

Review

Gas chromatographic retention indices of monoterpenes and sesquiterpenes on methyl silicone and Carbowax 20M phases

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INTRODUCTION

The separation and identification of monoterpenes and sesquiterpenes in plant essential oils and other natural and synthetic sources relies heavily on gas chromatography. In some cases gas chromatography may be the sole means of identification, in which case at least two columns of substantially different polarity are required for any confidence in assignments based on direct comparison of retention times with standards or precise knowledge of Kováts' retention indices¹. Even where combined gas chromatography–mass spectrometry is used for the analysis, assignments often cannot be made on the basis of mass spectrometric data only. As has been noted by Jennings and Shibamoto², many terpenes have essentially identical mass spectra. This can be due to the initial similarity of structures, or due to various fragmentations and rearrangements after ionization. Hence some knowledge of retention characteristics is often required to complement mass spectral data.

Much of the relevant literature is concerned with retention data on the many different types of stationary phase that have been used for terpene separations. However, most work now is carried out on capillary columns with "standard" dimethyl polysiloxane (methyl silicone) non-polar and Carbowax 20M polar phases. Indices on these phases have been reported in the literature over many years, but no single source to date has provided a comprehensive summary. Jennings and Shibamoto² have published a substantial set of retention indices for flavour and fragrance compounds on these phases, including some 150 terpenes. Andersen and

co-workers³⁻⁸ have provided a significant amount of information on sesquiterpene hydrocarbons. A general discussion on the use of retention indices in essential oil analyses has been presented by Shibamoto⁹.

The following tables list Kováts' retention indices for some 400 monoterpenes and sesquiterpenes (including some hydrogenation products) on either or both of these two types of stationary phase from various literature sources. Carbowax 20M (CW20M) phases include DB-Wax, BP20, PEG 20M and HP20, while methyl silicone phases include SE-30, SF-96, OV-1, OV-101, BP1, CPSIL5CB, SP2100, DB1 and HP1. There will be slight differences between the McReynold's constants on these various "equivalent" phases. The age of a column and amount of use it has had also have a slight influence on polarity of the liquid phase.

The dependence of retention index on temperature has been extensively described, including specific reference to terpenes¹⁰⁻¹³. In the temperature programmed mode variables such as carrier gas flow-rate and programme rate affect the measurement, since they determine the temperature range that the sample is exposed to prior to elution. Several articles have described the relationships between isothermal and temperature programmed retention indices¹⁴⁻¹⁸.

Temperature has a relatively small effect on Kováts' indices of terpenes on methyl silicone phases, but can have quite marked effects on the indices on CW20M. Differences of over 50 units can readily occur in indices determined under widely different conditions on CW20M. Multiple entries occur in the tables for many compounds to enable comparisons between different references and to give an indication of the dependence of the retention index on temperature. Some indices have been specifically excluded from the tables where there is a clear discrepancy between different sources.

This summary is primarily intended as a guide to aid the analysis of essential oils and related natural and synthetic products by gas chromatography combined with mass spectrometry or other spectroscopic detection. Data on the majority of commonly occurring monoterpenes and sesquiterpenes are listed here, as well as data on some that are relatively obscure. The tables are listed in alphabetical order, and also in order of reported Kováts' indices on CW20M and methyl silicone phases. These naturally do not represent elution sequences since the data include indices obtained under various isothermal and temperature programmed conditions, as well as multiple entries. Where possible generally accepted common names have been used. Isomer identification symbols (α , β , γ , δ , ϵ , *cis*, *trans*, *p*, *epi*, etc.) have been added at the end of the parent compound name.

2. KOVÁTS' RETENTION INDICES

The Kováts' retention indices are listed in Tables 1-3.

TABLE I

ALPHABETICAL LIST OF REPORTED KOVÁTS' INDICES OF MONOTERPENES AND SESQUITERPENES ON CW20M AND METHYL SILICONE PHASES

I = Kováts' index; *T* = isothermal temperature (°C) at which the index was determined, or "prog" if the index was determined using temperature programming.

Compound	CW20M			Methyl silicone		
	<i>I</i>	<i>T</i>	Ref.	<i>I</i>	<i>T</i>	Ref.
Aequilobene	1702	150	4	1483	170	4
Agarofuran α -	1907	prog	19			
Alaskene α -	1763	165	5			
Alaskene β -	1738	165	5			
Alloaromadendrene	1660	130	20	1475	150	20
	1662	prog	2	1478	prog	2
	1683	prog	21 ^a			
Allo-ocimene <i>cis</i> -	1373	70	13	1132	110	13
Allo-ocimene <i>trans</i> -	1392	70	13	1120	110	13
Amorphene α -	1691	prog	22	1451	prog	22
	1724	165	3	1492	170	3
Anastreptene	1568	150	4	1391	170	4
Aromadendrene	1650	prog	21 ^a			
Ascaridole				1278	110	23
Ascaridole epoxide				1215	110	23
Barbatene α -	1627	150	4	1440	170	4
Barbatene β -	1690	150	4	1473	170	4
Bergamotene α -	1590	prog	24	1436	prog	24
Bergamotene <i>trans</i> - β -	1586	prog	22	1427	prog	22
Bicycloelemene	1482	prog	24			
Bicyclogermacrene	1744	prog	22	1490	prog	22
	1738	130	20			
	1768	prog	21 ^a			
Bisabolane a	1492	130	25	1448	150	25
Bisabolane b	1510	130	25	1458	150	25
Bisabolene α -	1766	165	3	1505	170	3
Bisabolene <i>cis</i> - α -	1740	prog	22	1496	prog	22
Bisabolene β -	1745	165	3	1496	130	3
Bisabolol α -	2022	160	26	1595	175	26
Bisabolol β -				1666	175	27
Borneol	1698	prog	2	1164	prog	2
	1735	prog	21 ^a	1154	110	23
				1177	175	27
Bornyl acetate	1599	135	28	1278	135	28
	1615	150	29			
Bornyl benzoate				1749	prog	2
Bornyl butyrate	1760	prog	2	1473	prog	2
Bornyl formate	1610	prog	2	1239	prog	2
Bornyl isopentanoate	1774	prog	2	1512	prog	2
Bourbonene β -	1586	165	3	1386	130	3
	1546	prog	2	1406	prog	2
	1526	prog	22			
Bulnesene α -	1729	prog	22	1502	prog	22
Cadalene	2203	prog	30	1646	prog	22
Cadina-1,4-diene	1786	prog	22	1518	prog	22

(Continued on p. 4)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	<i>I</i>	<i>T</i>	Ref.	<i>I</i>	<i>T</i>	Ref.
Cadinene δ -	1784	165	3	1504	130	3
	1761	prog	2	1524	prog	2
	1785	prog	21 ^a			
Cadinene γ -	1792	165	3	1507	130	3
	1766	prog	2	1227	prog	2
Cadinol α -	2224	prog	24			
Cadinol δ -	2150	prog	31			
Cadinol T-	2136	prog	31			
Calacorene α -	1926	165	6			
	1916	prog	22			
Calamenene	1837	prog	22	1502	prog	22
	1839	150	4	1524	170	4
	1842	prog	2	1518	prog	2
Camphane	1021	65	32	953	100	32
Camphene	1066	75	5	952	100	5
Camphor	1078	75	28	956	100	28
	1083	prog	2	954	prog	2
	1518	prog	2	1136	prog	2
			1126	110	23	
Carane <i>cis</i> -	1064	65	32	986	100	32
Carene 3-	1141	75	5	1009	100	5
	1156	75	28	1013	100	28
Carvacrol	2159	prog	2	1297	prog	2
Carveol <i>cis</i> -	1820	prog	2	1215	120	23
				1222	prog	2
Carveol <i>trans</i> -	1790	prog	2	1209	prog	2
				1200	120	23
Carveyl acetate <i>cis</i> -	1795	150	29			
Carveyl acetate <i>trans</i> -	1759	150	29			
Carvomenthone				1181	110	23
Carvomenthyl acetate	1641	150	29			
Carvone	1715	prog	2	1228	prog	2
				1223	125	23
Carvone oxide	1805	prog	2	1261	prog	2
Carvyl propionate	1833	prog	2	1440	prog	2
Caryolan-1-ol	2019	prog	31			
Caryophyllane <i>a</i>	1522	130	25	1425	150	25
Caryophyllane <i>b</i>	1533	130	25	1432	150	25
Caryophyllane <i>c</i>	1555	130	25	1450	150	25
Caryophyllane <i>d</i>	1562	130	25	1450	150	25
Caryophyllene	1617	prog	2	1428	prog	2
	1618	130	20	1436	150	20
	1655	165	3	1417	130	3
Caryophyllene alcohol	2033	prog	31	1559	prog	24
Caryophyllene oxide	2000	prog	24	1576	prog	24
	1966	prog	31			
Cedrane 8 β H-	1617	130	25	1458	150	25
Cedrane 8 α H-	1627	130	25	1465	150	25
Cedrene epoxide α -	1961	prog	2	1585	prog	2
Cedrene α -	1640	165	3	1414	130	3
	1578	prog	22	1411	prog	22
	1600	prog	2	1436	prog	2

