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X-ray Crystallography of the Phenyltriphosphonitriles.
III. The Crystal Structure of 2,2,4,4,6,6-Hexaphenylcyclotriphosphazatriene

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The crystal structure of 2,2,4,4,6,6-hexaphenylcyclotriphosphazatriene, $(C_6H_5)_6P_3N_3$, has been determined from three-dimensional Patterson, Fourier, and difference syntheses, and has been refined by least squares to an R index of 0·054 for 2900 observed reflections. The space group is $P\bar{1}$, $Z=2$, and the cell constants are $a=11·778$, $b=14·130$, $c=9·761$ Å, $\alpha=96°51'$, $\beta=107°25'$, $\gamma=89°32'$. The cyclotriphosphazene ring, P_3N_3, has an irregular slight chair form. The six chemically equivalent P–N bonds are statistically equal in length (mean, 1·597 Å), as are the six P–C bonds (mean, 1·804 Å). The mean bond angles are 103·8° for C–P–C, 117·8° for N–P–N, and 122·1° for P–N–P. The average C–C bond length in the aromatic phenyl rings is 1·379 Å. The results are compared with available data for other trimeric phosphonitriles, and some systematic effects of the relative electronegativities of the ligands on bond lengths and angles are discussed.

Introduction

The crystal and molecular structures of $(C_6H_5)_2Cl_4P_3N_3$ and of $(C_6H_5)_4Cl_2P_3N_3$ have been described by Mani, Ahmed & Barnes (1965, 1966). In both of these cyclotriphosphazenes the two P–N bonds of some P–N–P segments of the P_3N_3 ring have significantly different lengths depending upon the relative electronegativity of the pairs of substituents on the two P atoms. Thus, when the substituents are different, *viz.* PCl_2–N–$P(C_6H_5)_2$ the P–N bond on the more strongly electronegative (Cl, Cl) side is shorter (1·555 Å) than the one on the side of the phenyl groups (1·612 Å), whereas when both are the same, *viz.* either PCl_2–N–PCl_2 or $P(C_6H_5)_2$–N–$P(C_6H_5)_2$ the P–N bonds have equal lengths (1·578 Å in each case). Furthermore, the cyclotriphosphazene ring, P_3N_3, deviates from planarity in both compounds by 0·08 to 0·09 Å, but has a slight chair form in the diphenyl, and a slight (distorted) boat form in the tetraphenyl, derivative. The present investigation completes the series with a description of $(C_6H_5)_6P_3N_3$, and provides accurate data for correlation with the previous results. The corresponding trimeric phosphonitrilic fluoride ($F_6P_3N_3$) has been studied by Dougill (1963), the chloride ($Cl_6P_3N_3$) by Pompa & Ripamonti (1959), Giglio (1960), Wilson & Carroll (1960), and the bromide ($Br_6P_3N_3$) by Giglio & Puliti (1967), and the structure of diphenyltetrafluorocyclotriphosphazene, $(C_6H_5)_2F_4P_3N_3$, has been described by Allen, Paul & Moeller (1967).

Crystal data

Crystals of 2,2,4,4,6,6-hexaphenylcyclotriphosphazatriene are very thin, colourless, triclinic prisms. No extraneous diffraction effects were observed as in the case of the dichlorotetraphenyl compound (Mani, Ahmed & Barnes, 1966). The unit-cell constants are $a=11·778$, $b=14·130$, $c=9·761$ Å ($\sigma=0·002$, in each case), $\alpha=96°51'$, $\beta=107°25'$, $\gamma=89°32'$ ($\sigma=5'$, in each case), $U=1538·24$ Å^3, F.W. 597·58, D_m(flotation in aqueous potassium iodide solution) $=1·28_7$ g.cm^{-3} at 22°C, $Z=2$, $D_c=1·290$ g.cm^{-3}, $\mu(\mathrm{Cu})=19·9$ cm^{-1}, $\mu(\mathrm{Mo})=2·3$ cm^{-1}, $F(000)=624$.

The space group is $P\bar{1}$. Although the mean values $\langle|E|\rangle$ and $\langle|E^2-1|\rangle$ obtained from the distribution of the normalized structure amplitudes are between those calculated for $P1$ and $P\bar{1}$, $|E|>3$ for 0·27% of the reflections, $|E|>2$ for 3·93%, and $|E|>1$ for 25·8%, which are comparable with 0·3%, 5%, and 32%, respectively, calculated by Karle, Dragonette & Brenner (1965) for centrosymmetric space groups (0·01%, 1·8%, and 37·0%, respectively for non-centrosymmetric space groups). Furthermore, the Patterson synthesis shows P–P Harker peaks at $2x, 2y, 2z$.

