OCD	112.55	RCP
91.00	OCD	112.90	RCP
91.30	2,4-dimethyloctane	113.60	RCP
92.10	4,4-dimethyloctane	115.35	RCP
92.65	2,5-dimethyloctane	115.80	RCP

Table 13.2 (continued).

t_{ret} / min	Product
117.80	RCP
118.45	RCP

13.1.3 Products in the Hydroconversion of Ethylcyclohexane

Table 13.3: Retention times (t_{ret}) and products of the hydroconversion of ethylcyclohexane. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
12.20	methane	48.15	C ₇
12.55	ethane	49.90	n-heptane
13.45	propane	54.00	trans-1,2-dimethyl- cyclopentane
14.85	iso-butane		
16.00	n-butane	54.20	methylcyclohexane
16.55	2,2-dimethylpropane	54.55	1,1,3-trimethylcyclopentane
20.00	2-methylbutane	55.85	2,5-dimethylhexane
21.95	n-pentane	56.25	2,4-dimethylhexane
25.40	2,2-dimethylbutane	57.60	1,2,4-trimethylcyclopentane
28.80	cyclopentane	57.80	3,3-dimethylhexane
29.25	2-methylpentane	59.50	1,2,3-trimethylcyclopentane
31.10	3-methylpentane	59.80	2,3,4-trimethylcyclopentane
33.40	n-hexane	60.45	toluene
37.10	2,2-dimethylpentane	61.30	2,3-dimethylhexane
37.70	methylcyclopentane	61.65	3-ethyl-2-methylpentane
38.00	2,4-dimethylpentane	61.95	sk-Iso
39.25	C ₇	62.20	2-methylheptane
41.50	benzene	62.55	4-methylheptane
42.30	3,3-dimethylpentane	63.10	3,4-dimethylhexane
43.15	cyclohexane	63.45	sk-Iso
44.15	2-methylhexane	63.70	3-methylheptane
44.60	2,3-dimethylpentane	64.00	3-ethylhexane
45.35	3-methylhexane	64.75	cis-1,3-dimethyl- cyclohexane
45.70	trans-1,3- dimethylcyclopentane	65.10	1,4-dimethylcyclohexane
47.10	cis-1,3-dimethyl- cyclopentane	66.35	1,1-dimethylcyclohexane
47.55	3-ethylpentane	66.60	1-ethyl-3-methyl- cyclopentane
48.10	cis-1,2-dimethyl- cyclopentane	67.00	1-ethyl-3-methyl- cyclopentane

Table 13.3 (continued).

$t_{\text{ret}} / \text{min}$	Product
67.30	1-ethyl-2-methylcyclopentane
67.85	1-ethyl-1-methylcyclopentane
68.60	n-octane
69.60	1,2,3-trimethylcyclopentane
69.80	dimethylcyclohexane
70.15	sk-Iso
71.05	(1-methylethyl)-cyclopentane
71.25	sk-Iso
72.95	1-ethyl-2-methylcyclopentane
74.35	1,2-dimethylcyclohexane
74.80	propylcyclopentane
75.25	ethylcyclohexane
77.80	ethylcyclohexene
78.40	ethylbenzene
79.80	methylcycloheptane
80.00	m-xylene
80.25	p-xylene
80.90	sk-Iso
81.05	sk-Iso
81.70	mono-unsaturated C ₈ naphthene
82.45	sk-Iso
83.60	bicyclo[3.2.1]octane
84.70	o-xylene
85.25	bicyclooctane

13.1.4 Products in the Hydroconversion of Butylcyclohexane

Table 13.4: Retention times (t_{ret}) and products of the hydroconversion of butylcyclohexane. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
11.95	methane	53.30	trans-1,2-dimethyl- cyclopentane
12.30	ethane		
13.20	propane	53.50	methylcyclohexane
14.55	iso-butane	53.90	1,1,3-trimethylcyclopentane
15.70	n-butane	55.15	2,5-dimethylhexane
19.60	2-methylbutane	55.60	ethylcyclopentane
21.55	n-pentane	55.90	2,4-dimethylhexane
24.95	2,2-dimethylbutane	56.95	1,2,4-trimethylcyclopentane
28.30	cyclopentane	57.00	C ₈
28.75	2-methylpentane	57.10	C ₈
30.60	3-methylpentane	58.35	1,2,3-trimethylcyclopentane
32.90	n-hexane	59.80	C ₈
36.55	2,2-dimethylpentane	60.60	2,3-dimethylhexane
37.10	methylcyclopentane	60.95	3-ethyl-2-methylpentane
37.45	2,4-dimethylpentane	61.50	C ₈
40.95	C ₇	61.55	2-methylheptane
41.65	C ₇	61.85	4-methylheptane
42.50	cyclohexane	62.40	3,4-dimethylhexane
43.55	2-methylhexane	62.70	C ₈
44.00	2,3-dimethylpentane	63.00	3-methylheptane
44.70	1,1-dimethylcyclopentane	63.25	3-ethylhexane
45.10	3-methylhexane	63.70	C ₈
46.45	trans-1,3-dimethyl- cyclopentane	64.00	cis-1,3-dimethyl- cyclohexane
46.90	cis-1,3-dimethyl- cyclopentane	64.35	1,4-dimethylcyclohexane
47.45	cis-1,2-dimethyl- cyclopentane	65.60	1,1-dimethylcyclohexane
49.25	n-heptane	65.90	1-ethyl-3-methyl- cyclopentane
		66.30	1-ethyl-3-methyl- cyclopentane

