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Biphenyl derivatives

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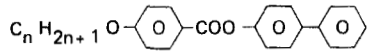
BIPHENYL DERIVATIVES

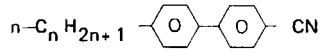


n	K		S (1)	N		I	Ref.
1	•	155 *8.9*	–	•	[148]	•	215
	•	156.5 *8.50*	–	•	[145.3] *0.137*	•	218
2	•	160 *8.1*	–	•	[157]	•	215
	•	160 *7.56*	–	•	[157.5] *0.160*	•	216
3	•	145	–	•	[139]	•	215
	•	146 *7.66*	–	•	[136.2] *0.137*	•	216
4	•	153 *10.6*	–	•	[143]	•	215
	•	156.5 *10.05*	–	•	[142.4] *0.160*	•	216
5	•	153.5 *10.6*	–	•	[133,5]	•	215
	•	154.5 *10.17*	–	•	[132.3] *0.137*	•	216
6	•	132.5 *9.4*	–	•	136.5	•	215
	•	132.5 *9.24*	–	•	135.3 *0.171*	•	216
7	•	126 *9.5*	–	•	129.5	•	215
	•	126 *9.35*	–	•	130 *0.130*	•	216

n	K		S (1)		N		I	Ref.
8	•	119 *9.0*	•	[97.5]	•	130.5	•	215
	•	120 *8.81*	•	[98]	•	130.8 *0.204*	•	216
9	•	117.1 *12.52*	•	[101] *0.223*	•	127.5 *0.178*	•	216
10	•	110 *12.7*	•	[106.5]	•	127	•	215
	•	110 *11.24*	•	[106] *0.213*	•	127 *0.190*	•	216
11	•	98.5 *12.72*	•	109.5 *0.336*	•	125 *0.221*	•	216
12	•	108.5 *14.4*	•	112	•	123	•	215
	•	109.7 *12.86*	•	113.2 *0.466*	•	124 *0.302*	•	216
14	•	114 *15.5*	•	116.5	•	121.5	•	215

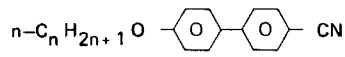
(1) $S = S_A$ from ref. 215, by miscibility studie.

• p–cyanobiphenyls



n	K_2	K_1		S_A	N		I	Ref.
1	–	•	109 *5.4*	–	•	[45]	•	212
2	–	•	75 *4.1*	–	•	[22]	•	212
3	–	•	66 *6.4*	–	•	[25.5]	•	212
4	–	•	46.4 *5.5*	–	•	[16.5]	•	78, 79
		•	48 *5.5*	–	•	[16.5]	•	212
5	–	•	22.5 *4.1*	–	•	35	•	78, 79
	–	•	24.5 *3.4*	–	•	35.5 *0.13*	•	15
	–	•	22.65 *3.754*	–	•	34.73 *0.09972*	•	211
	–	•	24 *4.1*	–	•	35.3	•	212
6	–	•	13.5 *5.8*	–	•	27	•	78, 79
	–	•	14.25 *4.184*	–	•	26.90 *0.0896*	•	211
	–	•	14.5 *5.8*	–	•	29	•	212
7	• [15]	•	28.5 *6.2*	–	•	42	•	78, 79
	–	•	28.5 *6.4*	–	•	42	•	15
	–	•	29.32 *6.427*	–	•	42.05 *0.2198*	•	211
	–	•	30 *6.2*	–	•	42.8	•	212

n	K_2		K_1		S_A		N		I	Ref.
8	–		•	21 *5.3*	•	32.5	•	40	•	78, 79
	–		•	21 *6.05*	•	32 *0.030*	•	40 *0.21*	•	165
	–		•	24 *6.05*	•	34 *0.031*	•	42.6 *0.23*	•	168
	–		•	21.5 *6.0*	•	33.5 *0.044*	•	40.5 *0.20*	•	15
	–		•	19.48 *6.302*	•	32.60 *0.0729*	•	39.54 *0.2944*	•	211
	–		•	21.5 *5.3*	•	33.5	•	40.5	•	212
9	•	[29.5]	•	40.5 *8.0*	•	44.5	•	47.5	•	78, 79
	–		•	40.91 *8.416*	•	46.77 *0.1520*	•	48.86 *0.4030*	•	211
	–		•	42 *8.0*	•	48	•	49.5	•	212
10	–		•	43.5 *7.9*	•	51	–		•	15
	–		•	41.26 *7.997*	•	49.32 *0.6709*	–		•	211
	–		•	44 *5.6*	•	50.5	–		•	212
11	–		•	50.92 *10.440*	•	55.35 *0.9071*	–		•	211
	–		•	53	•	57	•	57.5	•	212
12	–		•	48 *13.2*	•	58.5	–		•	212