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Cedrene β -	1670	165	3	1421	130	3
	1633	prog	2	1446	prog	2
	1605	prog	22			
Cedrol	2100	prog	2	1609	prog	2
				1616	175	27
Chamigrene α -	1765	150	4	1523	170	4
Chamigrene β -	1737	150	4	1550	170	4
Chrysanthenone				1100	100	23
Cineole 1,4-	1185	prog	2	1010	prog	2
				1000	80	23
Cineole 1,8-	1223	70	20	1025	100	20
	1228	prog	2	1017	prog	2
Citronellal	1465	prog	2	1137	prog	2
	1491	135	28	1143	135	28
				1146	160	33
Citronellic acid				1300	125	23
Citronellol β -	1722	prog	2	1215	prog	2
	1765	150	34	1216	100	23
				1224	175	27
Citronellol α -	1760	150	34			
Citronellyl acetate	1645	prog	2	1335	prog	2
	1662	135	28	1335	135	28
	1671	150	29	1335	140	23
Citronellyl butyrate	1786	prog	2	1511	prog	2
	1811	150	29			
Citronellyl ethyl acetal	1626	prog	2	1423	prog	2
Citronellyl formate	1600	prog	2	1261	prog	2
	1638	150	29			
Citronellyl isobutyrate	1705	prog	2	1469	prog	2
	1739	150	29			
Citronellyl pentanoate	1880	prog	2	1608	prog	2
Citronellyl propionate	1700	prog	2	1427	prog	2
	1738	150	29			
Clovane	1621	175	35			
Clovene	1601	175	35			
Copaene α -	1551	165	3	1378	130	3
	1493	prog	22	1369	prog	22
	1519	prog	2	1398	prog	2
Copaene β -	1626	prog	2	1445	prog	2
Cubebene α -	1481	130	20	1362	150	20
	1458	prog	22	1381	prog	22
Cubebene β -	1560	130	20	1400	150	20
	1541	prog	22	1381	prog	22
Cubenol <i>epi</i> -	2037	prog	30			
Cuparene	1811	130	20	1506	150	20
	1838	150	4	1516	170	4
	1831	prog	22			
Curcumene α - (ar-)	1777	prog	22			
	1787	165	3	1475	130	3
Curcumene β -	1756	165	3	1510	170	3

(Continued on p. 6)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Cyclocitral α -				1100	110	23
Cyclocitral β -				1200	125	23
Cyclosativene	1549	165	3	1400	170	3
Cymene <i>p</i> -	1250	75	5	1016	100	5
	1272	prog	2	1020	prog	2
	1275	70	20	1018	100	20
Cymene-7-ol <i>p</i> -				1270	115	23
Cymene-8-ol <i>p</i> -	1846	prog	24	1167	115	23
Cymenene				1277	100	23
Cyperene	1606	165	3	1398	130	3
	1535	prog	22	1398	prog	22
Damascenone	1801	prog	31			
Dihydrocurcumene	1696	130	25	1448	150	25
Dihydroagarofuran β -	1737	prog	19			
Dihydrocarveol	1713	prog	2	1188	prog	2
Dihydrocarvone	1600	prog	2	1183	prog	2
Dihydrocarvyl acetate	1670	prog	2	1319	prog	2
	1700	150	29			
Dihydrogeraniol	1759	150	34			
Dihydrohumulene	1655	175	35			
Dihydrolinalool 1,2-	1512	prog	2	1122	prog	2
	1537	150	34			
Dihydrolinalool 6,7-	1449	150	34			
Dihydromyrcenol 6,10-	1438	prog	2	1063	prog	2
	1473	150	34	1056	80	23
Dihydromyrcenyl acetate	1431	prog	2	1202	prog	2
Dihydronerol	1725	150	34			
Dihydroterpinyl acetate	1561	prog	2	1282	prog	2
Dimethyl-1,6-octadiene 3,7-				946	90	23
Dimethyloctane 2,6-	922	65	32	938	100	32
Dimethyl-2-octene 2,6-				966	80	23
Drimenol	2525	prog	19			
Elemene	1460	130	25	1403	150	25
Elemene β -	1608	130	20	1400	150	20
	1591	prog	22			
Elemene δ -	1469	prog	22	1381	prog	22
Elemene γ -	1642	prog	22	1425	prog	22
Elemol	2078	prog	24	1540	prog	24
Eudesmane 4 α H,5 α H-	1636	130	25	1497	150	25
Eudesmane 4 β H,5 α H-	1582	130	25	1405	150	25
Eudesmol α -	2237	prog	19			
	2249	prog	21 ^a			
Eudesmol β -	2248	prog	19			
	2258	prog	21 ^a			
Eudesmol γ -	2182	prog	19			
Eudesmol 7- <i>epi</i> - α -	2244	prog	19			
Eudesmol 10- <i>epi</i> - γ -	2121	prog	19			
Farnesene <i>cis,cis</i> - α -	1697	prog	22			
Farnesene <i>cis,trans</i> - α -	1727	prog	22			
Farnesene <i>trans,cis</i> - α -	1722	prog	22			

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Farnesene <i>trans,trans</i> - α -	1756	130	20	1501	150	20
	1735	prog	22	1494	prog	22
Farnesene <i>cis</i> - β -	1636	prog	22			
Farnesene <i>trans</i> - β -	1671	130	20	1426	150	20
	1668	165	3	1449	170	4
	1668	prog	22	1448	prog	36
Farnesol <i>trans,trans</i> -				1745	175	27
Farnesyl acetate	2225	200	28	1787	200	28
Fenchene α -	1071	70	13	957	110	13
Fenchene β -	1057	70	13	949	110	13
Fenchol	1574	prog	2	1110	prog	2
	1580	135	28	1125	135	28
Fenchone	1410	prog	2	1080	prog	2
				1077	105	23
Fenchyl acetate	1473	prog	2	1220	prog	2
Geranial	1730	prog	2	1252	prog	2
				1260	120	23
				1347	140	23
Geranic acid				1234	175	27
Geraniol	1842	150	34	1243	prog	2
				1237	120	23
				1363	135	28
Geranyl acetate	1754	135	28	1532	prog	2
Geranyl butyrate	1872	prog	2			
	1904	150	29			
Geranyl formate	1684	prog	2	1282	prog	2
	1717	150	29			
Geranyl isobutyrate	1795	prog	2	1493	prog	2
	1821	150	29			
Geranyl isopentanoate	1895	prog	2	1593	prog	2
Geranyl pentanoate	1960	prog	2	1632	prog	2
Geranyl propionate	1834	150	29			
Germacrane <i>b</i>	1572	130	25	1477	150	25
Germacrane <i>c</i>	1585	130	25	1482	150	25
Germacrane <i>d</i>	1593	130	25	1489	150	25
Germacrene D	1712	prog	22	1468	prog	22
	1718	130	20	1488	150	20
Globulol	2104	prog	21 ^a			
Grandisol				1200	110	23
Guaiene α -	1651	prog	22	1454	prog	22
Guaiene β -	1667	prog	22	1482	prog	22
Guaiene δ -	1729	prog	22	1502	prog	22
Gurjunene α -	1591	165	3	1413	130	3
	1529	prog	22	1400	prog	22
Gurjunene β - (calarene)	1656	165	3	1435	130	3
	1593	prog	22			
Helmiscapene α -	1683	150	4	1467	170	4
Helmiscapene β -	1686	150	4	1466	170	4
Himachalene α -	1873	150	4	1542	170	4
Himachalene β -	1704	165	3	1444	130	3
	1649	prog	22	1442	prog	22
Himachalene γ -	1736	150	4	1517	170	4
	1718	prog	22	1494	prog	22

(Continued on p. 8)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	<i>I</i>	<i>T</i>	<i>Ref.</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>
Himachalene γ -	1723	150	4	1499	170	4
Hop ether	1360	prog	31			
Humuladienone	1952	prog	31			
Humulane	1609	175	35			
Humulene	1672	prog	22	1437	prog	22
	1707	prog	21 ^a	1465	prog	2
	1719	165	3	1447	130	3
Humulene epoxide I	1972	prog	31			
Humulene epoxide II	2011	prog	31			
Humulenol II	2234	prog	31			
Humulol	2124	prog	31			
Ipsdienol				1128	100	23
Ipsenol				1087	90	23
Iridomyrmecin				1400	135	23
Isoborneol	1660	prog	2	1157	prog	2
				1149	110	23
Isobornyl acetate	1584	prog	2	1279	prog	2
	1623	150	29			
Isobornyl formate	1596	prog	2	1228	prog	2
Isobornyl propionate	1676	prog	2	1376	prog	2
Isocamphane <i>trans</i> -	1056	65	32	975	100	32
Isocamphane <i>cis</i> -	1065	65	32	980	100	32
Isogeraniol <i>cis</i> -	1812	150	2			
Isogeraniol <i>trans</i> -	1812	150	2			
Isogeraniol γ -	1800	150	2			
Isogeranyl acetate γ -	1726	150	29			
Isoiridomyrmecin				1422	150	23
Isomenthol	1667	130	20	1182	130	20
				1174	100	23
				1156	130	20
Isomenthone	1528	130	20	1151	prog	39
	1468	prog	39	1283	130	20
Isomenthyl acetate	1579	130	20			
	1599	150	29			
Isopinocampheol				1170	115	23
Isopinocampnone				1157	110	23
Isopulegol	1574	prog	2	1145	prog	2
				1133	110	23
				1258	prog	2
Isopulegyl acetate	1585	prog	2			
	1608	150	29			
Isosativene	1639	165	3	1441	170	3
Junenol	2028	prog	31			
Karahana ether	1368	prog	31			
Lavandulol	1662	prog	2	1154	prog	2
	1707	150	34	1153	110	23
Lavandulyl acetate	1597	prog	2	1274	prog	2
	1609	150	29			
Limonene	1187	75	5	1025	100	5
	1206	prog	2	1030	prog	2
	1210	70	20	1024	100	20
Limonene epoxide <i>cis</i> -				1119	100	23
Limonene epoxide <i>trans</i> -				1122	100	23