Table 13.4 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
66.55	1-ethyl-2-methyl-cyclopentane	79.65	4-ethylheptane
67.15	1-ethyl-1-methyl-cyclopentane	80.15	4-methyloctane
67.80	trans-1,2-dimethyl-cyclohexane	80.30	2-methyloctane
68.60	1,2,3,4-tetramethyl-cyclopentane	80.60	C ₉
68.75	C ₈	80.85	C ₉
68.85	C ₈	81.50	3-ethylheptane
70.35	propylcyclopentane	81.70	3-methyloctane
70.95	C ₉	81.80	C ₉
71.40	C ₉	82.60	2,4,6-trimethylheptane
71.65	2,2-dimethylheptane	82.85	C ₉
72.20	C ₉	83.10	1,1,3,5-tetramethyl-cyclohexane
72.40	2,4-dimethylheptane	83.30	C ₉
73.05	4,4-dimethylheptane	83.55	C ₉
73.50	4-ethyl-2-methylhexane	84.50	C ₉
73.60	2,6-dimethylheptane	84.75	1,2,3-trimethylcyclohexane
73.75	C ₉	85.00	1,1,3,5-tetramethyl-cyclohexane
74.00	C ₉	85.25	1-ethyl-4-methyl-cyclohexane
74.45	ethylcyclohexane	85.75	1,2,3,4,5-pentamethyl-cyclopentane
74.85	2,5-dimethylheptane	86.15	C ₉
75.05	3,5-dimethylheptane	86.25	1,1,4,4-tetramethyl-cyclohexane
75.20	3,5-dimethylheptane	86.40	C ₉
75.65	C ₉	86.65	1,1,3-trimethylcyclohexane
76.00	1,1,4-trimethylcyclohexane	87.20	n-nonane
76.25	C ₉	87.45	3,3,5-trimethylheptane
76.55	1,3-diethylcyclopentane	87.75	C ₉
77.20	3-ethyl-2-methylhexane	87.90	C ₉
77.40	C ₉	88.20	sk-Iso
77.75	C ₉	88.75	sk-Iso
78.40	3-ethyl-3-methylhexane	89.15	sk-Iso
78.85	2,3-dimethylheptane	89.35	sk-Iso
79.15	3-ethyl-4-methylhexane	89.90	C ₉
79.30	3,4-dimethylheptane	90.15	OCD
79.45	3,4-dimethylheptane		

Table 13.4 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
90.60	sk-Iso	98.75	sk-Iso
90.85	sk-Iso	99.50	4-ethyloctane
91.00	OCD	99.65	sk-Iso
91.30	2,4-dimethyloctane	99.90	sk-Iso
91.60	2,3-dimethyloctane	100.45	5-methylnonane
91.80	sk-Iso	100.75	4-methylnonane
91.95	sk-Iso	100.90	1,2-diethylcyclohexane
92.10	4,4-dimethyloctane	101.15	2-methylnonane
92.25	sk-Iso	101.30	trans-1,4-diethyl- cyclohexane
92.40	sk-Iso		
92.65	2,5-dimethyloctane	101.55	cis-1,4-diethylcyclohexane
92.80	3,5-dimethyloctane	101.65	sk-Iso
93.10	3,5-dimethyloctane	102.20	3-ethyloctane
93.30	sk-Iso	102.45	sk-Iso
93.50	sk-Iso	102.60	sk-Iso
93.65	2,7-dimethyloctane	102.70	sk-Iso
93.85	1-ethyl-2- methylcyclohexane	102.85	3-methylnonane
94.00	propylcyclohexane	103.00	sk-Iso
94.25	OCD	103.45	sk-Iso
94.40	sk-Iso	103.50	sk-Iso
94.75	2,6-dimethyloctane	103.70	sk-Iso
95.20	sk-Iso	104.50	sk-Iso
95.40	3,3-dimethyloctane	104.60	sk-Iso
95.50	sk-Iso	104.95	methyl-(1-methylethyl)- cyclohexane
95.65	sk-Iso		
95.75	sk-Iso	105.25	sk-Iso
95.80	sk-Iso	105.45	sk-Iso
96.55	OCD	105.85	sk-Iso
96.95	sk-Iso	106.05	sk-Iso
97.15	sk-Iso	106.30	1-methyl-3-propyl- cyclohexane
97.45	sk-Iso		
97.55	OCD	106.50	sk-Iso
97.60	sk-Iso	107.00	sk-Iso
97.75	sk-Iso	107.45	1-methyl-3-(1- methylethyl)cyclohexane
98.25	sk-Iso		
98.55	sk-Iso	107.85	sk-Iso

Table 13.4 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
108.30	1-methyl-4-(1-methylethyl)cyclohexane	120.50	sk-Iso
108.60	sk-Iso	120.80	butylbenzene
108.90	sk-Iso	121.00	sk-Iso
109.15	sk-Iso	121.50	sk-Iso
109.35	n-decane	121.90	sk-Iso
109.65	1-methyl-2-propylcyclohexane	122.20	sk-Iso
110.05	sk-Iso	123.00	sk-Iso
110.35	sk-Iso	123.70	sk-Iso
110.55	sk-Iso	124.20	sk-Iso
111.35	sk-Iso	124.60	sk-Iso
111.80	sk-Iso	125.25	sk-Iso
112.05	trans-1,4-diethylcyclohexane	126.45	sk-Iso
112.40	sk-Iso	126.60	sk-Iso
112.55	sk-Iso	126.80	sk-Iso
112.90	sk-Iso	127.05	sk-Iso
113.40	sk-Iso	128.10	sk-Iso
113.60	sk-Iso		
113.90	sk-Iso		
114.40	sk-Iso		
115.35	1-methyl-2-propylcyclohexane		
115.80	1-ethyl-2,4-dimethylcyclohexane		
116.35	1-(methylpropyl)cyclohexane		
116.70	sk-Iso		
117.80	butylcyclohexane		
118.45	pentylcyclopentane		
118.85	sk-Iso		
119.05	sk-Iso		
119.20	sk-Iso		
119.30	methylpropylbenzene		
119.70	sk-Iso		
120.05	sk-Iso		

