

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitro benzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
1	Benzene	80.1	5.5	1.5011	0.87901	84		1,3-di 89, 1,3,5 tri 122		127	120	Sulfonamide, 156
2	Toluene	110.6	-95	1.49613	0.86694	88.2, pa yel		2,4-di 70	2,4-di 221	137	102.3	Oxid → benzoic acid, 121, Sulfonamide, 137
3	Ethylbenzene	136.2	-93.9	1.49594	0.86690	96.6, pa yel		2,4,6-tri 37	2,4-di 223	122, 128	97	Oxid → benzoic acid, 121, Sulfonamide, 109
4	1,4-Xylene	138.3	13.26	1.49581	0.86105	90		2,3,5-tri 139		132, 148	134-5	Oxid → terephthalic acid, > 300, subl, Sulfonamide, 147
5	1,3-Xylene	139.1	-47.89	1.49722	0.86417	91		2,4,6-tri 183		126, 142		Oxid → isophthalic acid, 348, h w, Sulfonamide, 137
6	1,2-Xylene	144.4	-25.18	1.50545	0.88020	88		4,5-di 118		178		Oxid → phthalic acid, 206.8, Sulfonamide, 144
7	Isopropylbenzene (Cumene)	152.4	-96.04	1.49146	0.86179			2,4,6-tri 109	4-mono 106, 2,4-di 216	133		Oxid → benzoic acid, 121 Sulfonamide, 106
8	n-Propylbenzene	159.2	-99.59	1.49202	0.86204	103		2,4-di b p 150 ¹	4-mono 96, 2,4-di 208	125		Oxid → benzoic
9	1-Ethyl-3-methylbenzene (m-Ethyltoluene)	161.3	-96.55	1.49661	0.86455							Oxid → isophthalic acid, 348, h w
10	1-Ethyl-4-methylbenzene (p-Ethyltoluene)	162.1	-62.35	1.49500	0.86118							Oxid → terephthalic acid, > 300, subl
11	1,3,5-Trimethylbenzene (Mesitylene)	164.7	-44.72	1.49937	0.86518	97		2,4-di 86, 2,4,6- tri 235		212		Oxid → trimesic acid, 380, Sulfonamide, 141
12	1-Ethyl-2-methylbenzene (o-Ethyltoluene)	165.2	-80.83	1.50456	0.88069							Oxid → phthalic acid, 206.8
13	tert-Butylbenzene	169.1	-58.34	1.49266	0.86650			2,4-di 62, 2,4,6- tri 124	4-mono 170, 2,4-di 210		130.1	Oxid → benzoic acid, 121
14	1,2,4-Trimethylbenzene (Pseudocumene)	169.4	-43.91	1.50484	0.87582	97		3,5,6-tri 185				Oxid → trimellitic acid, 225.35 d
15	Isobutylbenzene	172.8	-51.53	1.48646	0.85321				4-mono 127.0 7.5		99.100	Oxid → benzoic acid, 121
16	sec-Butylbenzene	173.3	-75.57	1.49020	0.86207			2,4-di b p 161.2 ⁵	4-mono 126, 2,6-di 192		88-9	Oxid → benzoic
17	3-Isopropyl-1-methylbenzene (3-Isopropyltoluene, m-Cymene)	175.1	-63.75	1.4930	0.8610							

*Derivative data given in order m p, crystal color, solvent from which crystallized

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18	1,2,3-Trimethylbenzene (Hemimellitene)	176.08	-25.41	1.51393	0.89438	90.5						Oxid → hemimellitonic acid, 190.7 d
19	<i>trans</i> -Propenylbenzene	176.575	-27.1 to -25.9	1.5463 ²⁵	0.902							
20	Indane	177	-51.4	1.5381	0.9645							
21	4-Isopropyl-1-methylbenzene (4-Isopropyltoluene, 4-Cymene)	177.1	-67.94	1.4909	0.8537			2,6-di 54, 2,3,6 tri 118		123.4		Sulfonamide, 115