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Linalool	1506	prog	2	1092	prog	2
	1533	135	28	1097	135	28
	1555	150	34	1086	90	23
Linalool oxide <i>cis</i> - (furan)	1423	prog	2 ^b	1068	prog	2 ^b
	1461	prog	30 ^b			
Linalool oxide <i>trans</i> - (furan)	1451	prog	2 ^b	1082	prog	2 ^b
	1432	prog	30 ^b			
Linalool oxide I (pyran)				1063	100	23
Linalool oxide II (pyran)				1077	100	23
Linalyl acetate	1538	prog	2	1246	prog	2
	1569	150	29	1240	130	23
Linalyl butyrate	1680	prog	2	1420	prog	2
	1698	150	29			
Linalyl formate	1570	prog	2	1206	prog	2
Linalyl isobutyrate	1597	prog	2	1366	prog	2
	1622	150	29			
Linalyl isopentanoate	1698	prog	2	1461	prog	2
Linalyl 2-methylbutyrate	1695	prog	2	1450	prog	2
Linalyl pentanoate	1765	prog	2	1500	prog	2
Linalyl propionate	1596	prog	2	1324	prog	2
	1624	150	29			
Longicyclene	1554	165	3	1371	130	3
Longifolane 7 α H-	1627	130	25	1460	150	25
Longifolane 7 β H-	1633	130	25	1467	150	25
Longifolene	1574	prog	22	1398	prog	22
	1643	165	3	1404	130	3
Longipinene α -	1541	165	37	1359	130	3
Longipinene β -	1612	150	4	1432	170	4
Mentha-2,8-dien-1-ol <i>cis-p</i> -				1120	95	23
Menthane <i>trans-p</i> -	1022	65	32	981	100	32
Menthane <i>cis-p</i> -	1045	65	32	995	100	32
Menthan-1-ol <i>p</i> -				1156	160	33
Menthan-2-ol <i>p</i> -				1205	160	33
Menthan-7-ol <i>cis-p</i> -	1823	120	12			
Menthan-7-ol <i>trans-p</i> -	1800	120	12			
Menthan-8-ol <i>p</i> -				1162	160	33
Menthan-9-ol <i>cis-p</i> -	1806	120	12			
Menthan-9-ol <i>trans-p</i> -	1777	120	12			
Menthan-8-yl acetate <i>cis-p</i> -	1598	150	29			
Menthan-8-yl acetate <i>trans-p</i> -	1623	150	29			
Menth-1-ene <i>p</i> -				985	160	33
Menth-4(8)-ene <i>p</i> -				998	160	33
Menth-1-en-9-ol <i>p</i> -	1904	120	12			
Menth-1(7)-en-9-ol <i>p</i> -	1881	120	12			
Menth-2-en-1-ol <i>cis-p</i> -	1560	prog	38 ^c	1111	prog	38 ^c
	1662	prog	21 ^{a,c}			
Menth-2-en-1-ol <i>trans-p</i> -	1628	prog	38 ^c	1128	prog	38 ^c
	1597	prog	21 ^{a,c}			
Menth-2-en-7-ol <i>cis-p</i> -	1839	120	12			
Menth-2-en-7-ol <i>trans-p</i> -	1842	120	12			
Menth-3-en-9-ol <i>p</i> -	1736	120	12			

(Continued on p. 10)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	<i>I</i>	<i>T</i>	Ref.	<i>I</i>	<i>T</i>	Ref.
Menth-8-en-1-ol <i>p</i> -				1156	160	33
Menth-8-en-2-ol <i>p</i> -				1208	160	33
Menthofuran	1503	130	20	1147	130	20
	1460	prog	39	1155	prog	39
Menthol	1612	prog	2	1171	prog	2
	1640	130	20	1168	130	20
	1600	prog	39	1171	prog	39
Menthone	1478	prog	2	1143	prog	2
	1518	130	20	1158	130	20
	1444	prog	39	1142	prog	39
Menthyl acetate	1600	150	29			
	1541	prog	39	1281	prog	39
Muurolene α -	1753	165	3	1495	130	3
	1727	prog	22			
	1730	prog	2	1500	prog	2
Muurolene γ -	1695	130	20	1486	150	20
	1725	165	3	1486	150	20
	1692	prog	22			
Muurolene ϵ -	1714	165	3	1445	130	3
Myrcene	1156	prog	2	986	prog	2
	1166	75	28	988	100	28
	1168	70	20	984	100	20
Myrcene-8-ol	1919	150	34			
Myrcenol	1585	prog	2	1103	prog	2
	1631	150	34			
Myrcenyl acetate	1574	prog	2	1247	prog	2
	1595	150	29			
Myrcenyl propionate	1625	prog	2	1327	prog	2
Myrtanol <i>cis</i> -				1245	120	23
Myrtenal				1173	120	23
Myrtenol				1281	120	23
Myrtenyl acetate	1720	150	29			
Neocarvomenthyl acetate	1604	150	29			
Neoisocarvomenthyl acetate	1672	150	29			
Neoisomenthol	1634	130	20	1180	130	20
Neoisomenthyl acetate	1602	130	20	1297	130	20
	1623	150	29			
Neomenthol	1559	prog	39	1159	prog	39
				1159	120	23
Neomenthyl acetate	1569	150	29			
Neral	1680	prog	2	1227	prog	2
				1220	120	23
Nerol	1757	prog	2	1218	prog	2
	1808	150	34	1218	120	23
Nerolic acid				1316	140	23
Nerolidol <i>cis</i> -	1961	prog	2	1524	prog	2
				1540	175	27
Nerolidol <i>trans</i> -	2000	prog	2	1553	prog	2
	2044	prog	19			
Neryl acetate	1699	prog	2	1345	prog	2
	1735	150	29	1343	135	23

TABLE I (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Neryl butyrate	1868	150	29			
Neryl formate	1663	prog	2	1267	prog	2
	1700	150	29			
Neryl isobutyrate	1764	prog	2	1474	prog	2
	1790	150	29			
Neryl isopentanoate	1864	prog	2	1574	prog	2
Neryl propionate	1771	prog	2	1436	prog	2
	1794	150	29			
Nootkatone	2250	prog	2	1802	prog	2
Norbornyl acetate	1476	prog	2	1112	prog	2
Ocimene <i>cis</i> - β -	1238	70	20	1027	100	20
	1228	prog	2	1025	prog	2
				1027	90	23
Ocimene <i>trans</i> - β -	1257	70	20	1042	100	20
	1250	prog	2	1038	prog	2
Ocimenol <i>cis</i> -	1660	150	34			
Ocimenol <i>trans</i> -	1685	150	34			
Patchoulene β -	1488	prog	22	1378	prog	22
Perilla aldehyde				1253	120	23
Perillyl acetate	1791	150	29			
Perillyl alcohol				1281	115	23
Phellandrene α -	1177	prog	2	1002	prog	2
	1173	70	13	1007	110	13
				1000	90	23
Phellandrene β -	1216	prog	2	1025	prog	2
	1213	70	13	1032	110	13
Phellandrol	1896	120	12			
Pinane <i>cis</i> -	1075	prog	2	987	prog	2
	1061	65	32	977	80	23
				1002	160	33
Pinane <i>trans</i> -	1062	prog	2	981	prog	2
	1049	65	32	973	100	32
Pinene α -	1036	75	28	942	100	28
	1038	70	20	939	100	20
				942	prog	2
Pinene oxide α -				1100	112	23
Pinene β -	1120	70	20	978	100	20
	1120	75	28	983	100	28
	1124	prog	2	981	prog	2
Pinocamphone				1152	110	23
Pinocarveol <i>trans</i> -				1132	110	23
Pinocarveyl acetate <i>trans</i> -	1682	150	29			
Pinonic acid <i>cis</i> -				1427	165	23
Piperitenone				1315	125	23
Piperitenone oxide	1997	prog	21 ^a			
Piperitone	1739	prog	2	1247	prog	2
				1231	125	23
Pulegone	1662	prog	2	1230	prog	2
Pyrovetivene α -	1817	165	3	1522	170	3
Rose oxide <i>cis</i> -	1354	prog	2	1087	prog	2
				1100	95	23