13.1.5 Products in the Hydroconversion of Perhydroindan

Table 13.5: Retention times (t_{ret}) and products of the hydroconversion of perhydroindan. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
11.95	methane	49.25	n-heptane
12.30	ethane	53.30	trans-1,2-dimethyl- cyclopentane
13.20	propane		
14.55	iso-butane	53.50	methylcyclohexane
15.70	n-butane	53.90	1,1,3-trimethylcyclopentane
16.25	2,2-dimethylpropane	55.15	2,5-dimethylhexane
19.60	2-methylbutane	55.45	C ₇
21.55	n-pentane	55.60	ethylcyclopentane
24.95	2,2-dimethylbutane	55.80	C ₈
28.30	cyclopentane	55.90	2,4-dimethylhexane
28.35	2,3-dimethylbutane	56.95	1,2,4-trimethylcyclopentane
28.75	2-methylpentane	57.00	3,3-dimethylhexane
30.60	3-methylpentane	57.10	C ₈
32.90	n-hexane	58.35	1,2,3-trimethylcyclopentane
36.55	2,2-dimethylpentane	58.80	C ₈
37.10	methylcyclopentane	59.80	toluene
37.45	2,4-dimethylpentane	60.60	2,3-dimethylhexane
41.65	C ₇	60.95	3-ethyl-2-methylpentane
42.50	cyclohexane	61.50	C ₈
43.55	2-methylhexane	61.55	2-methylheptane
44.00	2,3-dimethylpentane	61.85	4-methylheptane
44.70	1,1-dimethylcyclopentane	62.40	3,4-dimethylhexane
45.10	3-methylhexane	62.70	C ₈
46.45	trans-1,3-dimethyl- cyclopentane	63.00	3-methylheptane
		63.25	3-ethylhexane
46.90	cis-1,3-dimethyl- cyclopentane	63.55	C ₈
		63.70	tetramethylcyclopentane
47.45	cis-1,2-dimethyl- cyclopentane	64.00	cis-1,3-dimethyl- cyclohexane
47.60	C ₇	64.35	1,4-dimethylcyclohexane
49.25	n-heptane	65.10	C ₈

Table 13.5 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
65.60	1,1-dimethylcyclohexane	75.20	3,5-dimethylheptane
65.90	1-ethyl-3-methyl- cyclopentane	75.45	3,3-dimethylheptane
66.30	1-ethyl-3-methyl- cyclopentane	75.65	C ₉
66.55	1-ethyl-2-methyl- cyclopentane	76.00	1,1,4-trimethylcyclohexane
66.65	C ₈	76.25	1-ethyl-1-methyl- cyclohexane or OCN *)
67.15	1-ethyl-1-methyl- cyclopentane	76.55	1,3-diethylcyclopentane
67.65	n-octane	77.20	3-ethyl-2-methylhexane
67.80	trans-1,2-dimethyl- cyclohexane	77.40	ROP
68.60	1,3-dimethylcyclohexane	77.60	CPn-ROP or ethylbenzene *)
68.75	tetramethylcyclopentane	77.75	ROP
68.85	sk-Iso	78.10	ROP
69.05	1,4-dimethylcyclohexane	78.40	trimethylcyclohexane or 3- ethyl-3-methylhexane *)
69.75	tetramethylcyclopentane	78.65	ROP
70.35	propylcyclopentane	78.85	trimethylcyclohexane
70.95	tetramethylcyclopentane	79.15	3-ethyl-4-methylhexane
71.20	2,3,5-trimethylhexane	79.30	3,4-dimethylheptane
71.40	ROP	79.45	3,4-dimethylheptane
71.65	2,2-dimethylheptane	79.65	4-ethylheptane
72.20	ROP	80.15	4-methyloctane
72.40	2,4-dimethylheptane	80.30	2-methyloctane
72.80	OCN	80.60	CPn-ROP
73.05	4,4-dimethylheptane	80.85	CPn-ROP
73.30	ROP	81.05	ROP
73.50	4-ethyl-2-methylhexane	81.50	3-ethylheptane
73.60	2,6-dimethylheptane or ROP *)	81.70	3-methyloctane
73.75	ROP	81.80	ROP
74.00	ROP	81.95	ROP
74.25	1,3,5-trimethylcyclohexane	82.10	ROP
74.45	ethylcyclohexane	82.35	ROP
74.85	2,5-dimethylheptane	82.60	ROP
75.05	3,5-dimethylheptane	82.85	trimethylcyclohexane
		82.95	trimethylcyclohexane
		83.10	C ₁₀
		83.30	ROP