22	2-Isopropyl-1-methylbenzene (2-Isopropyltoluene, 2-Cymene)	178.35	-71.71	1.5006	0.8766							Br ₂ → Tetrabromo, 59.5, 60.5
23	1,3-Diethylbenzene	181.1		1.49552	0.86394			2,4,6-tri 62		114		
24	1-Methyl-3-propylbenzene (<i>m</i> -Propyltoluene)	181.8		1.4936	0.8610							
25	Indene	182.4	-2	1.5764	0.9915	98, yel						Acid → polymer
26	<i>n</i> -Butylbenzene	183.27	-88.15	1.48979	0.86013				4-mono 105 2,4-di 214	97	72.3	
27	1-Methyl-4-propylbenzene (<i>p</i> -Propyltoluene)	183.3		1.4919	0.8584							
28	1,2-Diethylbenzene	183.4		1.50346	0.87996							
29	1,4-Diethylbenzene	183.8		1.49483	0.86196							
30	1,3-Dimethyl-5-ethylbenzene	183.8	-84.4	1.4981	0.8648			2,4,6-tri 117.0 7.6				Br ₂ → Tribromo, 89
31	1-Methyl-2-propylbenzene (<i>o</i> -Propyltoluene)	184.8	-60.2	1.4998	0.8744							
32	2,2-Dimethyl-1-phenylpropane (Neopentylbenzene)	186		1.4880	0.858							
33	1,4-Dimethyl-2-ethylbenzene	186.9		1.5043	0.8772			3,5,6-tri 127.8, al	4-mono 142, 2,4-di 181			Sulfonamide, 107-8
34	2-Methylindane	187.0		1.5070	0.9034							
35	3-Methyl-2-phenylbutane	188		1.486	0.8701				4-mono 147.8, 2,4-di 193			4-Benzamido deriv., 141.2
36	1-Methylindane	188.90		1.5274	0.939							Heat with Pt at 310-350 → Naphthalene, 80.3
37	1,3-Dimethyl-4-ethylbenzene	188.4	-63.0	1.5038	0.8763			2,5,6-tri 127.5 9.0				Br ₂ → 2,5,6-Tribromo, 94.5, 81.2
38	3-<i>tert</i>-Butyl-1-methylbenzene (3- <i>tert</i> -Butyltoluene)	189.3	-41.39	1.4944	0.8657							
39	1,2-Dimethyl-4-ethylbenzene	189.55	-67.1	1.5031	0.8745							Oxid → trimellitonic acid, 225.35 d
40	1,3-Dimethyl-2-ethylbenzene	190		1.5107	0.8904							Oxid → hemimellitonic acid, 190-7 d

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41	3-Phenylpentane	191		1.4877	0.8649				4-mono 145.6 2,4-di 199.200			4-Benzamido deriv., 154
42	1-Ethyl-3-isopropylbenzene	192		1.4955	0.859							
43	2-Methyl-2-phenylbutane	192.38		1.4934	0.8737				4-mono 142 2,4-di 181			4-Benzamido deriv. 112.3
44	4-tert-Butyl-1-methylbenzene (4-tert-Butyltoluene)	192.8	-52.49	1.4918	0.8612			2,6-di 96				
45	1-Ethyl-2-isopropylbenzene	193		1.5080	0.888							
46	2-Phenylpentane	193		1.4876	0.8576				4-mono 107 2,4-di 181.2			4-Benzamido 127.8
47	1,2-Dimethyl-3-ethylbenzene	193.9	-49.5	1.5117	0.8921							Oxid → hemimellitic acid 190.7 d
48	3-sec-Butyl-1-methylbenzene (3-sec-Butyltoluene)	194		1.490	0.858							
49	3-Isobutyl-1-methylbenzene (3-Isobutyltoluene)	194		1.4888	0.8536							
50	d-2-Methyl-1-phenylbutane	194		1.4880	0.8617							
51	1,3-Dimethyl-5-isopropylbenzene	194.5 191		1.4955	0.8591							Oxid → trimesic acid, 380
52	2-Phenyl-cis-2-butene	194.5		1.5402 ²³	0.9191 ²						81.2	
53	4-Isobutyl-1-methylbenzene (p-Isobutyltoluene)	196		1.4874	0.8517							
54	2-sec-Butyl-1-methylbenzene (2-sec-Butyltoluene)	196		1.497	0.873							