(Continued on p. 12)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Rose oxide <i>trans</i> -	1370	prog	2	1100	prog	2
				1114	95	23
Sabinene	1130	70	20	972	100	20
	1130	prog	2	976	prog	2
Sabinene hydrate <i>cis</i> -				1092	prog	38
Sabinene hydrate <i>trans</i> -	1463	prog	38	1060	prog	38
Sabinol (<i>cis</i> -)	1683	prog	2	1135	prog	2
				1130	115	23
Sabinyl acetate (<i>cis</i> -)	1651	prog	2	1262	prog	2
	1677	150	29			
Safranal				1167	120	23
Santalene <i>epi</i> - β -	1638	prog	22	1437	prog	22
Santalene α -	1574	prog	22	1412	prog	22
Santalene β -	1653	prog	22	1450	prog	22
Santalol α -				1660	175	27
Sativene	1595	165	3	1421	170	3
Scapanene	1664	150	4	1465	170	4
Selina-3,7(11)-diene	1791	prog	19			
Selina-4(14), 7(11)-diene	1816	165	3			
Selina-4(14), 7-diene	1694	165	3	1476	170	3
Selina-4,11-diene	1702	150	4			
Selinene α -	1751	150	4	1513	170	3
	1729	prog	22	1484	prog	22
	1759	prog	21 ^a			
Selinene β -	1767	165	3	1506	170	3
	1727	prog	22	1477	prog	22
	1756	prog	21 ^a			
Selinene δ -	1728	165	3			
Selinene 7- <i>epi</i> - α -	1775	prog	19			
Selinene 10- <i>epi</i> - α -	1803	165	37			
Sesquiphellandrene β -	1776	prog	22	1512	prog	22
Seychellene	1669	prog	22			
Shisool				1248	130	23
Sibirene	1594	150	4	1427	170	4
Sinuene	1646	150	4	1451	170	4
Spathulenol	2153	prog	21 ^a			
Tagetone <i>cis</i> -				1136	110	23
Tagetone <i>trans</i> -				1125	110	23
Terpinenc α -	1189	70	20	1016	100	20
	1188	70	13	1018	110	13
Terpinene γ -	1247	75	28	1056	100	28
	1251	prog	2	1057	prog	2
Terpinene-1-ol	1576	prog	24			
Terpinene-4-ol	1601	135	28	1129	135	28
	1628	prog	2	1175	prog	2
	1637	prog	21 ^a	1170	115	23
				1160	175	27
Terpinene-4-yl acetate	1640	150	29	1282	120	23
Terpineol α -	1731	prog	21 ^a	1185	prog	2
	1685	135	28	1178	135	28
				1205	160	33
Terpineol β -	1616	prog	2	1137	prog	2
Terpineol δ -	1655	prog	2	1160	prog	2

TABLE I (continued)

Compound	CW20M			Methyl silicone		
	I	T	Ref.	I	T	Ref.
Terpinolene	1279	75	28	1074	100	28
	1289	70	20	1081	100	20
	1287	prog	2			
Terpinyl acetate	1687	prog	2	1333	prog	2
	1722	150	29	1337	140	23
Terpinyl acetate <i>cis</i> - β -	1622	150	29			
Terpinyl butyrate	1828	prog	2	1514	prog	2
Terpinyl formate	1666	prog	2	1333	prog	2
Terpinyl isobutyrate	1748	prog	2	1467	prog	2
Terpinyl isopentanoate	1858	prog	2	1565	prog	2
Terpinyl pentanoate	1928	prog	2	1614	prog	2
Terpinyl propionate	1747	prog	2	1426	prog	2
Tetrahydrogeraniol	1626	prog	2	1185	prog	2
	1675	150	34			
Tetrahydrogeranyl acetate	1582	150	29			
Tetrahydrohumulene	1653	175	35			
Tetrahydrolavandulol	1600	150	34			
Tetrahydrolinalool	1397	prog	2	1087	prog	2
	1431	150	34	1088	90	23
Tetrahydrolinalyl acetate	1422	150	29			
Tetrahydromyrcenol	1414	prog	2	1090	prog	34
	1449	150	34			
Tetrahydrothujopsane <i>a</i>	1668	130	25	1496	150	25
Tetrahydrothujopsane <i>b</i>	1678	130	25	1508	150	25
Thuj-2-en-4-ol <i>cis</i> -	1551	100	40	1053	140	40
Thuj-2-en-4-ol <i>trans</i> -	1468	100	40	1035	140	40
Thujene α -	1038	70	20	931	100	20
	1023	70	13	935	110	13
				938	prog	2
Thujone α -				1100	110	23
Thujopsene	1626	prog	22	1425	prog	22
	1660	prog	2	1451	prog	2
	1684	165	3	1430	130	3
Thujyl acetate	1626	150	29			
Thymol				1270	130	23
Tricyclene	1009	75	5	928	100	5
Undulatene	1812	150	4	1557	170	4
Valencane (nootkatane)	1624	130	25	1493	150	25
Valencene	1722	prog	22	1482	prog	22
	1751	prog	34	1487	prog	2
	1760	165	3	1457	130	3
Valerianol	2231	prog	19			
Verbenol <i>cis</i> -				1165	100	23
Verbenol <i>trans</i> -				1140	120	23
Verbenone	1733	prog	2	1195	prog	2
				1185	110	23
Vetivenene β -	1885	165	3	1563	170	3
	1868	prog	22	1544	prog	22
Viridiflorene	1697	prog	22	1484	prog	22
Viridiflorol	2103	180	20	1588	150	20
	2112	prog	21 ^a			

(Continued on p. 14)

TABLE 1 (continued)

Compound	CW20M			Methyl silicone		
	<i>I</i>	<i>T</i>	Ref.	<i>I</i>	<i>T</i>	Ref.
Ylangene α -	1539	165	3	1396	170	3
	1491	prog	22	1368	prog	22
Zingiberene	1728	prog	22	1486	prog	22
	1738	165	3	1480	170	3
Zizaene	1706	165	3	1482	170	3
Zonarene	1781	165	8			

^a Indices reported from this laboratory were determined on a 50 m \times 0.33 mm I.D. BP20 column with a 0.5- μ m film thickness (S.G.E.), temperature programmed from 100 to 220°C at 3°C/min with helium as carrier gas.

^b Refs. 2 and 30 have conflicting orders of elution for *cis*- and *trans*-linalool oxides.

^c Refs. 21 and 38 have conflicting orders of elution for *cis*- and *trans*-*p*-menth-2-en-1-ols.

TABLE 2
KOVÁTS' INDICES LISTED IN ORDER ON CW20M

Column headings and footnotes as for Table 1.

Compound	<i>I</i>	<i>T</i>	Ref.	Compound	<i>I</i>	<i>T</i>	Ref.
Dimethyloctane 2,6-	922	65	32	Myrcene	1156	prog	2
Tricyclene	1009	75	5	Myrcene	1166	75	28
Camphane	1021	65	32	Myrcene	1168	70	20
Menthane <i>trans-p</i> -	1022	65	32	Phellandrene α -	1173	70	13
Thujene α -	1023	70	13	Phellandrene α -	1177	prog	2
Pinene α -	1036	75	28	Cineole 1,4-	1185	prog	2
Pinene α -	1038	70	20	Limonene	1187	75	5
Thujene α -	1038	70	20	Terpinene α -	1188	70	13
Menthane <i>cis-p</i> -	1045	65	32	Terpinene α -	1189	70	20
Pinane <i>trans</i> -	1049	65	32	Limonene	1206	prog	2
Isocamphane <i>trans</i> -	1056	65	32	Limonene	1210	70	20
Fenchene β -	1057	70	13	Phellandrene β -	1213	70	13
Pinane <i>cis</i> -	1061	65	32	Phellandrene β -	1216	prog	2
Pinane <i>trans</i> -	1062	prog	2	Cineole 1,8-	1223	70	20
Carane <i>cis</i> -	1064	65	32	Cineole 1,8-	1228	prog	2
Isocamphane <i>cis</i> -	1065	65	32	Ocimene <i>cis</i> - β -	1228	prog	2
Camphene	1066	75	5	Ocimene <i>cis</i> - β -	1238	70	20
Fenchene α -	1071	70	13	Terpinene γ -	1247	75	28
Pinane <i>cis</i> -	1075	prog	2	Cymene <i>p</i> -	1250	75	5
Camphene	1078	75	28	Ocimene <i>trans</i> - β -	1250	prog	2
Camphene	1083	prog	2	Terpinene γ -	1251	prog	2
Pinene β -	1120	70	20	Ocimene <i>trans</i> - β -	1257	70	20
Pinene β -	1120	75	28	Cymene <i>p</i> -	1272	prog	2
Pinene β -	1124	prog	2	Cymene <i>p</i> -	1275	70	20
Sabinene	1130	70	20	Terpinolene	1279	75	28
Sabinene	1130	prog	2	Terpinolene	1287	prog	2
Carene 3-	1141	75	5	Terpinolene	1289	70	20
Carene 3-	1156	75	28	Rose oxide <i>cis</i> -	1354	prog	2

TABLE 2 (continued)