Table 13.5 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
83.55	CPn-ROP or xylene *)	91.95	sk-Iso
83.70	ROP	92.10	C ₁₀
83.85	ROP	92.25	C ₁₀
84.30	CH _x -ROP	92.30	sk-Iso
84.50	C ₈	92.40	C ₁₀
84.75	CH _x -ROP	92.65	C ₁₀
85.00	CPn-ROP	92.80	C ₁₀
85.25	1-ethyl-4- methylcyclohexane	93.10	C ₁₀
85.75	ethylmethylcyclohexane	93.30	C ₁₀
86.15	diethylcyclopentane	93.40	2-methylbicyclo[3.3.0]- octane
86.25	sk-Iso or ROP *)	93.50	C ₁₀
86.40	ROP	93.65	C ₁₀
86.65	1,1,3-trimethylcyclohexane	93.85	1-ethyl-2-methyl- cyclohexane
87.20	n-nonane		
87.45	C ₁₀	94.00	propylcyclohexane
87.75	C ₁₀	94.15	C ₁₀
87.90	C ₁₀	94.25	C ₁₀
88.20	C ₁₀	94.40	butylcyclopentane
88.55	sk-Iso	94.75	C ₁₀
88.75	C ₁₀	95.00	sk-Iso
89.15	C ₁₀	95.20	C ₁₀
89.35	1-ethyl-2-methyl- cyclohexane	95.40	C ₁₀
89.65	ethylmethylcyclohexane	95.50	C ₁₀
89.80	ethylmethylcyclohexane	95.65	C ₁₀
89.90	1-ethyl-1- methylcyclohexane	95.80	C ₁₀
90.15	C ₁₀	96.00	C ₁₀
90.25	sk-Iso	96.25	C ₁₀
90.60	C ₁₀	96.40	C ₁₀
90.85	C ₁₀	96.55	sk-Iso
91.00	C ₁₀	96.65	C ₁₀
91.30	C ₁₀	96.75	propylbenzene
91.40	C ₁₀	96.95	C ₁₀
91.60	C ₁₀	97.15	sk-Iso
91.80	C ₁₀	97.25	C ₁₀
		97.35	sk-Iso
		97.45	C ₁₀

Table 13.5 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
97.55	sk-Iso	104.15	C ₁₀
97.60	C ₁₀	104.50	C ₁₀
97.75	C ₁₀	104.60	C ₁₀
97.95	C ₁₀	104.70	C ₁₀
98.25	C ₁₀	104.95	C ₁₀
98.55	ethylmethylbenzene	105.25	C ₁₀
98.75	2-methylbicyclo[2.2.2]- octane	105.45	C ₁₀
98.85	C ₁₀	105.55	C ₁₀
99.15	C ₁₀	105.85	trimethylbenzene
99.30	C ₁₀	106.05	C ₁₀
99.50	C ₁₀	106.30	C ₁₀
99.65	perhydroindan	106.50	C ₁₀
99.90	sk-Iso	106.75	C ₁₀
100.10	sk-Iso	107.00	C ₁₀
100.45	C ₁₀	107.15	perhydroindan
100.75	C ₁₀	107.85	C ₁₀
100.90	C ₁₀	107.15	C ₁₀
101.15	C ₁₀	108.60	C ₁₀
101.25	C ₁₀	108.90	C ₁₀
101.30	sk-Iso	109.05	C ₁₀
101.40	sk-Iso	109.15	C ₁₀
101.55	C ₁₀	109.35	C ₁₀
101.60	sk-Iso	109.65	C ₁₀
101.65	ethylmethylbenzene	110.05	C ₁₀
101.90	C ₁₀	110.35	C ₁₀
102.20	C ₁₀	110.55	C ₁₀
102.45	C ₁₀	110.60	C ₁₀
102.60	C ₁₀	110.75	C ₁₀
102.70	C ₁₀	111.00	C ₁₀
102.85	C ₁₀	111.35	C ₁₀
103.00	C ₁₀	111.50	C ₁₀
103.15	C ₁₀	111.80	C ₁₀
103.45	C ₁₀	112.05	bicyclo[3.3.1]nonane
103.50	C ₁₀	112.20	C ₁₀
103.70	C ₁₀	112.40	trimethylbenzene
104.05	C ₁₀	112.55	C ₁₀
		112.75	C ₁₀

Table 13.5 (continued).

t_{ret} / min	Product
112.90	C ₁₀
113.15	C ₁₀
113.25	C ₁₀
113.40	C ₁₀
113.60	C ₁₀
113.90	C ₁₀
114.40	C ₁₀
114.65	C ₁₀
114.85	C ₁₀
115.35	C ₁₀
115.60	indan
115.80	C ₁₀
116.35	C ₁₀
116.70	indene
117.00 - 152.60	C ₁₀

*) : not separable, for each experiment the peak was assigned, depending on the GC/MS result

13.1.6 Products in the Hydroconversion of cis-Decalin and Spiro[4.5]decane

Table 13.6: Retention times (t_{ret}) and products of the hydroconversion of cis-decalin and spiro[4.5]decane. For the conditions of the GC analyses see Section 5.4.1.

t_{ret} / min	Product	t_{ret} / min	Product
11.95	methane	47.60	C ₇
12.30	ethane	49.25	n-heptane
13.20	propane	53.30	trans-1,2-dimethyl- cyclopentane
14.55	iso-butane		
15.70	n-butane	53.50	methylcyclohexane
16.25	2,2-dimethylpropane	53.90	1,1,3-trimethylcyclopentane
19.60	2-methylbutane	55.15	2,5-dimethylhexane
21.55	n-pentane	55.45	C ₇
24.95	2,2-dimethylbutane	55.60	ethylcyclopentane
28.30	cyclopentane	55.80	C ₈
28.35	2,3-dimethylbutane	55.90	2,4-dimethylhexane
28.75	2-methylpentane	56.95	1,2,4-trimethylcyclopentane
30.60	3-methylpentane	57.00	3,3-dimethylhexane
32.90	n-hexane	57.10	C ₈
36.55	2,2-dimethylpentane	58.35	1,2,3-trimethylcyclopentane
37.10	methylcyclopentane	58.80	C ₈
37.45	2,4-dimethylpentane	59.80	C ₈ or toluene
41.65	C ₇	60.60	2,3-dimethylhexane
42.50	cyclohexane	60.95	3-ethyl-2-methylpentane
43.55	2-methylhexane	61.30	C ₈
44.00	2,3-dimethylpentane	61.50	C ₈
44.70	1,1-dimethylcyclopentane	61.55	2-methylheptane
45.10	3-methylhexane	61.85	4-methylheptane
46.45	trans-1,3-dimethyl- cyclopentane	62.40	3,4-dimethylhexane
		62.70	C ₈
46.90	cis-1,3-dimethyl- cyclopentane	63.00	3-methylheptane
		63.25	3-ethylhexane
47.45	cis-1,2- dimethylcyclopentane	63.55	C ₈
		63.70	C ₈