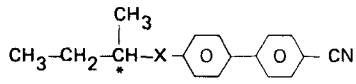


n	K_2		K_1		S_A	N		I	Ref.
1	–		•	105 *5.5*	–	•	[85.5]	•	212
2	•	[100]	•	102 *5.9*	–	•	[90.5]	•	212
3	–		•	71.5 *4.6*	–	•	[64]	•	78, 79
	–		•	74.5 *4.6*	–	•	[64]	•	212
	–		•	75 *4.8*	–	•	[64]	•	15
4	–		•	78 *5.6*	–	•	[75.5]	•	78, 79, 212
	–		•	78 *5.3*	–	•	[75]	•	15
5	•	[48]	•	53 *6.9*	–	•	67.5	•	78, 79
	•	48 *6.9*	•	[53]	–	•	68	•	212
	•	46.5 *6.9*	–	*6.9*	–	•	69	•	15
	•	46.02 *6.239*	–		–	•	66.61 *0.0717*	•	211
6 (1)	•	[44]	•	58 *7.1*	–	•	76.5	•	78
	•	[44]	•	57 *7.1*	-	•	75.5	•	212
	•	[45]	•	58 *7.1*	–	•	77.5	•	15
	•	[42.30] *6.976*	•	55.57 *7.258*	–	•	73.71 *0.192*	•	211

n	K_2		K_1		S_A		N		I	Ref.
7	•	[47.5]	•	53.5 *6.9*	–		•	75	•	78, 79
	•	[47.5]	•	54 *6.9*	–		•	74	•	212
	•	[46.5]	•	51 *6.0*	–		•	76	•	15
	•	48.22 *1.631*	•	51.98 *7.510*	–		•	72.48 *0.144*	•	211
8	–		•	54.5 *5.9*	•	67	•	80	•	78, 79, 212
	–		•	54.5 *6.8*	•	67 *0.03*	•	80 *0.51*	•	15
	–		•	53.00 *7.288*	•	65.58 *0.0187*	•	79.03 *0.235*	•	211
	–		•	54 *6.8*	•	67 *0.030*	•	80 *0.16*	•	165
9	–		•	64 *9.4*	•	77.5	•	80	•	212
	•	53.32 *12.28*	•	61.29 *9.101*	•	76.41 *0.170*	•	78.45 *0.292*	•	211
10	–		•	59.5	•	84	–		•	212
11	–		•	71.5	•	87.5	–		•	212
12	–		•	70 *12.2*	•	90	–		•	212

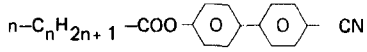
(1) From ref. 193, the temperatures and enthalpies of transition are given depending on the cooling rate :

Cooling rate oc/mn	K		N		I
0.625	•	45.6 *5.84*	•	78.4	•
10.0	•	58.4 *7.14*	•	78.4	•



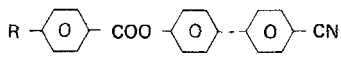
X	K		S_A (1)		N*		I	Ref.
$-CH_2-$	•	4 *1.5*	•	[– 54]	•	[– 30]	•	80
$-(CH_2)_2-$	•	9 *3.2*	•	[– 22]	•	[– 14]	•	80
$-(CH_2)_3-$	•	28 *6.0*	•	[– 20]	•	[– 10]	•	80
$-CH_2O-$	•	53.5 *3.5*	–		•	[9 ± 3] (2)	•	80
$-(CH_2)_3O-$	•	57.5 *7.2*	–		•	[35 ± 3] (2)	•	80

(1) Identification by miscibility with the S_A phase of the cholesterylmyristate (Ref. 80).