Compound	I	T	Ref.	Compound	I	T	Ref.
Hop ether	1360	prog	31	Linalyl acetate	1538	prog	2
Karahana ether	1368	prog	31	Ylangene α -	1539	165	3
Rose oxide <i>trans</i> -	1370	prog	2	Cubebene β -	1541	prog	22
Allo-ocimene <i>cis</i> -	1373	70	13	Longipinene α -	1541	165	37
Allo-ocimene <i>trans</i> -	1392	70	13	Menthyl acetate	1541	prog	39
Tetrahydrolinalool	1397	prog	2	Bourbonene β -	1546	prog	2
Fenchone	1410	prog	2	Cyclosativene	1549	165	3
Tetrahydromyrcenol	1414	prog	2	Copaene α -	1551	165	3
Tetrahydrolinalyl acetate	1422	150	29	Thuj-2-en-4-ol <i>cis</i> -	1551	100	40
Linalool oxide <i>cis</i> - (furan)	1423	prog	2 ^b	Longicyclene	1554	165	3
Dihydromyrcenyl acetate	1431	prog	2	Caryophyllane <i>c</i>	1555	130	25
Tetrahydrolinalool	1431	150	34	Linalool	1555	150	34
Linalool oxide <i>trans</i> - (furan)	1432	prog	30 ^b	Neomenthol	1559	prog	39
Dihydromyrcenol 6,10-	1438	prog	2	Cubebene β -	1560	130	20
Menthone	1444	prog	39	Menth-2-en-1-ol <i>cis</i> - <i>p</i> -	1560	prog	38 ^c
Dihydrolinalool 6,7-	1449	150	34	Dihydroterpinyl acetate	1561	prog	2
Tetrahydromyrcenol	1449	150	34	Caryophyllane <i>d</i>	1562	130	25
Linalool oxide <i>trans</i> - (furan)	1451	prog	2 ^b	Anastreptene	1568	150	4
Cubebene α -	1458	prog	22	Linalyl acetate	1569	150	29
Elemene	1460	130	25	Neomenthyl acetate	1569	150	29
Menthofuran	1460	prog	39	Linalyl formate	1570	prog	2
Linalool oxide <i>cis</i> - (furan)	1461	prog	30 ^b	Germacrane <i>b</i>	1572	130	25
Sabinene hydrate <i>trans</i> -	1463	prog	38	Fenchol	1574	prog	2
Citronellal	1465	prog	2	Isopulegol	1574	prog	2
Isomenthone	1468	prog	39	Longifolene	1574	prog	22
Thuj-2-en-4-ol <i>trans</i> -	1468	100	40	Myrcenyl acetate	1574	prog	2
Elemene δ -	1469	prog	22	Santalene α -	1574	prog	22
Dihydromyrcenol 6,10-	1473	150	34	Terpinene-1-ol	1576	prog	24
Fenchyl acetate	1473	prog	2	Cedrene α -	1578	prog	22
Norbornyl acetate	1476	prog	2	Isomenthyl acetate	1579	130	20
Menthone	1478	prog	2	Fenchol	1580	135	28
Cubebene α -	1481	130	20	Eudesmane 4 β H, 5 α H-	1582	130	25
Bicycloelemene	1482	prog	24	Tetrahydrogeranyl acetate	1582	150	29
Patchoulene β -	1488	prog	22	Isobornyl acetate	1584	prog	2
Citronellal	1491	135	28	Germacrane <i>c</i>	1585	130	25
Ylangene α -	1491	prog	22	Isopulegyl acetate	1585	prog	2
Bisabolane <i>a</i>	1492	130	25	Myrcenol	1585	prog	2
Copaene α -	1493	prog	22	Bergamotene <i>trans</i> - β -	1586	prog	22
Menthofuran	1503	130	20	Bourbonene β -	1586	165	3
Linalool	1506	prog	2	Bergamotene α -	1590	prog	24
Bisabolane <i>b</i>	1510	130	25	Elemene β -	1591	prog	22
Dihydrolinalool 1,2-	1512	prog	2	Gurjunene α -	1591	165	3
Camphor	1518	prog	2	Germacrane <i>d</i>	1593	130	25
Menthone	1518	130	20	Gurjunene β - (calarene)	1593	prog	22
Copaene α -	1519	prog	2	Sibirene	1594	150	4
Caryophyllane <i>a</i>	1522	130	25	Myrcenyl acetate	1595	150	29
Bourbonene β -	1526	prog	22	Sativene	1595	165	3
Isomenthone	1528	130	20	Isobornyl formate	1596	prog	2
Gurjunene α -	1529	prog	22	Linalyl propionate	1596	prog	2
Caryophyllane <i>b</i>	1533	130	25	Lavandulyl acetate	1597	prog	2
Linalool	1533	135	28	Linalyl isobutyrate	1597	prog	2
Cyperene	1535	prog	22	Menth-2-en-1-ol <i>trans</i> - <i>p</i> -	1597	prog	21 ^{a,c}
Dihydrolinalool 1,2-	1537	150	34	Menthan-8-yl acetate <i>cis</i> - <i>p</i> -	1598	150	29

(Continued on p. 16)

TABLE 2 (continued)

<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>	<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>
Bornyl acetate	1599	135	28	Santalene <i>epi</i> - β -	1638	prog	22
Isomenthyl acetate	1599	150	29	Isosativene	1639	165	3
Cedrene α -	1600	prog	2	Cedrene α -	1640	165	3
Citronellyl formate	1600	prog	2	Menthol	1640	130	20
Dihydrocarvone	1600	prog	2	Terpinene-4-yl acetate	1640	150	29
Menthol	1600	prog	39	Carvomenthyl acetate	1641	150	29
Menthyl acetate	1600	150	29	Elemene γ -	1642	prog	22
Tetrahydrolavandulol	1600	150	34	Longifolene	1643	165	3
Clovene	1601	175	35	Citronellyl acetate	1645	prog	2
Terpinene-4-ol	1601	135	28	Sinuene	1646	150	4
Neoisomenthyl acetate	1602	130	20	Himachalene α -	1649	prog	22
Neocarvomenthyl acetate	1604	150	29	Aromadendrene	1650	prog	21 ^a
Cedrene β -	1605	prog	22	Guaiene α -	1651	prog	22
Cyperene	1606	165	3	Sabinyl acetate (<i>cis</i> -)	1651	prog	2
Elemene β -	1608	130	20	Santalene β -	1653	prog	22
Isopulegyl acetate	1608	150	29	Tetrahydrohumulene	1653	175	35
Humulane	1609	175	35	Caryophyllene	1655	165	3
Lavandulyl acetate	1609	150	29	Dihydrohumulene	1655	175	35
Bornyl formate	1610	prog	2	Terpineol δ -	1655	prog	2
Longipinene β -	1612	150	4	Gurjunene β - (calarene)	1656	165	3
Menthol	1612	prog	2	Alloaromadendrene	1660	130	20
Bornyl acetate	1615	150	29	Isoborneol	1660	prog	2
Terpineol β -	1616	prog	2	Ocimenol <i>cis</i> -	1660	150	34
Caryophyllene	1617	prog	2	Thujopsene	1660	prog	2
Cedrane 8 β H-	1617	130	25	Alloaromadendrene	1662	prog	2
Caryophyllene	1618	130	20	Citronellyl acetate	1662	135	28
Clovane	1621	175	35	Lavandulol	1662	prog	2
Linalyl isobutyrate	1622	150	29	Menth-2-en-1-ol <i>cis-p</i> -	1662	prog	21 ^{a,c}
Terpinyl acetate <i>cis</i> - β -	1622	150	29	Pulegone	1662	prog	2
Isobornyl acetate	1623	150	29	Neryl formate	1663	prog	2
Menthan-8-yl acetate				Scapanene	1664	150	4
<i>trans-p</i> -	1623	150	29	Terpinyl formate	1666	prog	2
Neoisomenthyl acetate	1623	150	29	Guaiene β -	1667	prog	22
Linalyl propionate	1624	150	29	Isomenthol	1667	130	20
Valencane (nootkatane)	1624	130	25	Farnesene <i>trans</i> - β -	1668	165	3
Myrcenyl propionate	1625	prog	2	Farnesene <i>trans</i> - β -	1668	prog	22
Citronellyl ethyl acetal	1626	prog	2	Tetrahydrothujopsane <i>a</i>	1668	130	25
Copaene β -	1626	prog	2	Seychellene	1669	prog	22
Tetrahydrogeraniol	1626	prog	2	Cedrene β -	1670	165	3
Thujopsene	1626	prog	22	Dihydrocarvyl acetate	1670	prog	2
Thujyl acetate	1626	150	29	Citronellyl acetate	1671	150	29
Barbatene α -	1627	150	4	Farnesene <i>trans</i> - β -	1671	130	20
Cedrane 8 α H-	1627	130	25	Humulene	1672	prog	22
Longifolane 7 α H-	1627	130	25	Neoisocarvomenthyl acetate	1672	150	29
Menth-2-en-1-ol <i>trans-p</i> -	1628	prog	38 ^c	Tetrahydrogeraniol	1675	150	34
Terpinene-4-ol	1628	prog	2	Isobornyl propionate	1676	prog	2
Myrcenol	1631	150	34	Sabinyl acetate (<i>cis</i> -)	1677	150	29
Cedrene β -	1633	prog	2	Tetrahydrothujopsane <i>b</i>	1678	130	25
Longifolane 7 β H-	1633	130	25	Linalyl butyrate	1680	prog	2
Neoisomenthol	1634	130	20	Neral	1680	prog	2
Eudesmane 4 α H, 5 α H-	1636	130	25	Pinocarveyl acetate <i>trans</i> -	1682	150	29
Farnesene <i>cis</i> - β -	1636	prog	22	Alloaromadendrene	1683	prog	21 ^a
Citronellyl formate	1638	150	29	Helmiscapene α -	1683	150	4

TABLE 2 (continued)