Table 13.6 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
64.00	cis-1,3-dimethyl- cyclohexane	74.00	C ₉
64.35	1,4-dimethylcyclohexane	74.25	1,3,5-trimethylcyclohexane
65.10	C ₈	74.45	ethylcyclohexane
65.60	1,1-dimethylcyclohexane	74.85	2,5-dimethylheptane
65.90	1-ethyl-3-methyl- cyclopentane	75.05	3,5-dimethylheptane
66.30	1-ethyl-3-methyl- cyclopentane	75.20	3,5-dimethylheptane
66.55	1-ethyl-2-methyl- cyclopentane	75.45	3,3-dimethylheptane
66.65	C ₈	75.65	C ₉
67.15	1-ethyl-1- methylcyclopentane	76.00	1,1,4-trimethylcyclohexane
67.65	n-octane	76.25	C ₉
67.80	trans-1,2-dimethyl- cyclohexane	76.55	1,3-diethylcyclopentane
68.60	1,2,3,4-tetramethyl- cyclopentane	77.20	3-ethyl-2-methylhexane
68.75	C ₈	77.40	C ₉
68.85	C ₈	77.60	C ₉ or ethylbenzene *)
69.05	1,4-dimethylcyclohexane	77.75	C ₉
69.75	C ₈	78.10	C ₉
70.35	propylcyclopentane	78.40	3-ethyl-3-methylhexane
70.95	C ₉	78.85	2,3-dimethylheptane
71.20	2,3,5-trimethylhexane	79.15	3-ethyl-4-methylhexane or m-xylene *)
71.40	C ₉	79.30	3,4-dimethylheptane
71.65	2,2-dimethylheptane	79.45	3,4-dimethylheptane or p-xylene *)
72.20	C ₉	79.65	4-ethylheptane
72.40	2,4-dimethylheptane	80.15	4-methyloctane
72.80	C ₉	80.30	2-methyloctane
73.05	4,4-dimethylheptane	80.60	C ₉
73.30	C ₉	80.85	C ₉
73.50	4-ethyl-2-methylhexane	81.05	C ₉
73.60	cis-1,2- dimethylcyclohexane	81.50	3-ethylheptane
73.75	C ₉	81.70	3-methyloctane
		81.80	C ₉
		81.95	C ₉
		82.10	C ₉
		82.35	C ₉
		82.60	2,4,6-trimethylheptane
		82.85	C ₉

Table 13.6 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
82.95	C ₉	90.85	sk-Iso
83.10	1,1,3,5-tetramethyl- cyclohexane	91.00	OCD
83.30	C ₉	91.30	2,4-dimethyloctane
83.55	C ₉ or o-xylene *)	91.40	sk-Iso
83.70	C ₉	91.60	2,3-dimethyloctane
83.85	C ₉	91.80	2-isopropyl-1,3- dimethylcyclopentane
84.30	C ₉	91.95	sk-Iso
84.50	C ₉	92.10	4,4-dimethyloctane
84.75	1,2,3-trimethylcyclohexane	92.25	sk-Iso
85.00	1,1,3,5-tetramethyl- cyclohexane	92.40	sk-Iso
85.25	1-ethyl-4-methyl- cyclohexane	92.65	2,5-dimethyloctane
85.75	1,2,3,4,5- pentamethylcyclopentane	92.80	3,5-dimethyloctane
86.15	C ₉	93.10	3,5-dimethyloctane
86.25	1,1,4,4-tetramethyl- cyclohexane	93.30	1,2,4,5- tetramethylcyclohexane
86.40	C ₉	93.40	1,5-dimethylbicyclo[3.2.1]- octane
86.65	1,1,3-trimethylcyclohexane	93.50	sk-Iso
87.20	n-nonane	93.65	2,7-dimethyloctane
87.45	3,3,5-trimethylheptane	93.85	1-ethyl-2- methylcyclohexane
87.75	C ₉	94.00	propylcyclohexane
87.90	C ₉	94.15	OCD
88.20	sk-Iso	94.25	OCD
88.55	C ₉	94.40	sk-Iso
88.75	sk-Iso	94.75	2,6-dimethyloctane
89.15	C ₉	95.00	4-ethyl-4-methylheptane
89.35	1-ethyl-2-methyl- cyclohexane	95.20	sk-Iso
89.65	C ₉	95.40	3,3-dimethyloctane
89.80	sk-Iso	95.50	sk-Iso
89.90	C ₉	95.65	sk-Iso
90.15	OCD	95.80	sk-Iso
90.25	OCD	96.00	3,6-dimethyloctane
90.60	ROP	96.25	3,6-dimethyloctane
		96.40	3,4-diethylhexane
		96.55	OCD