Data collection

The crystal employed for data collection was 0·25 mm in length and 0·22 × 0·08 mm in cross-section. It was attached to a glass fibre and mounted on a eucentric goniometer head. A preliminary survey of the reciprocal lattice by precession methods showed that the crystal class was triclinic, and established the reciprocal and direct cell constants with reasonable accuracy. The goniometer head was then transferred to a General Electric XRD-5 manual diffractometer and the crystal was adjusted so that the a axis (its longest dimension) was along the φ axis of the goniostat. The reciprocal cell constants were then remeasured with Ni-filtered Cu radiation (λ, $K\alpha_1=1·54050$ Å, $K\alpha_2=1·54434$ Å), a 1° take-off angle, and a 0·02° slit for all but the weak reflections for which the slit width was increased to

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0·05°. The parameters b^*, c^*, and α^* were measured at $\chi=0°$ with b^* and c^* in the equatorial plane. The arcs were adjusted to bring a^* along the φ axis and thus into the equatorial plane for direct measurement at $\chi=90°$. The angles β^* and γ^* were measured on the χ circle by suitable adjustments of φ to bring the planes a^*c^* and a^*b^*, respectively, into the plane of the χ circle. All measurements, therefore, could be made without remounting the crystal and the final values of all parameters were very close to those obtained from the preliminary precession survey. Only the high-angle reflections were employed for the reciprocal-cell lengths.

Intensity data were collected from the same crystal on the same instrument but with Nb-filtered Mo radiation. The integrated intensities were measured by the moving-crystal moving-counter method (Furnas, 1957) with 2° scans over 2θ. The background was measured separately for each reflection along its Laue streak at the start, and again at the end, of the 2θ scan. The tube current was reduced by a known amount for the strong reflections, the intensity of the 200 reflection was recorded at regular intervals of time for scaling purposes, and most of the weak reflections were measured more than once to improve their counting statistics. All intensities were placed on the same scale and 1/Lp corrections were applied to the net counts. Absorption corrections for Mo radiation were considered to be negligible and, therefore, were not applied.

Data collection was restricted to the sphere $\sin\theta/\lambda=0·65$ because very few reflections were observable at higher 2θ values and, of 7042 possible reflections within the range covered, only 2900 (41·2%) had intensity values above threshold.

Structure determination

The positions of the three P and three N atoms in the asymmetric unit were determined from a 3-D sharpened Patterson synthesis with a sharpening function of $2\sin 2\theta/(1+\cos^2 2\theta)$. The R index calculated for these atoms alone, with an assumed $B=2·5$ Å^2, was 0·43. All thirty-six C atoms were located from the first Fourier synthesis which was evaluated with 2592 reflections whose phases appeared to be decided by the contributions of the P and N atoms. The R index for this first trial structure (hydrogen atoms excluded) was 0·18, which dropped to 0·09 after three cycles of block-diagonal anisotropic least-squares refinement. The positions of twenty-nine of the thirty H atoms were found from a difference synthesis computed at this stage. After two more cycles of refinement but with all H atoms included (the unlocated one in its theoretical position), the R index for the observed reflections was reduced to 0·072. The sites of the twenty-nine H atoms were redetermined from a second difference synthesis but, after three more refinement cycles, the R index was about the same (0·065) although there was noticeable improvement in the geometry of the molecule. The shifts in the last cycle were less than $0·2\sigma$ for most of the parameters, and less than $0·4\sigma$ for the remainder. The weighting function was $w^{-1}=1+[(|F_o|-55)/45]^2$, with $|F_o|$ in the range 5·0 to 172·1.

Although differences among chemically equivalent bonds and angles were below the significance level, or in the possibly significant range, the importance of the results prompted attempts to reduce all apparent discrepancies by the use of other weighting schemes. Three cycles of refinement, therefore, were computed with one based on counting statistics (Hall & Ahmed, 1968), and three more with those of Hughes (1941), but the results were approximately the same as before.

Finally, about 300 weak reflections were remeasured, and three further cycles of refinement were carried out with a weighting function, $w^{-1}=1+[(|F_o|-50)/40]^4$, so that the weights were nearly equal in the medium range of $|F_o|$, but were very much reduced for the higher and lower values. The shifts in the last cycle were less than

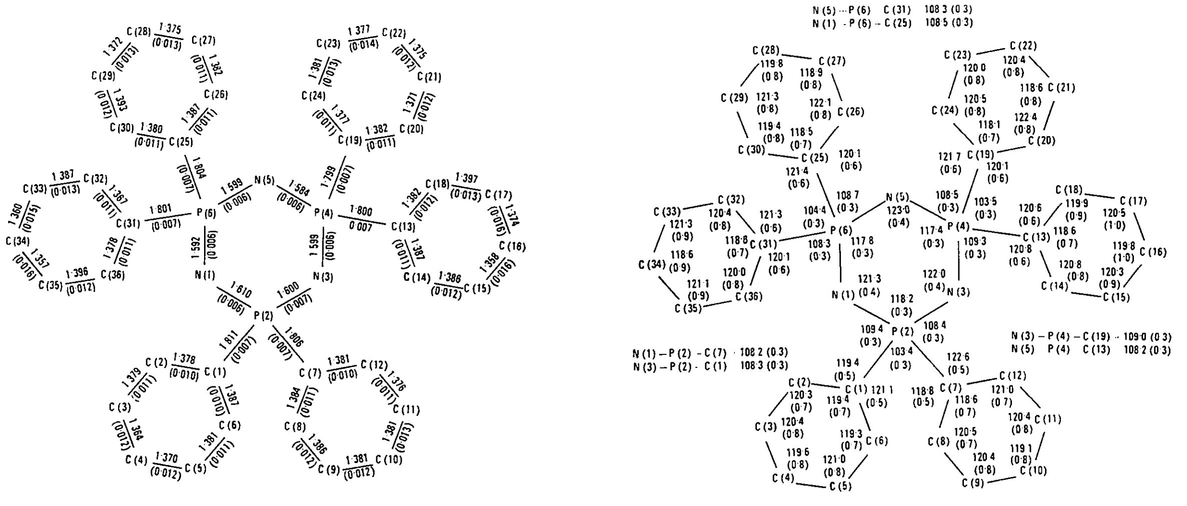
N(5)···P(6) C(31) 108·3 (0·3)
N(1)···P(6)···C(25) 108·5 (0·3)
N(1)–P(2)–C(7) 108·2 (0·3)
N(3)–P(2)–C(1) 108·3 (0·3)
N(3)–P(4)–C(19) 109·0 (0·3)
N(5) P(4) C(13) 108·2 (0·3)