Compound	I	T	Ref.	Compound	I	T	Ref.
Sabinol (<i>cis</i> -)	1683	prog	2	Bulnesene α -	1729	prog	22
Geranyl formate	1684	prog	2	Guaiene δ -	1729	prog	22
Thujopsene	1684	165	3	Selinene α -	1729	prog	22
Ocimenol <i>trans</i> -	1685	150	34	Geranial	1730	prog	2
Terpineol α -	1685	135	28	Muurolene α -	1730	prog	2
Helmiscapene β -	1686	150	4	Verbenone	1733	prog	2
Terpinyl acetate	1687	prog	2	Borneol	1735	prog	21 ^a
Barbatene β -	1690	150	4	Farnesene <i>trans,trans</i> - α -	1735	prog	22
Amorphene α -	1691	prog	22	Neryl acetate	1735	150	29
Muurolene γ -	1692	prog	22	Himachalene β -	1736	150	4
Selina-4(14), 7-diene	1694	165	3	Menth-3-en-9-ol <i>p</i> -	1736	120	12
Linalyl 2-methylbutyrate	1695	prog	2	Chamigrene β -	1737	150	4
Muurolene γ -	1695	130	20	Dihydroagarofuran β -	1737	prog	19
Dihydrocurcumene	1696	130	25	Alaskene β -	1738	165	5
Farnesene <i>cis,cis</i> - α -	1697	prog	22	Bicyclgermacrene	1738	130	20
Viridiflorene	1697	prog	22	Citronellyl propionate	1738	150	29
Borneol	1698	prog	2	Zingiberene	1738	165	3
Linalyl butyrate	1698	150	29	Citronellyl isobutyrate	1739	150	29
Linalyl isopentanoate	1698	prog	2	Piperitone	1739	prog	2
Neryl acetate	1699	prog	2	Bisabolene <i>cis</i> - α -	1740	prog	22
Citronellyl propionate	1700	prog	2	Bicyclgermacrene	1744	prog	22
Dihydrocarvyl acetate	1700	150	29	Bisabolene β -	1745	165	3
Neryl formate	1700	150	29	Terpinyl propionate	1747	prog	2
Aequilobene	1702	150	4	Terpinyl isobutyrate	1748	prog	2
Selina-4-,11-diene	1702	150	4	Selinene α -	1751	150	4
Himachalene α -	1704	165	3	Valencene	1751	prog	34
Citronellyl isobutyrate	1705	prog	2	Muurolene α -	1753	165	3
Zizaene	1706	165	3	Geranyl acetate	1754	135	28
Humulene	1707	prog	21 ^a	Curcumene β -	1756	165	3
Lavandulol	1707	150	34	Farnesene <i>trans,trans</i> - α -	1756	130	20
Germacrene D	1712	prog	22	Selinene β -	1756	prog	21 ^a
Dihydrocarveol	1713	prog	2	Nerol	1757	prog	2
Muurolene ϵ -	1714	165	3	Carveyl acetate <i>trans</i> -	1759	150	29
Carvone	1715	prog	2	Dihydrogeraniol	1759	150	34
Geranyl formate	1717	150	29	Selinene α -	1759	prog	21 ^a
Germacrene D	1718	130	20	Bornyl butyrate	1760	prog	2
Himachalene β -	1718	prog	22	Citronellol α -	1760	150	34
Humulene	1719	165	3	Valencene	1760	165	3
Myrtenyl acetate	1720	150	29	Cadinene δ -	1761	prog	2
Citronellol (β -)	1722	prog	2	Alaskene α -	1763	165	5
Farnesene <i>trans,cis</i> - α -	1722	prog	22	Neryl isobutyrate	1764	prog	2
Terpinyl acetate	1722	150	29	Chamigrene α -	1765	150	4
Valencene	1722	prog	22	Citronellol (β -)	1765	150	34
Himachalene γ -	1723	150	4	Linalyl pentanoate	1765	prog	2
Amorphene α -	1724	165	3	Bisabolene	1766	165	3
Dihydronerol	1725	150	34	Cadinene γ -	1766	prog	2
Muurolene γ -	1725	165	3	Selinene β -	1767	165	3
Isogeranyl acetate γ -	1726	150	29	Bicyclgermacrene	1768	prog	21 ^a
Farnesene <i>cis,trans</i> - α -	1727	prog	22	Neryl propionate	1771	prog	2
Muurolene α -	1727	prog	22	Bornyl isopentanoate	1774	prog	2
Selinene β -	1727	prog	22	Selinene 7- <i>epi</i> - α -	1775	prog	19
Selinene δ -	1728	165	3	Sesquiphellandrene β -	1776	prog	22
Zingiberene	1728	prog	22	Curcumene α - (ar-)	1777	prog	22

(Continued on p. 18)

TABLE 2 (continued)

<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>	<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>
Menthan-9-ol <i>trans-p</i> -	1777	120	12	Citronellyl pentanoate	1880	prog	2
Zonarene	1781	165	8	Menth-1(7)-en-9-ol <i>p</i> -	1881	120	12
Cadinene δ -	1784	165	3	Vetivenene β -	1885	165	3
Cadinene δ -	1785	prog	21 ^a	Geranyl isopentanoate	1895	prog	2
Cadina-1,4-diene	1786	prog	22	Phellandrol	1896	120	12
Citronellyl butyrate	1786	prog	2	Geranyl butyrate	1904	150	29
Curcumene α - (ar-)	1787	165	3	Menth-1-en-9-ol <i>p</i> -	1904	120	12
Carveol <i>trans</i> -	1790	prog	2	Agarofuran α -	1907	prog	19
Neryl isobutyrate	1790	150	29	Calacorene α -	1916	prog	22
Perillyl acetate	1791	150	29	Myrcene-8-ol	1919	150	34
Selina-3,7(11)-diene	1791	prog	19	Calacorene α -	1926	165	6
Cadinene γ -	1792	165	3	Terpinyl pentanoate	1928	prog	2
Neryl propionate	1794	150	29	Humuladienone	1952	prog	31
Carveyl acetate <i>cis</i> -	1795	150	29	Geranyl pentanoate	1960	prog	2
Geranyl isobutyrate	1795	prog	2	Cedrene epoxide α -	1961	prog	2
Geraniol	1797	prog	2	Nerolidol <i>cis</i> -	1961	prog	2
Isogeraniol γ -	1800	150	2	Caryophyllene oxide	1966	prog	31
Menthan-7-ol <i>trans-p</i> -	1800	120	12	Humulene epoxide I	1972	prog	31
Damascenone	1801	prog	31	Caryophyllene oxide	2000	prog	24
Selinene 10- <i>epi</i> - α -	1803	165	37	Nerolidol <i>trans</i> -	2000	prog	2
Carvone oxide	1805	prog	2	Humulene epoxide II	2011	prog	31
Menthan-9-ol <i>cis-p</i> -	1806	120	12	Caryolan-1-ol	2019	prog	31
Nerol	1808	150	34	Bisabolol α -	2022	160	26
Citronellyl butyrate	1811	150	29	Junenol	2028	prog	31
Cuparene	1811	130	20	Caryophyllene alcohol	2033	prog	31
Isogeraniol <i>cis</i> -	1812	150	2	Cubenol <i>epi</i> -	2037	prog	30
Isogeraniol <i>trans</i> -	1812	150	2	Nerolidol <i>trans</i> -	2044	prog	19
Undulatene	1812	150	4	Elemol	2078	prog	24
Selina-4(14),7(11)-diene	1816	165	3	Cedrol	2100	prog	2
Pyrovetivene α -	1817	165	3	Viridiflorol	2103	180	20
Carveol <i>cis</i> -	1820	prog	2	Globulol	2104	prog	21 ^a
Geranyl isobutyrate	1821	150	29	Viridiflorol	2112	prog	21 ^a
Menthan-7-ol <i>cis-p</i> -	1823	120	12	Eudesmol 10- <i>epi</i> - γ -	2121	prog	19
Terpinyl butyrate	1828	prog	2	Humulol	2124	prog	31
Cuparene	1831	prog	22	Cadinol T-	2136	prog	31
Carvyl propionate	1833	prog	2	Cadinol δ -	2150	prog	31
Geranyl propionate	1834	150	29	Spathulenol	2153	prog	21 ^a
Calamenene	1837	prog	22	Carvacrol	2159	prog	2
Cuparene	1838	150	4	Eudesmol γ -	2182	prog	19
Calamenene	1839	150	4	Cadalene	2203	prog	30
Menth-2-en-7-ol <i>cis-p</i> -	1839	120	12	Cadinol α -	2224	prog	24
Calamenene	1842	prog	2	Farnesyl acetate	2225	200	28
Geraniol	1842	150	34	Valerianol	2231	prog	19
Menth-2-en-7-ol <i>trans-p</i> -	1842	120	12	Humulenol II	2234	prog	31
Cymene-8-ol <i>p</i> -	1846	prog	24	Eudesmol α -	2237	prog	19
Terpinyl isopentanoate	1858	prog	2	Eudesmol 7- <i>epi</i> - α -	2244	prog	19
Neryl isopentanoate	1864	prog	2	Eudesmol α -	2248	prog	19
Neryl butyrate	1868	150	29	Eudesmol α -	2249	prog	21 ^a
Vetivenene β -	1868	prog	22	Nootkatone	2250	prog	2
Geranyl butyrate	1872	prog	2	Eudesmol β -	2258	prog	21 ^a
Himachalene ar-	1873	150	4	Drimenol	2525	prog	19

TABLE 3

KOVÁTS' INDICES LISTED IN ORDER ON METHYL SILICONE

Column headings and footnotes as for Table 1.