Table 13.6 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
96.65	sk-Iso	102.85	3-methylnonane
96.75	3-ethyl-2-methylheptane or propylbenzene *)	103.00	sk-Iso
96.95	sk-Iso	103.15	sk-Iso
97.15	sk-Iso	103.45	sk-Iso
97.35	sk-Iso	103.50	sk-Iso
97.45	sk-Iso	103.70	sk-Iso
97.55	4,5-dimethyloctane	104.05	cis-1-methyl-4-(1-methyl-ethyl)cyclohexane
97.60	sk-Iso	104.15	sk-Iso
97.75	sk-Iso	104.50	3,7,7-trimethyl-bicyclo[4.1.0]heptane
97.95	4,5-dimethyloctane		
98.25	sk-Iso	104.60	sk-Iso
98.55	3-ethyl-3-methylheptane	104.70	sk-Iso
98.75	1,2,3,5-tetramethyl-cyclohexane	104.95	methyl-(1-methylethyl)-cyclohexane
98.85	sk-Iso	105.25	sk-Iso
99.15	sk-Iso	105.45	sk-Iso
99.30	sk-Iso	105.55	sk-Iso
99.50	4-ethyloctane	105.85	sk-Iso or trimethylbenzene *)
99.65	sk-Iso		
99.90	ROP	106.05	sk-Iso
100.10	3,3-diethylhexane	106.30	1-methyl-3-propylcyclohexane
100.45	5-methylnonane		
100.75	4-methylnonane	106.50	sk-Iso
100.90	ROP	106.75	sk-Iso
101.15	2-methylnonane	107.00	ROP
101.25	sk-Iso	107.15	tert-butylcyclohexane
101.30	trans-1,4-diethyl-cyclohexane	107.15	1-methyl-3-(1-methyl-ethyl)cyclohexane
101.55	cis-1,4-diethylcyclohexane	107.85	sk-Iso
101.65	ethylmethylbenzene	107.15	1-methyl-4-(1-methylethyl)cyclohexane
101.90	1-ethyl-2,4-dimethyl-cyclohexane		
102.20	3-ethyloctane	108.60	sk-Iso
102.45	sk-Iso	108.90	sk-Iso
102.60	sk-Iso	109.05	1-methyl-3-(1-methylethyl)-cyclohexane
102.70	sk-Iso	109.15	sk-Iso

Table 13.6 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
109.35	n-decane	117.50	sk-Iso
109.65	1-methyl-2-propylcyclohexane	117.80	butylcyclohexane
110.05	1-methyl-1-propylcyclohexane	117.95	sk-Iso
110.35	ROP	118.10	sk-Iso
110.55	sk-Iso	118.45	pentylcyclopentane
110.60	sk-Iso	118.65	sk-Iso
110.75	ROP	118.85	sk-Iso
111.00	sk-Iso	119.05	sk-Iso
111.35	ROP	119.20	sk-Iso
111.50	sk-Iso	119.30	sk-Iso
111.80	sk-Iso	119.70	sk-Iso
112.05	trans-1,4-diethylcyclohexane	120.05	octahydro-5-methyl-1H-indene
112.20	sk-Iso	120.50	sk-Iso
112.40	sk-Iso	120.80	sk-Iso
112.55	ROP or trimethylbenzene *)	121.00	sk-Iso
112.75	sk-Iso	121.25	sk-Iso
112.90	sk-Iso	121.50	sk-Iso
113.15	1,2-diethylcyclohexane	121.90	sk-Iso
113.25	sk-Iso	122.20	sk-Iso
113.40	sk-Iso	122.50	sk-Iso
113.60	sk-Iso	122.70	sk-Iso
113.90	sk-Iso	122.95	sk-Iso
114.40	sk-Iso	123.00	sk-Iso
114.65	sk-Iso	123.70	bicyclo[4.1.0]heptane or methylpropylbenzene *)
114.85	sk-Iso	123.85	sk-Iso
115.35	1-methyl-2-propylcyclohexane	124.20	trans-decalin
115.60	sk-Iso	124.60	spiro[4.5]decane
115.80	1,2-diethylcyclohexane	124.90	sk-Iso
116.35	(methylpropyl)-cyclohexane	125.25	sk-Iso
116.70	1,1-diethylcyclohexane or C ₁₀ -benzene *)	125.40	sk-Iso
117.00	sk-Iso	125.50	sk-Iso
117.20	sk-Iso	126.10	C ₁₀ -benzene
		126.45	C ₁₀ -benzene
		126.60	sk-Iso
		126.80	sk-Iso

Table 13.6 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
127.05	2-methyl-2-propenylbenzene	138.65	decahydro-2-methylnaphthalene
127.20	sk-Iso	141.20	sk-Iso
127.85	sk-Iso	142.00	sk-Iso
128.10	sk-Iso	143.35	sk-Iso
128.40	sk-Iso	142.80	sk-Iso
128.65	sk-Iso	144.00	sk-Iso
129.60	sk-Iso	144.70	cyclodecane or 2,3-dihydro-4-methyl-1H-indene *)
129.75	C ₁₀ -benzene		
130.15	bicyclopentyl	145.00	sk-Iso
130.95	sk-Iso	145.60	sk-Iso
131.45	bicyclo[5.3.0]decane	147.50	tetralin
132.10	sk-Iso	148.30	sk-Iso
132.65	endo-2-methylbicyclo[3.3.1]nonane	148.80	sk-Iso
133.10	sk-Iso	149.20	sk-Iso
133.40	C ₁₀ -benzene	149.70	sk-Iso
133.85	bicyclo[5.3.0]decane	152.60	naphthalene
134.00	sk-Iso		
134.30	sk-Iso		
134.70	sk-Iso		
135.30	cis-decalin		
136.10	sk-Iso		
136.60	sk-Iso		
137.25	sk-Iso		
137.35	sk-Iso		

*) : not separable, for each experiment the peak was assigned, depending on the GC/MS result

13.1.7 Products in the Hydroconversion of Methyldecalin

Table 13.7: Retention times (t_{ret}) and products of the hydroconversion of methyldecalin. For the conditions of the GC analyses see Section 5.4.1.