55	2-Isobutyl-1-methylbenzene (o-Isobutyltoluene)	196		1.4935	0.8649							
56	1,4-Dimethyl-2-isopropylbenzene	196.2		1.5010	0.8738							
57	1-Ethyl-4-isopropylbenzene	196.6		1.4923	0.8585							
58	d,l-2-Methyl-1-phenylbutane	197		1.486	0.859				4-mono 115.6 2,4-di 193.4			4-Benzamido 126
59	1,2,3,5-Tetramethylbenzene (Isodurene)	197.9		1.5125	0.8899			4,6-di 181.157		213		
60	3-Methyl-1-phenylbutane (Isopentylbenzene)	198.9 196		1.4847	0.8558				4-mono 114 2,4-di 215.6			
61	1,3-Dimethyl-2-isopropylbenzene	199		1.509	0.890							
62	1,3-Dimethyl-4-isopropylbenzene	199.1 195		1.5018	0.869							
63	3-Methylindene	199.2 200 198.5		1.55907 ²⁷	0.9640	76.8, or - yel., al						
64	4-sec-Butyl-1-methylbenzene (p-sec-Butyltoluene)	200		1.4932	0.8650							

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65	2- <i>tert</i> -Butyl-1-methylbenzene (2- <i>tert</i> -Butyltoluene)	200.5		1.5076	0.8897							
66	3,5-Diethyl-1-methylbenzene (3,5-Diethyltoluene)	200.7	-74.12	1.4969	0.8630			2,4,6- <i>tri</i> 106.65				
67	2-Butyl-1-methylbenzene (2-Butyltoluene)	201.208		1.4958	0.8721							
68	1-Ethyl-3-propylbenzene	201		1.4930	0.8607							
69	1,2-Dimethyl-4-isopropylbenzene	201.8		1.4993	0.8699							
71	1,2-Dimethyl-3-isopropylbenzene	202.6		1.508	0.888							
72	1-Ethyl-2-propylbenzene	203		1.4992	0.8744							
73	1,3-Di-isopropylbenzene	203.2	-63.1	1.4883	0.85593			4,6- <i>di</i> 76.972, 2-ProH				
74	1,2-Diethyl-4-methylbenzene	203.6		1.5039	0.8762							
75	1,2-Di-isopropylbenzene	203.8		1.4960	0.8771							
76	1,4-Dimethyl-2-propylbenzene	204.3		1.4999	0.8717							
77	1,2,3,4-Tetramethylbenzene (Prehnitene)	205.0	-6.3	1.5201	0.9053	92-5		5,6- <i>di</i> 176				
78	1-Ethyl-4-propylbenzene	205		1.4921	0.8594							
79	3-Butyl-1-methylbenzene (<i>m</i> -Butyltoluene)	205		1.491	0.859							
80	2,4-Diethyl-1-methylbenzene (2,4-Diethyltoluene)	205		1.5027	0.8748							
81	<i>n</i> -Pentylbenzene	205.4	-75	1.4878	0.8585				4- <i>mono</i> 101-2, 2,4- <i>di</i> 202			4-Benzamido, 128.9
82	3-Methyl-3-phenylpentane	206		1.4958	0.8755							
83	1,3-Dimethyl-5- <i>tert</i> -butylbenzene	206-6.5	-21.5	1.4958	0.8645			2,4,6- <i>tri</i> 107 (one form), 114 (another form)				
84	1,3-Dimethyl-4-propylbenzene	206.6		1.4998	0.8723							
85	1,2-Diethyl-3-methylbenzene	206.6		1.5105	0.8910							
86	4-Butyl-1-methylbenzene (4-Butyltoluene)	207		1.490	0.857							
87	2,5-Diethyl-1-methylbenzene (2,5-Diethyltoluene)	207.1		1.5034	0.8758							
88	1,2,3,4-Tetrahydronaphthalene (Tetralin)	207.6	-35.79	1.54135	0.9702			5,7- <i>di</i> 95		153.5		Cl ₂ * 5,6,7,8-Tetrachloro, 172
89	1,3-Diethyl-2-propylbenzene	207.6		1.5063	0.8856							