<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>	<i>Compound</i>	<i>I</i>	<i>T</i>	<i>Ref.</i>
Tricyclene	928	100	5	Cineole 1,8-	1025	100	20
Thujene α -	931	100	20	Limonene	1025	100	5
Thujene α -	935	110	13	Ocimene <i>cis</i> - β -	1025	prog	2
Dimethyloctane 2,6-	938	100	32	Phellandrene β -	1025	prog	2
Thujene α -	938	prog	2	Ocimene <i>cis</i> - β -	1027	100	20
Pinene α -	939	100	20	Ocimene <i>cis</i> - β -	1027	90	23
Pinene α -	942	100	28	Limonene	1030	prog	2
Pinene α -	942	prog	2	Phellandrene β -	1032	110	13
Dimethyl-1,6-octadiene 3,7-	946	90	23	Thuj-2-en-4-ol <i>trans</i> -	1035	140	40
Fenchene β -	949	110	13	Ocimene <i>trans</i> - β -	1038	prog	2
Camphene	952	100	5	Ocimene <i>trans</i> - β -	1042	100	20
Camphane	953	100	32	Thuj-2-en-4-ol <i>cis</i> -	1053	140	40
Camphene	954	prog	2	Dihydromyrcenol 6,10-	1056	80	23
Camphene	956	100	28	Terpinene γ -	1056	100	28
Fenchene α -	957	110	13	Terpinene γ -	1057	prog	2
Dimethyl-2-octene 2,6-	966	80	23	Sabinene hydrate <i>trans</i> -	1060	prog	38
Sabinene	972	100	20	Dihydromyrcenol 6,10-	1063	prog	2
Pinane <i>trans</i> -	973	100	32	Linalool oxide I (pyran)	1063	100	23
Isocamphane <i>trans</i> -	975	100	32	Linalool oxide <i>cis</i> - (furan)	1068	prog	2 ^b
Sabinene	976	prog	2	Terpinolene	1074	100	28
Pinane <i>cis</i> -	977	80	23	Fenchone	1077	105	23
Pinene β -	978	100	20	Linalool oxide II (pyran)	1077	100	23
Isocamphane <i>cis</i> -	980	100	32	Fenchone	1080	prog	2
Menthane <i>trans-p</i> -	981	100	32	Terpinolene	1081	100	20
Pinane <i>trans</i> -	981	prog	2	Linalool oxide <i>trans</i> - (furan)	1082	prog	2 ^b
Pinene β -	981	prog	2	Linalool	1086	90	23
Pinene β -	983	100	28	Ipsenol	1087	90	23
Myrcene	984	100	20	Rose oxide <i>cis</i> -	1087	prog	2
Menth-1-ene <i>p</i> -	985	160	33	Tetrahydrolinalool	1087	prog	2
Carane <i>cis</i> -	986	100	32	Tetrahydrolinalool	1088	90	23
Myrcene	986	prog	2	Tetrahydromyrcenol	1090	prog	34
Pinane <i>cis</i> -	987	prog	2	Linalool	1092	prog	2
Myrcene	988	100	28	Sabinene hydrate <i>cis</i> -	1092	prog	38
Menthane <i>cis-p</i> -	995	100	32	Linalool	1097	135	28
Menth-4(8)-ene- <i>p</i> -	998	160	33	Chrysanthenone	1100	100	23
Cineole 1,4-	1000	80	23	Cyclocitral α -	1100	110	23
Phellandrene α -	1000	90	23	Pinene oxide α -	1100	112	23
Phellandrene α -	1002	prog	2	Rose oxide <i>cis</i> -	1100	95	23
Pinane <i>cis</i> -	1002	160	33	Rose oxide <i>trans</i> -	1100	prog	2
Phellandrene α -	1007	110	13	Thujone α -	1100	110	23
Carene 3-	1009	100	5	Myrcenol	1103	prog	2
Cineole 1,4-	1010	prog	2	Fenchol	1110	prog	2
Carene 3-	1013	100	28	Menth-2-en-1-ol <i>cis-p</i> -	1111	prog	38 ^c
Cymene <i>p</i> -	1016	100	5	Norbornyl acetate	1112	prog	2
Terpinene α -	1016	100	20	Rose oxide <i>trans</i> -	1114	95	23
Cineole 1,8-	1017	prog	2	Limonene epoxide <i>cis</i> -	1119	100	23
Cymene <i>p</i> -	1018	100	20	Allo-ocimene <i>trans</i> -	1120	110	13
Terpinene α -	1018	110	13	Mentha-2,8-dien-1-ol <i>cis-p</i> -	1120	95	23
Cymene <i>p</i> -	1020	prog	2	Dihydrolinalool 1,2-	1122	prog	2
Limonene	1024	100	20	Limonene epoxide <i>trans</i> -	1122	100	23

(Continued on p. 20)

TABLE 3 (continued)

Compound	I	T	Ref.	Compound	I	T	Ref.
Fenchol	1125	135	28	Borneol	1177	175	27
Tagetone <i>trans</i> -	1125	110	23	Terpineol α -	1178	135	28
Camphor	1126	110	23	Neoisomenthol	1180	130	20
Ipsdienol	1128	100	23	Carvomenthone	1181	110	23
Menth-2-en-1-ol <i>trans-p</i> -	1128	prog	38 ^c	Isomenthol	1182	130	20
Terpinene-4-ol	1129	135	28	Dihydrocarvone	1183	prog	2
Sabinol (<i>cis</i> -)	1130	115	23	Terpineol α -	1185	prog	2
Allo-ocimene <i>cis</i> -	1132	110	13	Tetrahydrogeraniol	1185	prog	2
Pinocarveol <i>trans</i> -	1132	110	23	Verbenone	1185	110	23
Isopulegol	1133	110	23	Dihydrocarveol	1188	prog	2
Sabinol (<i>cis</i> -)	1135	prog	2	Verbenone	1195	prog	2
Camphor	1136	prog	2	Carveol <i>trans</i> -	1200	120	23
Tagetone <i>cis</i> -	1136	110	23	Cyclocitral β -	1200	125	23
Citronellal	1137	prog	2	Grandisol	1200	110	23
Terpineol β -	1137	prog	2	Dihydromyrcenyl acetate	1202	prog	2
Verbenol <i>trans</i> -	1140	120	23	Menthan-2-ol <i>p</i> -	1205	160	33
Menthone	1142	prog	39	Terpineol α -	1205	160	33
Citronellal	1143	135	28	Linalyl formate	1206	prog	2
Menthone	1143	prog	2	Menth-8-en-2-ol <i>p</i> -	1208	160	33
Isopulegol	1145	prog	2	Carveol <i>trans</i> -	1209	prog	2
Citronellal	1146	160	33	Ascaridole epoxide	1215	110	23
Menthofuran	1147	130	20	Carveol <i>cis</i> -	1215	120	23
Isoborneol	1149	110	23	Citronellol (β -)	1215	prog	2
Isomenthone	1151	prog	39	Citronellol (β -)	1216	100	23
Pinocamphone	1152	110	23	Nerol	1218	prog	2
Lavandulol	1153	110	23	Nerol	1218	120	23
Borneol	1154	110	23	Fenchyl acetate	1220	prog	2
Lavandulol	1154	prog	2	Neral	1220	120	23
Menthofuran	1155	prog	39	Carveol <i>cis</i> -	1222	prog	2
Isomenthone	1156	130	20	Carvone	1223	125	23
Menth-8-en-1-ol <i>p</i> -	1156	160	33	Citronellol (β -)	1224	175	27
Menthan-1-ol <i>p</i> -	1156	160	33	Cadinene γ -	1227	prog	2
Isoborneol	1157	prog	2	Neral	1227	prog	2
Isopinocampheol	1157	110	23	Carvone	1228	prog	2
Menthone	1158	130	20	Isobornyl formate	1228	prog	2
Neomenthol	1159	prog	39	Pulegone	1230	prog	2
Neomenthol	1159	120	23	Piperitone	1231	125	23
Terpinene-4-ol	1160	175	27	Geraniol	1234	175	27
Terpineol δ -	1160	prog	2	Geraniol	1237	120	23
Menthan-8-ol <i>p</i> -	1162	160	33	Bornyl formate	1239	prog	2
Borneol	1164	prog	2	Linalyl acetate	1240	130	23
Verbenol <i>cis</i> -	1165	100	23	Geraniol	1243	prog	2
Cymene-8-ol <i>p</i> -	1167	115	23	Myrtanol <i>cis</i> -	1245	120	23
Safranal	1167	120	23	Linalyl acetate	1246	prog	2
Menthol	1168	130	20	Myrcenyl acetate	1247	prog	2
Isopinocampheol	1170	115	23	Piperitone	1247	prog	2
Terpinene-4-ol	1170	115	23	Shisool	1248	130	23
Menthol	1171	prog	2	Geraniol	1252	prog	2
Menthol	1171	prog	39	Perilla aldehyde	1253	120	23
Menthol	1173	175	27	Isopulegyl acetate	1258	prog	2
Myrtenal	1173	120	23	Geraniol	1260	120	23
Isomenthol	1174	100	23	Carvone oxide	1261	prog	2
Terpinene-4-ol	1175	prog	2	Citronellyl formate	1261	prog	2

TABLE 3 (continued)