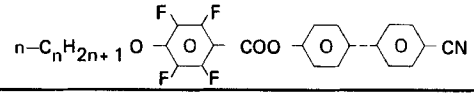


n	K_1		K_2		S_A		N		I	Ref.
5	•	52	•	56 *5.7*	–		•	72	•	81
6	–		•	59 *6.3*	–		•	71	•	81
7	–		•	78 *8.3*	–		•	[72]	•	81
8	–		•	42.5 *7.2*	•	58	•	76	•	81
	•	[26] *4.9*	–		•	58	•	76	•	81
9 (1)	–		•	53.5 *8.3*	•	78.5	•	80.5	•	81

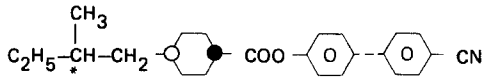
(1) Temperatures and enthalpies of transitions published in Ref. 81 were determined with an impure sample.



R	K	S		S_A		N	I	Ref.
n-C_6H_{13}	92 *5.2*	–		–			229	15
n-C_7H_{15}	95.5 *6.3*	–		–			230	81
n-C_8H_{17}	89 *5.9*	–		•	180	•	215	15
n-C_4H_9O	120 *7.6*	–		–			270	81
n-$C_8H_{17}O$	96.5 *8.7*	•	140	•	200	•	237	81
C_2H_5–CH(CH$_3$)–CH_2–	96 *5.2*	–		–			*210*	*80*
C_2H_5–CH(CH$_3$)–CH_2–	99.2 *4.5*	–		–			205	80

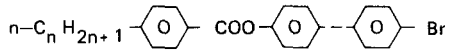


n	K		S_A		N		I	Ref.
8	•	66 *9.1*	•	120.5	•	172	•	213
9	•	58 *8.5*	•	139.5	•	160.5 *0.07*	•	213
10	•	72 *11.3*	•	150 *0.032*	•	161.5 *0.136*	•	213
11	•	62.5 *10.9*	•	153.5	•	157	•	213
12	•	63.5 *12.1*	•	155	•	156.5	•	213



K	77.5 *4.6*	S_A	138	N*	190.4	I	80

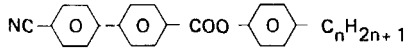
• **p–bromobiphenyls**



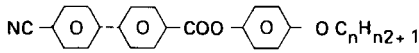
n	K_1		K_2		S		N		I	Ref.
3	–		•	169 *6.7*	•	[168.5]	•	220	•	15
4	–		•	163 *6.2*	•	183	•	210	•	15
5	–		•	150 *6.0*	•	189	•	212	•	15
6	•	134	•	137 *4.9*	•	193.5	•	203.5	•	15
7	•	109	•	133	•	194	•	200	•	15
8	–		•	133 *4.7*	•	196	–		•	15

BIPHENYLCARBOXYLATES

• p–cyanobiphenylcarboxylates



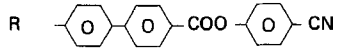
n	K		N		I	Ref.
1	•	189 *6.2*	•	272	•	82
2	•	147 *6.8*	•	257	•	82
3	•	125.8 *7.1*	•	245	•	82
4	•	108.5 *6.9*	•	245	•	82



n	K		S_A (1)		N		I	Ref.
1	•	158 *6.4*	–		•	315	•	82
2	•	161 *7.4*	–		•	308	•	82
3	•	146 *6.7*	–		•	281	•	82
4	•	114.5 *10.2*	–		•	272	•	82
5	•	110.5 *7.0*	•	[98.2]	•	258.2	•	82
6	•	119.8 *7.7*	–		•	253	•	82
7	•	121.5 *8.0*	•	[108.5]	•	241	•	82

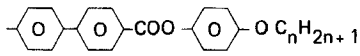
(1) S_A identified from texture.

• **p–cyanophenol biphenylcarboxylates**



R	K		N		I	Ref.
$n\text{–}C_6H_{13}O\text{–}$	•	121 *9.3*	•	233	•	82
$n\text{–}C_8H_{17}O\text{–}$	•	114 *11.4*	•	221	•	82
$C_2H_5\text{–}\overset{*}{C}H(CH_3)\text{–}CH_2\text{–}$	•	99.5 *7.1*	•	195.9	•	80