90	2,6-Diethyl-1-methylbenzene (2,6-Diethyltoluene)	208.8		1.5106	0.8907							
91	1,2-Dimethyl-4-propylbenzene	208.9		1.5000	0.8715							
92	1,3-Dimethyl-5-propylbenzene	209		1.4933	0.8610							
93	2-Methyl-3-phenylpentane	209		1.4912	0.8678							
94	4- <i>tert</i> -Butyl-1,3-dimethylbenzene	210-4		1.5030 ³⁷	0.9372 ³⁸			2,5,6- <i>tri</i> 112, al				
95	1,4-Di-isopropylbenzene	210.4	-17.1	1.48983	0.85676							
96	1,2-Dimethyl-3-propylbenzene	210.7		1.5075	0.8864							

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97	1- <i>tert</i> -Butyl-4-ethylbenzene	211		1.4950	0.8635			2,6- <i>di</i> 94 5, al				
98	<i>d,l</i> -3-Phenylhexane	211 208.3		1.4867	0.8596				2,4- <i>di</i> 207 8			
99	2-Ethyl-1,3,5-trimethylbenzene	212.4	-12.2	1.5074	0.883			4,6- <i>di</i> 111, al				
100	3-Ethyl-4-isopropyl-1-methylbenzene	213		1.5006	0.8722							
101	5-Ethyl-1,2,4-trimethylbenzene	213	-13.5	1.5075	0.833			3,6- <i>di</i> 87 8, al				3,6-Dibromo, 60-1, acet
102	6-Ethyl-1,2,4-trimethylbenzene	213		1.5118	0.8897							
103	2-Phenylhexane	214		1.4882	0.8600				2,4- <i>di</i> 178			
104	2-Methyl-1-phenylpentane	215		1.4847	0.8624							
105	4-Isopropyl-1-propylbenzene	215		1.4972	0.8614							
106	1,3-Dipropylbenzene	215.8		1.5155 ¹¹	0.9137 ¹							
107	5-Ethyl-1,2,3-trimethylbenzene	215.8		1.5101	0.8863							
108	3-Ethyl-1,2,4-trimethylbenzene	216.6		1.5133	0.895			5,6- <i>di</i> 79 80, al				
109	1,2,4-Triethylbenzene	217.7		1.4982	0.8791							
110	1,3,5-Triethylbenzene	218 211.2		1.4965	0.8568 ²⁵			2,4,6- <i>tri</i> 112 4 2 6		129		2,4,6-Tribromo, 105
111	2-Methyl-1,2,3,4-tetrahydronaphthalene (2-Methyltetralin)	218		1.5311	0.952							
112	1-Methyl-1,2,3,4-tetrahydronaphthalene (1-Methyltetralin)	219		1.5357	0.9580							
113	4-Ethyl-1,2,3-trimethylbenzene	220.4		1.5180	0.9019							
114	1,4-Dipropylbenzene	221		1.4914	0.8564							
115	3-Methyl-1-phenylpentane	221		1.4876	0.8605							
116	2-Propyl-1,3,5-trimethylbenzene	221		1.5033	0.8782							
117	1,1-Dimethyl-1,2,3,4-tetrahydronaphthalene (1,1-Dimethyltetralin)	221		1.5292	0.950			<i>Ar-x, x-di</i> 64 5				
118	3- <i>tert</i> -Butyl-1-isopropylbenzene	222		1.4832	0.8512							
119	1-Methyl-3-pentylbenzene (3-Pentyltoluene)	223		1.4911	0.8593							
120	4- <i>tert</i> -Butyl-1-isopropylbenzene	224		1.4872	0.8665							
121	2-Methyl-2-phenylhexane	225		1.4943	0.8737							
122	2,4-Di-isopropyl-1-methylbenzene (2,4-Di-isopropyltoluene)	225		1.4990	0.8664							
123	3-Methyl-3-phenylhexane	226		1.4980	0.8776							
124	<i>n</i> -Hexylbenzene	226.1	-61.2	1.4864	0.8575				2,4- <i>di</i> 205 6			
125	3-Phenylheptane	227		1.4862	0.8607							
126	2,6-Di-isopropyl-1-methylbenzene (2,6-Di-isopropyltoluene)	228		1.5032	0.8768							