Compound	I	T	Ref.	Compound	I	T	Ref.
Sabinyl acetate (<i>cis</i> -)	1262	prog	2	Cubebene β -	1400	150	20
Neryl formate	1267	prog	2	Cyclosativene	1400	170	3
Cymene-7-ol <i>p</i> -	1270	115	23	Elemene β -	1400	150	20
Thymol	1270	130	23	Gurjenene α -	1400	prog	22
Lavandulyl acetate	1274	prog	2	Iridomyrmecin	1400	135	23
Cymenene	1277	100	23	Elemene	1403	150	25
Ascaridole	1278	110	23	Longifolene	1404	130	3
Bornyl acetate	1278	135	28	Eudesmane 4 β H,5 α H-	1405	150	25
Isobornyl acetate	1279	prog	2	Bourbonene β -	1406	prog	2
Menthyl acetate	1281	prog	39	Cedrene α -	1411	prog	22
Myrtenol	1281	120	23	Santalene α -	1412	prog	22
Perillyl alcohol	1281	115	23	Gurjunene α -	1413	130	3
Dihydroterpinyl acetate	1282	prog	2	Cedrene α -	1414	130	3
Geranyl formate	1282	prog	2	Caryophyllene	1417	130	3
Terpinene-4-yl acetate	1282	120	23	Linalyl butyrate	1420	prog	2
Isomenthyl acetate	1283	130	20	Cedrene β -	1421	130	3
Carvacrol	1297	prog	2	Sativene	1421	170	3
Neoisomenthyl acetate	1297	130	20	Isoiridomyrmecin	1422	150	23
Citronellic acid	1300	125	23	Citronellyl ethyl acetal	1423	prog	2
Piperitenone	1315	125	23	Caryophyllane <i>a</i>	1425	150	25
Nerolic acid	1316	140	23	Elemene γ -	1425	prog	22
Dihydrocarvyl acetate	1319	prog	2	Thujopsene	1425	prog	22
Linalyl propionate	1324	prog	2	Farnesene <i>trans</i> - β -	1426	150	20
Myrcenyl propionate	1327	prog	2	Terpinyl propionate	1426	prog	2
Terpinyl acetate	1333	prog	2	Bergamotene <i>trans</i> - β -	1427	prog	22
Terpinyl formate	1333	prog	2	Citronellyl propionate	1427	prog	2
Citronellyl acetate	1335	prog	2	Pinonic acid <i>cis</i> -	1427	165	23
Citronellyl acetate	1335	135	28	Sibirene	1427	170	4
Citronellyl acetate	1335	140	23	Caryophyllene	1428	prog	2
Terpinyl acetate	1337	140	23	Thujopsene	1430	130	3
Neryl acetate	1343	135	23	Caryophyllane <i>b</i>	1432	150	25
Neryl acetate	1345	prog	2	Longipinene β -	1432	170	4
Geranic acid	1347	140	23	Gurjunene β - (calarene)	1435	130	3
Longipinene α -	1359	130	3	Bergamotene α -	1436	prog	24
Cubebene α -	1362	150	20	Caryophyllene	1436	150	20
Geranyl acetate	1363	135	28	Cedrene α -	1436	prog	2
Linalyl isobutyrate	1366	prog	2	Neryl propionate	1436	prog	2
Ylangene α -	1368	prog	22	Humulene	1437	prog	22
Copaene α -	1369	prog	22	Santalene <i>epi</i> - β -	1437	prog	22
Longicyclene	1371	130	3	Barbatene α -	1440	170	4
Isobornyl propionate	1376	prog	2	Carvyl propionate	1440	prog	2
Copaene α -	1378	130	3	Isosativene	1441	170	3
Patchoulene β -	1378	prog	22	Himachalene α -	1442	prog	22
Cubebene α -	1381	prog	22	Himachalene α -	1444	130	3
Cubebene β -	1381	prog	22	Copaene β -	1445	prog	2
Elemene δ -	1381	prog	22	Murolene ϵ -	1445	130	3
Bourbonene β -	1386	130	3	Cedrene β -	1446	prog	2
Anastreptene	1391	170	4	Humulene	1447	130	3
Ylangene α -	1396	170	3	Bisabolene <i>a</i>	1448	150	25
Copaene α -	1398	prog	2	Dihydrocurcumene	1448	150	25
Cyperene	1398	130	3	Farnesene <i>trans</i> - β -	1448	prog	36
Cyperene	1398	prog	22	Farnesene <i>trans</i> - β -	1449	170	4
Longifolene	1398	prog	22	Caryophyllane <i>c</i>	1450	150	25

(Continued on p. 22)

TABLE 3 (continued)

Compound	<i>I</i>	<i>T</i>	Ref.	Compound	<i>I</i>	<i>T</i>	Ref.
Caryophyllane <i>d</i>	1450	150	25	Linalyl pentanoate	1500	prog	2
Linalyl 2-methylbutyrate	1450	prog	2	Murolene α -	1500	prog	2
Santalene β -	1450	prog	22	Farnesene <i>trans,trans</i> - α -	1501	150	20
Amorphene α -	1451	prog	22	Bulnesene α -	1502	prog	22
Sinuene	1451	170	4	Calamenene	1502	prog	22
Thujopsene	1451	prog	2	Guaiene δ -	1502	prog	22
Guaiene α -	1454	prog	22	Cadinene δ -	1504	130	3
Valencene	1457	130	3	Bisabolene	1505	170	3
Bisabolane <i>b</i>	1458	150	25	Cuparene	1506	150	20
Cedrane 8β H-	1458	150	25	Selinene β -	1506	170	3
Longifolane 7α H-	1460	150	25	Cadinene γ -	1507	130	3
Linalyl isopentanoate	1461	prog	2	Tetrahydrothujopsane <i>b</i>	1508	150	25
Cedrane 8α H-	1465	150	25	Curcumene β -	1510	170	3
Humulene	1465	prog	2	Citronellyl butyrate	1511	prog	2
Scapanene	1465	170	4	Bornyl isopentanoate	1512	prog	2
Helmiscapene β -	1466	170	4	Sesquiphellandrene β -	1512	prog	22
Helmiscapene α -	1467	170	4	Selinene α -	1513	170	3
Longifolane 7β H-	1467	150	25	Terpinyl butyrate	1514	prog	2
Terpinyl isobutyrate	1467	prog	2	Cuparene	1516	170	4
Germacrene <i>D</i>	1468	prog	22	Himachalene β -	1517	170	4
Citronellyl isobutyrate	1469	prog	2	Cadina-1,4-diene	1518	prog	22
Barbatene β -	1473	170	4	Calamenene	1518	prog	2
Bornyl butyrate	1473	prog	2	Pyroctivenc α -	1522	170	3
Neryl isobutyrate	1474	prog	2	Chamigrene α	1523	170	4
Alloaromadendrene	1475	150	20	Cadinene δ -	1524	prog	2
Curcumene α - (ar-)	1475	130	3	Calamenene	1524	170	4
Selina-4(14),7-diene	1476	170	3	Nerolidol <i>cis</i> -	1524	prog	2
Germacrane <i>b</i>	1477	150	25	Geranyl butyrate	1532	prog	2
Selinene β -	1477	prog	22	Elemol	1540	prog	24
Alloaromadendrene	1478	prog	2	Nerolidol <i>cis</i> -	1540	175	27
Zingiberene	1480	170	3	Himachalene ar-	1542	170	4
Germacrane <i>c</i>	1482	150	25	Vetivenene β -	1544	prog	22
Guaiene β -	1482	prog	22	Chamigrene β -	1550	170	4
Valencene	1482	prog	22	Nerolidol <i>trans</i> -	1553	prog	2
Zizaene	1482	170	3	Undulatene	1557	170	4
Aequilobene	1483	170	4	Caryophyllene alcohol	1559	prog	24
Selinene α -	1484	prog	22	Vetivenene β -	1563	170	3
Viridiflorene	1484	prog	22	Terpinyl isopentanoate	1565	prog	2
Murolene γ -	1486	150	20	Neryl isopentanoate	1574	prog	2
Zingiberene	1486	prog	22	Caryophyllene oxide	1576	prog	24
Valencene	1487	prog	2	Cedrene epoxide α -	1585	prog	2
Germacrene <i>D</i>	1488	150	20	Viridiflorol	1588	150	20
Germacrane <i>d</i>	1489	150	25	Geranyl isopentanoate	1593	prog	2
Bicyclogermacrene	1490	prog	22	Citronellyl pentanoate	1608	prog	2
Amorphene α -	1492	170	3	Cedrol	1609	prog	2
Geranyl isobutyrate	1493	prog	2	Terpinyl pentanoate	1614	prog	2
Valencane (nootkatane)	1493	150	25	Cedrol	1616	175	27
Farnesene <i>trans,trans</i> - α -	1494	prog	22	Geranyl pentanoate	1632	prog	2
Himachalene β -	1494	prog	22	Cadalene	1646	prog	22
Murolene α -	1495	130	3	Santalol α -	1660	175	27
Bisabolene <i>cis</i> - α -	1496	prog	22	Bisabolol β -	1666	175	27
Bisabolene β -	1496	130	3	Farnesol <i>trans,trans</i> -	1745	175	27
Tetrahydrothujopsane <i>a</i>	1496	150	25	Bornyl benzoate	1749	prog	2
Eudesmane 4α H, 5α H-	1497	150	25	Farnesyl acetate	1787	200	28
Himachalene γ -	1499	170	4	Nootkatone	1802	prog	2

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4. SUMMARY

Gas chromatographic retention indices (Kováts' indices) are a valuable aid in the identification of monoterpenes and sesquiterpenes in essential oils and related natural and synthetic products. Some 900 Kováts' indices of 400 individual compounds on methyl silicone (dimethyl polysiloxane) and/or Carbowax 20M liquid phases are summarized from the general literature.

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