• **Para n alkoxyphenol biphenyl carboxylates**

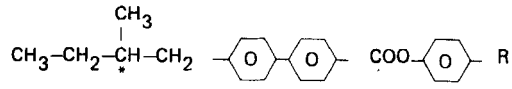


n	K		N		I	Ref.
1	•	161 *8.4*	•	[140.5]	•	214
2	•	149.5 *8.2*	•	149.5	•	214
3	•	142	•	[136–137]	•	214
4	•	140 *8.4*	•	141	•	214
5	•	132 *8.8*	•	132.5	•	214
6	•	125.5 *8.4*	•	134	•	214
7	•	111 *8.5*	•	129	•	214
8	•	114 *9.0*	•	128.5	•	214

n	K		N		I	Ref.
10	•	110.5 *9.3*	•	123.5	•	214
12	•	111.5 *12.4*	•	119	•	214
14	•	114 *9.9*	•	116	•	214
16 (1)	•	114.5 *15.8*	•	[113]	•	214

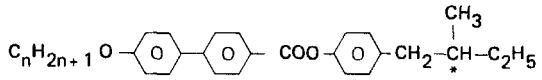
(1) Monotropic [S_A–N] transition : 104°. Value obtained by extrapolation on mixtures with 4 biphenylyl 4''–n tetradecycloxybenzoate (see Ref. 215).

• Para 2 methyl butyl biphenyl carboxylates



R	K		S_C* (1)		N* (1)		I	Ref.
$-C_2H_5$	•	81.3 *5.7*	–		•	141.1	•	80
$-n-C_3H_7$	•	81.5 *5.6*	–		•	151.3	•	80
$n-C_4H_9$	•	65.6 *4.4*	–		•	127.5	•	80
$-n-C_5H_{11}$	•	63.6 *4.1*	–		•	138.2	•	80
$-nC_6H_{13}$	•	60.3 *6.5*	–		•	132.3	•	80
$-OC_4H_9-n$	•	81.7 *5.0*	–		•	169.3	•	80
$-O-C_5H_{11}-n$	•	79.8 *6.9*	•	[70]	•	164.5	•	80
$-O-C_6H_{13}-n$ (2)	•	68.8 *6.1*	•	80.2	•	165.5	•	80

• Para alkoxy biphenyl carboxylates



R	K		S_C^*		N*		I	Ref.
$-O-C_7H_{15}-n$	•	80.4 *7.2*	•	87.3	•	157.7	•	80
$-O-C_8H_{17}-n$	•	76 *10.7*	•	88.4	•	155.4	•	80
$-O-C_9H_{19}-n$	•	79 *10.2*	•	89.5	•	147	•	80
$-O-C_{10}H_{21}-n$ (3)	•	76.8 *11.5*	•	93.4	•	148.5	•	80

(1) S_C^*, N* : identification by isomorphy.
Unpublished results.

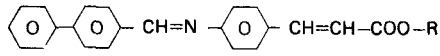
(2) S_{Cd}, N_d : by comparison with compound no of this table, with levogyre mesophases.
Unpublished results.

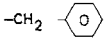
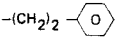
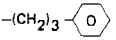
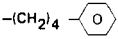
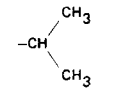
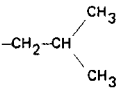
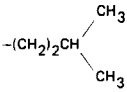
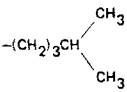
(3) S_{Cd}, N_d : by comparison with a levogyre mesorphic compound
Unpublished results.

n	K		S_H		S_G		S_F		S_C		S_A		N		I	Ref.
8[1]	•	76 *1.94*	•	[61]	•	[72] *0.095*	•	79 *0.44*	•	132	•	171 *0.61*	•	174 *0.23*	•	188
12	•	72 *4.24*	–		•	[68]	•	78 *0.32*	•	130	•	162 *0.77*	–		•	188

(1) In fact S'_H and S'_G, ref. 237.