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127	5-Propyl-1,2,4-trimethylbenzene	228		1.5095	0.887							
128	6-Methyl-1,2,3,4-tetrahydronaphthalene (6-Methyltetralin)	229		1.5357	0.9537							
129	2,2-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,2-Dimethyltetralin)	230		1.5200	0.935							
130	2-Phenylheptane	231		1.4863	0.8610							
131	5-Methyl-1,2,3,4-tetrahydronaphthalene (5-Methyltetralin)	234.4		1.54395	0.9720							
132	2-Ethyl-1,2,3,4-tetrahydronaphthalene (2-Ethyltetralin)	235		1.523	0.938							
133	Cyclohexylbenzene	235-6	7-8	1.5329	0.9502							
134	1-Ethyl-1,2,3,4-tetrahydronaphthalene (1-Ethyltetralin)	236		1.5321	0.9535							
135	2,5-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,5-Dimethyltetralin)	236		1.526	0.946							
136	2,8-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,8-Dimethyltetralin)	236		1.526	0.941							
137	2,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,7-Dimethyltetralin)	237.8		1.526	0.941							
138	2,6-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,6-Dimethyltetralin)	238		1.526	0.941							Oxid → trimellitic acid 225-35 d
139	1,4-Di-sec-butylbenzene	239		1.4892	0.8590							
140	1,5-Dimethyl-1,2,3,4-tetrahydronaphthalene (1,5-Dimethyltetralin)	239		1.526	0.9410							
141	3-Ethyl-3-phenylhexane	239		1.4943	0.875							
142	6-Ethyl-1,2,3,4-tetrahydronaphthalene (6-Ethyltetralin)	241		1.5331	0.9568							
143	2-Methyl-1-phenyl-1-butene	241.2		1.528 ¹⁸								Nitrosit, 129-30
144	5-Ethyl-1,2,3,4-tetrahydronaphthalene (5-Ethyltetralin)	242		1.540	0.973							
145	n-Heptylbenzene	244		1.4875	0.8595							
146	1-Methylnaphthalene	244.8	-30.57	1.6174	1.02025	142, or red, al	153.5, 4.5, al	4-mono 71, 4,5-di 143		68		Styphnate, 135, al
147	5,6-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,6-Dimethyltetralin)	252		1.552	0.975							Oxid → melo phanic acid, 238-42
148	6,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (6,7-Dimethyltetralin)	252	10	1.5360	0.954			5,8 di 203				
149	5,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,7-Dimethyltetralin)	253.1	-6	1.5405	0.9583							Heating with S at 320° → 1,3-Dimethylnaphthalene, b p 263

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150	5,8-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,8-Dimethyltetralin)	254		1.547	0.967							Heating with S at 230° → 1,4-Dimethylnaphthalene, b.p. 268
151	2-Ethynaphthalene	257.9	-7.5	1.59761	0.9922	77.0	88.9, 2-					Styphnate, 88.90
152	1-Ethynaphthalene	258.67	-13.88	1.6062	1.00816	75.0, al	2-PrOH					Styphnate, 111.3, al
153	1,7-Dimethylnaphthalene	263	-13	1.60831	1.0115	121	137					Styphnate, 143
154	1,6-Dimethylnaphthalene	263	-14	1.6072	1.003	114.5	139					Styphnate, 122