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
11.95	methane	53.90	1,1,3-trimethylcyclopentane
12.30	ethane	55.15	2,5-dimethylhexane
13.20	propane	55.90	2,4-dimethylhexane
14.55	iso-butane	56.95	1,2,4-trimethylcyclopentane
15.70	n-butane	57.00	C ₈
16.25	2,2-dimethylpropane	58.80	C ₈
19.60	2-methylbutane	59.80	C ₈
21.55	n-pentane	60.60	2,3-dimethylhexane
24.95	2,2-dimethylbutane	60.95	3-ethyl-2-methylpentane
28.30	cyclopentane	61.30	C ₈
28.75	2-methylpentane	61.55	2-methylheptane
30.60	3-methylpentane	61.85	4-methylheptane
32.90	n-hexane	62.40	3,4-dimethylhexane
36.55	2,2-dimethylpentane	62.70	C ₈
37.10	methylcyclopentane	63.00	3-methylheptane
37.45	2,4-dimethylpentane	63.25	3-ethylhexane
41.65	C ₇	63.70	C ₈
42.50	cyclohexane	64.00	cis-1,3-dimethyl- cyclohexane
43.55	2-methylhexane		
44.00	2,3-dimethylpentane	65.90	1-ethyl-3- methylcyclopentane
45.10	3-methylhexane		
46.45	trans-1,3-dimethyl- cyclopentane	66.30	1-ethyl-3-methyl- cyclopentane
46.90	cis-1,3-dimethyl- cyclopentane	66.55	1-ethyl-2-methyl- cyclopentane
47.45	cis-1,2-dimethyl- cyclopentane	66.65	C ₈
49.25	n-heptane	67.15	1-ethyl-1-methyl- cyclopentane
53.30	trans-1,2-dimethyl- cyclopentane	67.65	n-octane
53.50	methylcyclohexane	67.80	trans-1,2-dimethyl- cyclohexane

Table 13.7 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
68.60	1,2,3,4-tetra- methylcyclopentane	81.05	C ₉
68.85	C ₈	81.50	3-ethylheptane
69.75	C ₈	81.70	3-methyloctane
70.35	propylcyclopentane	82.10	C ₉
71.20	2,3,5-trimethylhexane	82.60	2,4,6-trimethylheptane
71.40	C ₉	82.85	C ₉
72.20	C ₉	82.95	C ₉
72.40	2,4-dimethylheptane	83.55	C ₉
73.05	4,4-dimethylheptane	83.85	C ₉
73.30	C ₉	84.30	C ₉
73.60	2,6-dimethylheptane	84.75	1,2,3-trimethylcyclohexane
74.00	C ₉	85.00	1,1,3,5-tetra- methylcyclohexane
74.25	1,3,5-trimethylcyclohexane	85.25	1-ethyl-4-methyl- cyclohexane
74.45	ethylcyclohexane		
74.85	2,5-dimethylheptane	85.75	1,2,3,4,5-penta- methylcyclopentane
75.05	3,5-dimethylheptane		
75.20	3,5-dimethylheptane	86.15	C ₉
75.65	C ₉	86.40	C ₉
76.00	1,1,4-trimethylcyclohexane	87.20	n-nonane
76.25	C ₉	87.75	C ₉
76.55	1,3-diethylcyclopentane	88.20	C ₁₀ H ₁₈
77.20	3-ethyl-2-methylhexane	88.75	C ₁₀ H ₁₈
77.40	C ₉	89.15	C ₉
77.60	C ₉	89.35	1-ethyl-2-methyl- cyclohexane
77.75	C ₉		
78.10	C ₉	89.90	C ₉
78.40	3-ethyl-3-methylhexane	90.15	OCD
78.85	2,3-dimethylheptane	90.60	C ₁₀ H ₂₀
79.15	3-ethyl-4-methylhexane	91.00	OCD
79.30	3,4-dimethylheptane	91.30	2,4-dimethyloctane
79.45	3,4-dimethylheptane	91.60	2,3-dimethyloctane
79.65	4-ethylheptane	91.80	2-isopropyl-1,3- dimethylcyclopentane
80.15	4-methyloctane		
80.30	2-methyloctane	92.10	4,4-dimethyloctane
80.60	C ₉	92.25	C ₁₀ H ₁₈
80.85	C ₉	92.40	C ₁₀ H ₁₈

Table 13.7 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
92.65	2,5-dimethyloctane	102.85	3-methylnonane
93.30	1,2,4,5-tetramethyl- cyclohexane	104.05	OCU
93.65	2,7-dimethyloctane	104.50	OCU
94.00	propylcyclohexane	104.70	$\text{C}_{10}\text{H}_{18}$
94.15	OCD	104.95	$\text{C}_{10}\text{H}_{18}$
94.25	OCD	105.25	OCU
94.40	$\text{C}_{10}\text{H}_{18}$	105.45	$\text{C}_{10}\text{H}_{18}$
94.75	2,6-dimethyloctane	106.05	$\text{C}_{10}\text{H}_{18}$
95.20	$\text{C}_{10}\text{H}_{18}$	106.30	1-methyl-3- propylcyclohexane
95.40	3,3-dimethyloctane	107.00	$\text{C}_{10}\text{H}_{20}$
95.50	$\text{C}_{10}\text{H}_{18}$	107.45	$\text{C}_{10}\text{H}_{18}$
95.65	$\text{C}_{10}\text{H}_{18}$	107.85	$\text{C}_{10}\text{H}_{18}$
96.40	3,4-diethylhexane	107.95	$\text{C}_{10}\text{H}_{20}$
96.55	OCD	108.10	$\text{C}_{10}\text{H}_{18}$
96.95	$\text{C}_{10}\text{H}_{18}$	108.60	$\text{C}_{10}\text{H}_{18}$
97.15	$\text{C}_{10}\text{H}_{18}$	108.90	$\text{C}_{10}\text{H}_{18}$
97.35	$\text{C}_{10}\text{H}_{18}$	109.15	$\text{C}_{10}\text{H}_{18}$
97.45	$\text{C}_{10}\text{H}_{18}$	109.35	n-decane
97.55	OCD	109.65	1-methyl-2- propylcyclohexane
98.25	$\text{C}_{10}\text{H}_{18}$		
98.55	1,1,4,4-tetramethyl- cyclohexane	110.05	$\text{C}_{10}\text{H}_{20}$
98.85	$\text{C}_{10}\text{H}_{18}$	110.55	2,6,6-trimethyloctane
99.15	$\text{C}_{10}\text{H}_{18}$	110.60	$\text{C}_{10}\text{H}_{18}$
99.50	4-ethyloctane	110.75	$\text{C}_{10}\text{H}_{20}$
99.90	1,2-diethylcyclohexane	111.00	OCU
100.45	5-methylnonane	111.35	$\text{C}_{10}\text{H}_{20}$
100.75	4-methylnonane	112.05	OCU
101.15	2-methylnonane	112.40	$\text{C}_{10}\text{H}_{18}$
101.30	trans-1,4- diethylcyclohexane	112.55	OCU
101.65	$\text{C}_{10}\text{H}_{20}$	113.15	OCU
101.90	1-ethyl-2,4- dimethylcyclohexane	113.40	$\text{C}_{10}\text{H}_{18}$
102.45	$\text{C}_{10}\text{H}_{18}$	113.60	OCU
102.60	$\text{C}_{10}\text{H}_{18}$	113.90	$\text{C}_{10}\text{H}_{18}$
		114.00	ROP
		114.40	2,5-dimethylnonane
		114.85	OCU