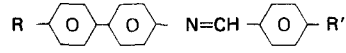
• **Biphenyl–benzylidene anilins**



R	K		S_E		S_B		S_A		N		I	Ref.
	•	188 *5.74*	–		–		•	190	•	266	•	52
	•	189 *10.6*	–		•	[172] *0.97*	•	[178] *0.12*	–		•	52
	•	168.5 *9.92*	–		•	[152.5] *0.90*	•	179 *0.15*	•	217.5 *0.07*	•	52
	•	148 *7.83*	•	[110] *0.29*	•	162.5 *1.10*	•	166 *1.16*	–		•	52
	•	137.5 *7.68*	–		•	153 *0.96*	•	170 *0.64*	•	174 *0.05*	•	52
$-CH_2-CH_3$	•	148 *4.23*	•	[121] *0.27*	•	182 *0.81*	•	213 *0.93*	•	219 *0.04*	•	52
$-(CH_2)_2-CH_3$	•	119 *5.08*	•	[108] *0.24*	•	172 *0.76*	•	211 *0.84*	•	215 *0.08*	•	52
$-(CH_2)_3-CH_3$	•	77 *4.42*	•	107 *0.22*	•	172 *0.78*	•	206 *1.14*	–		•	52
$-(CH_2)_4-CH_3$	•	92 *6.35*	•	101.5 *0.15*	•	168 *0.76*	•	204 *1.12*	–		•	52
	•	118 *5.6*	•	137 *0.42*	•	180.5 *0.84*	•	202 *1.60*	–		•	52
	•	86 *4.24*	•	113 *0.30*	•	162.5 *0.78*	•	205.5 *0.89*	•	212 *0.06*	•	52
ΔSR	•	86 *2.9*	•	114 *0.22*	•	164 *0.65*	•	207 *0.60*	•	214 *0.11*	•	217
	•	87.5 *3.89*	•	111 *0.13*	•	172 *0.82*	•	203 *1.29*	–		•	52
	•	93 *5.17*	•	108 *0.21*	•	168.5 *0.92*	•	199 *1.36*	–		•	52

R	K		S_E		S_B		S_A		N		I	Ref.
$-CH(CH_3)-CH_2-CH_3$	•	113.5 *4.97*	•	134.5 *0.44*	•	174 *0.85*	•	193 *1.47*	–		•	52
$-CH(CH_3)-(CH_2)_2-CH_3$	•	79.5 *4.23*	•	135 *0.40*	•	173.5 *0.79*	•	186 *1.48*	–		•	52
$-CH(CH_3)-(CH_2)_3-CH_3$	•	70 *4.51*	•	128 *0.39*	•	168 *0.82*	•	180 *1.57*	–		•	52
$-CH_2-CH(CH_3)-CH_2-CH_3$	•	65 *2.43*	•	114 *0.27*	•	161 *0.54*	•	194 *0.83*	–		•	52
$-CH_2-CH(CH_3)-(CH_2)_2-CH_3$	•	68 *3.78*	•	113.5 *0.18*	•	157 *0.51*	•	190.5 *0.73*	–		•	52
$-(CH_2)_2-CH(CH_3)-CH_2-CH_3$	•	77.5 *3.71*	•	109 *0.21*	•	167.5 *0.73*	•	196 *1.08*	–		•	52

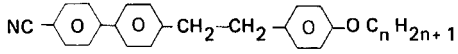
• Benzylidene aminobiphenyls



R	R′	K_2	K_1	S_3	S_B (1)	S_A (1)	N	I	Ref.
CH_3O	H	–	• 170 *8.4*	–	–	–	• 175.5 *0.0094*	•	83 36,1
CH_3O	F	–	• 209 *6.0*	–	–	–	• 262	•	5
CH_3O	Cl	–	• 229 *6.70*	–	–	–	• 290 *0.09*	•	5
OCH_3	$CO(CH_3)_3$	–	• 143 *4.83*	–	–	• [130]	• 200 *0.138*	•	84
$n\text{-}C_8H_{17}O$	H	• *117* *0.71*	• 132 *3.02*	• 154 *0.30*	• 167	• 169 *2.18*	–	•	5
$n\text{-}C_8H_{17}O$	CN	–	• 124 *6.10*	• [105]	• [107]	• 139 *1.13*	• 263 *0.14*	•	5
$n\text{-}C_8H_{17}O$	Cl	–	• 122 *5.45*	• 190.5 *0.22*	• 219 *0.43*	• 258 *1.40*	–	•	5
$n\text{-}C_8H_{17}O$	F	–	• 128 *5.75*	• 164 *0.46*	• 194 *0.54*	• 228 *1.41*	–	•	5
$n\text{-}C_8H_{17}O$		• 114 *1.32*	• 179 *4.17*	• 214 *1.20*	• 251 *0.83*	• 288 *0.37*	• 302 *0.15*	•	5
		–	• 241 *6.85*	–	–	–	• 268 *0.06*	•	5

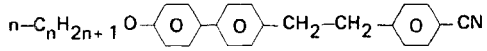
(1) S_A, S_B : from textures.