155	1,3-Dimethylnaphthalene	263	-4.0	1.6078	1.0063	or, al	118					Styphnate, 117.8, w-me al, 2,4,7-Trinitrofluorenone deriv., 142.5, or
156	n-Octylbenzene (1-Phenyl-octane)	264.5	-36	1.4845	0.8562			2,4-di 2				
157	1-Allylnaphthalene	265.7		1.6140	1.0228	69						
158	1-Isopropylnaphthalene	267.9	-16	1.5950	0.99565	85.6						Dimer, 198.5, 9.5
159	1,4-Dimethylnaphthalene	268, 262-4	7.66	1.6127	1.0166	144, or, me al	165.6					Tetrabromo, 141.2
160	1,1-Diphenylethane	268-70		1.5761	1.0033							Styphnate, 126-7 or me al
161	2-Isopropylnaphthalene	a) 268.2		1.5772	0.9795	93.5, 91.3						Oxid → benzophenone, 49
162	2-Propylnaphthalene	b) 262 273.5, 277.9		1.5861 1.5872	0.9770	93.4, or al	99					
163	1-Propylnaphthalene	277, 272.5	-10	1.5952	0.9918	91.2	86.7, al					
164	1,3,7-Trimethylnaphthalene	280	13.5	1.5759	1.007	144, or, al						Styphnate, 151.5 or me al
165	1-Isopropyl-7-methylnaphthalene (Apocadale)	282		1.5884	0.9833	102, or, al						Styphnate, 166 (163-4), yel, al
166	n-Nonylbenzene (1-Phenyl-nonane)	282	-24	1.4838	0.8558							4-Sulfonamide, 94.5-5.0
167	2-Butylnaphthalene	283-5, 292	-8.1	1.57774	0.9673	71.3, or-yel, al						Maleic anhydride → 3-(4-Nonylbenzoyl) acrylic acid, 82.3
168	2-tert-Butylnaphthalene	285-90	-4	1.5768	0.9687	102.3						
169	1-tert-Butylnaphthalene	287.9		1.5726	0.9629	96, yel						
170	1-Butylnaphthalene	289.34	-19.76	1.5819	0.97673	104.5, or-yel						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfenyl chloride derivative	Miscellaneous
171	4,5-Benzindane (1,2-Cyclopentanonaphthalene)	294.5		1.6290	1.066	110	119.20					2,4,7-Trinitrofluorenone deriv., 133
172	<i>n</i> -Decylbenzene (1-Phenyldecane)	300	-14.38	1.48319	0.85553							
173	1-Pentyl-naphthalene	307	-22	1.5725	0.9656		75, yel					
174	2-Pentyl-naphthalene	310	-21	1.5694	0.9561		74, yel					
175	<i>n</i> -Undecylbenzene (<i>n</i> -Hendecylbenzene, 1-Phenylundecane)	316	-5	1.4828	0.8553							4-Sulfonamide, 95.7.6.2
176	1-Hexyl-naphthalene	322	-17.7	1.5647	0.9566		69.74					
177	2-Hexyl-naphthalene	324	-5.6	1.620	0.9479		67-8, yel					
178	<i>n</i> -Dodecylbenzene (1-Phenyl-dodecane)	331	3	1.4824	0.8551							4-Sulfonamide, 97.5
179	1-Heptyl-naphthalene	340		1.5582	0.9491							
180	2-Heptyl-naphthalene	341	1	1.5556	0.9410							
181	Tridecylbenzene (1-Phenyl-tridecane)	346	10	1.4821	0.8550							
182	1-Octyl-naphthalene	356	-2.0	1.5532	0.9427							
183	2-Octyl-naphthalene	357	2 forms stable -0.5, meta-stable 13	1.5501	0.9356							
184	1-Nonyl-naphthalene	372		1.5477	0.9371							
185	2-Nonyl-naphthalene	372	12	1.5454	0.9298							
186	1-Decyl-naphthalene	387		1.5435	0.9322							

*Derivative data given in order m p, crystal color, solvent from which crystallized