Table 13.7 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
115.35	1-methyl-2-propylcyclohexane	127.55	3-methyldecane
115.80	1,2-diethylcyclohexane	127.75	ROP
116.20	ROP	128.15	diethyl-methylcyclohexane
116.30	ROP	128.50	diethyl-methylcyclohexane
117.20	C ₁₀ H ₁₈	129.00	ROP
117.80	butylcyclohexane	129.15	ROP
117.95	3,7-dimethylnonane	129.70	ROP
118.10	C ₁₀ H ₁₈	129.90	ROP
118.65	2,6,6-trimethyloctane	130.30	ROP
118.85	OCU	130.45	1-methyl-2-(1-methylethyl)benzene
119.65	sk-Iso	130.60	1-methyl-2-(1-methylethyl)benzene
119.90	3,7-dimethylnonane	131.00	1,2-dipropylcyclopentane
120.25	4,5-dimethylnonane	131.30	diethyl-methylcyclohexane
120.35	ROP	131.50	ROP
120.80	4,5-dimethylnonane	131.70	ROP
121.10	C ₁₀	132.10	ROP
121.35	C ₁₀ H ₁₈	132.35	ROP
121.75	C ₁₀ H ₁₈	132.80	ROP
122.00	ROP	133.10	ROP
122.25	ethylnonane	133.60	ROP
122.55	ROP	133.95	(2-methylbutyl)-cyclohexane
122.95	ethylnonane	134.20	n-undecane
123.30	OCU	134.40	ROP
123.55	2,3-dimethylnonane	134.70	bicyclo[5.3.0]decane
124.20	5-methyldecane	134.90	ROP
124.50	1-methyl-3-propylbenzene	135.20	methyl-diethylcyclohexane
124.95	trans-decalin	135.50	ROP
125.25	ROP	135.60	ROP
125.40	ROP	135.90	cis-decalin
125.90	2-methyldecane	136.45	ROP
126.60	ethylnonane	136.90	ROP
126.10	ROP	137.10	methyldecalin
126.90	ROP	137.50	ROP
127.00	ROP		
127.20	ROP		
127.25	sk-Iso		

Table 13.7 (continued).

$t_{\text{ret}} / \text{min}$	Product	$t_{\text{ret}} / \text{min}$	Product
137.55	1-methyl-4-(1-methylpropyl)benzene	150.60	methyldecalin
138.00	butylbicyclo[2.2.1]heptane	151.10	sk-Iso
138.70	sk-Iso	151.35	methyldiethylbenzene
138.90	1-ethyl-2-propylcyclohexane	152.05	methyldecalin
139.35	methyldecalin	152.45	sk-Iso
139.70	sk-Iso	153.55	methyldecalin
140.00	ROP	154.35	methyltetralin
140.15	1-(1-methylbutyl)-cyclohexane	155.30	methyldecalin
140.60	ROP	155.95	C ₁₁ benzene
141.00	ROP	156.75	C ₁₁ benzene
141.30	ROP	156.95	ethylindan
141.50	ROP	157.20	dimethylindan
142.20	ROP	158.15	dimethylindan
142.85	methyltetralin	158.85	6-methylene-spiro[4.5]decane
143.25	sk-Iso	159.75	sk-Iso
143.75	methyldecalin	163.20	methyltetralin
144.25	sk-Iso	163.95	sk-Iso
144.50	methyldecalin	165.65	methyltetralin
145.20	methyldecalin	168.00	(1-ethyl-1-propenyl)-benzene
145.50	methyldecalin	168.65	7-ethylbicyclo[4.2.1]nona-2,4,7-triene
146.05	sk-Iso	173.60	2,3-dihydro-dimethyl-1H-indene
146.50	sk-Iso	177.80	methyltetralin
146.85	C ₁₁ benzene	178.60	2,3-dihydro-dimethyl-1H-indene
147.20	sk-Iso	182.60	2,3-dihydro-dimethyl-1H-indene
147.45	C ₁₁ benzene	184.85	methyltetralin
148.05	sk-Iso	188.85	methylnaphthalene
148.35	tetralin	207.10	sk-Iso
148.65	sk-Iso	229.80	dimethyl-1H-indene
149.10	methyldecalin		
149.15	methyltetralin		
149.65	methyltetralin		
150.05	methyldecalin		
150.10	sk-Iso		