• **1–phenyl 2–biphenyl ethanes**



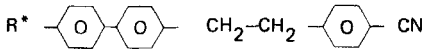
n	K		S_A (1)		N		I	Ref.
2	•	136.3 *6.6*	–		•	183.6	•	85
3	•	127 *8.6*	–		•	166.4	•	85
4	•	105 *8.4*	–		•	166	•	85
5	•	87.5 *9.29*	–		•	155.5	•	85
6	•	74.5 *8.1*	–		•	155	•	85
7	•	61.3 *8.2*	•	125.8	•	147.8	•	85
8	•	72.5 *8.3*	•	144	•	148	•	85

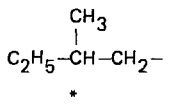
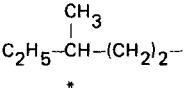
(1) S_A identified by isomorphy.



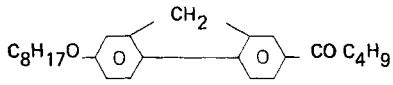
n	K		S_A (1)		N		I	Ref.
3	•	114.7 *8.15*	•	[93.9]	•	173.6	•	85
4	•	99.5 *7.91*	•	[98.8]	•	175.4	•	85
5	•	91.0 *6.77*	•	93.5	•	164.7	•	85
6	•	88.3 *5.93*	•	91.3	•	163.2	•	85
7	•	83.5 *6.43*	•	85.1	•	157.4	•	85
8	•	91.8 *6.7*	•	[⩽80]	•	155.9	•	85

(1) S_A identified by isomorphy.



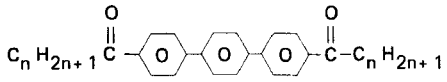
R	K	N*	I	Ref.
	91.7 *5.6*	103.4		80
	91.6 *6.1*	110.8		80

• **Fluorenone**



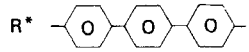
K 144 *6.2* S_A 152 *2.35* I Ref. 48

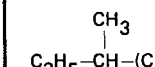
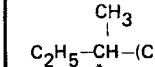
• **Terphenyls**



n	K_2	K_1	S_E (1)	S_C (1)	S_A (1)	I	Ref.
2	• 145 *1.76*	• 173 *3.28*	• 188.5 *1.88*	–	• 259 *0.202*	•	76
3	–	• 122 *3.73*	• 137.1 *1.49*	–	• 239 *1.68*	•	76
4	–	• 132.45 *5.98*	–	–	• 210 *1.68*	•	76
5	–	• 139.4 *6.74*	–	–	• 200 *1.76*	•	76
6	–	• 138.5 *6.78*	–	• 142.9	• 185.2 *1.77*	•	76
7	–	• 135.3 *7.05*	–	• 145.5 *0.02*	• 177.0 *1.84*	•	76
8	–	• 138.1 *7.85*	–	• 150.9 *0.06*	• 169.7 *1.86*	•	76
16	–	• 134.1 *18.2*	–	–	• [132] *2.01*	•	76

(1) Identified by isimorphy – Ref. 76 bis –



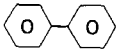
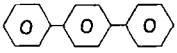
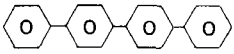
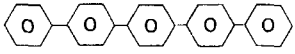
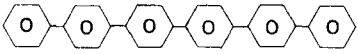
R*	K	S_A	N*	I	Ref.
	• 157 *3.7*	–	• 202	•	80
	• 120	• 163	• 186	•	80

R* = n–C_5H_{11}

K 130.5 *4.12* N 239.0 I Ref. 167

K_3 80 *0.19* K_2 115 *1.58* K_1 131 *2.15* N 240 I Ref. 168

• p—polyphenyls

Compound	K	S_A	N	I	Ref.
	• 71.1 *4.50*	–	–	•	164
	• 213.3 *8.49*	–	–	•	164
	• 314.2 *9.04*	–	–	•	164
	• 386.6 *10.1*	–	• 415.1 *0.220*	•	164
	• 434 *7.7*	• 464 *1.1*	• > 500	•	218