Fig. 1. Bond lengths (Å) and bond angles (°); e.s.d.'s in parentheses.

$0{\cdot}1\sigma$ for most of the parameters and less than $0{\cdot}3\sigma$ for the others. The final R index for all observed reflections was 0·054.

The scattering factors employed in the calculations were those derived by Hanson, Herman, Lea & Skillman (1964).

Results

The final parameters, and their estimated standard deviations, of the P, N, and C atoms are shown in Table 1. Those of the H atoms, derived from the least-squares refinement, their e.s.d.'s, and the corresponding electron-density maxima, obtained from the second difference synthesis, are listed in Table 2, where each H atom has been assigned the same number as the C atom to which it is attached. All e.s.d.'s were calculated with the appropriate expression for least-squares refinement (*International Tables for X-ray Crystallography*, 1959, p.330), and then increased by 30% to allow for the omission of the unobserved reflections. The observed structure amplitudes, and the calculated structure factors for the parameters given in Tables 1 and 2, are tabulated in Table 3. For each of the 2900 observed reflections, the discrepancy $|\Delta F|$ is either $\leq 0{\cdot}1|F_o|$ or $\leq F_{th}$, where F_{th} is the threshold amplitude. Of the unobserved reflections, $|F_c| \leq |F_{th}|$ for 4106 and $|F_{th}| < |F_c| \leq 1{\cdot}5|F_{th}|$ for 36.

The bond lengths and bond angles, not corrected for thermal vibration, and their e.s.d.'s (Ahmed & Cruickshank, 1953, for bond lengths; *International Tables for X-ray Crystallography*, 1959, p.331 for bond angles), are shown in Fig.1. The C–H bond lengths are between 0·88 and 1·10 (mean, 0·99) Å. The six tetrahedral angles at each of the P atoms have a mean value of 109·3° in each case.

All intermolecular distances are greater than the sum of the corresponding atomic van der Waals radii; the shortest distances are N···C, 3·583; N···H, 3·23;

Table 1. *Fractional coordinates, vibration tensor components* (Å^2) *for the expression* $T = \exp[-2\pi^2(U_{11}a^{*2}h^2 + \ldots + 2U_{23}b^*c^*kl + \ldots)]$, *and their e.s.d.'s*(*all quantities* $\times 10^4$)

	x	y	z	U_{11}	U_{22}	U_{33}	$2U_{23}$	$2U_{13}$	$2U_{12}$
N(1)	3795 (5)	1641 (4)	1201 (6)	426 (35)	349 (32)	600 (39)	93 (57)	518 (62)	27 (53)
P(2)	3727 (2)	2774 (1)	1599 (2)	348 (10)	299 (9)	377 (10)	124 (15)	333 (16)	−10 (14)
N(3)	2619 (5)	3170 (4)	2100 (7)	507 (38)	398 (34)	630 (42)	151 (61)	610 (66)	84 (57)
P(4)	1567 (2)	2480 (1)	2151 (2)	367 (10)	341 (9)	419 (11)	173 (16)	398 (17)	97 (16)
N(5)	1684 (5)	1371 (4)	1747 (6)	428 (35)	372 (34)	646 (42)	223 (59)	578 (64)	42 (54)
P(6)	2749 (2)	933 (1)	1196 (2)	315 (9)	285 (9)	392 (10)	146 (14)	311 (16)	25 (14)
C(1)	3796 (6)	3372 (5)	83 (7)	351 (37)	385 (38)	355 (38)	194 (61)	209 (62)	−93 (60)
C(2)	3409 (7)	4292 (5)	−8 (8)	656 (54)	437 (44)	578 (49)	348 (75)	588 (85)	127 (77)
C(3)	3471 (8)	4763 (5)	−1142 (9)	862 (64)	388 (44)	667 (55)	397 (80)	667 (98)	116 (84)
C(4)	3926 (8)	4329 (6)	−2180 (8)	707 (57)	684 (56)	525 (51)	364 (86)	490 (89)	−152 (90)
C(5)	4310 (8)	3413 (6)	−2099 (8)	751 (59)	692 (57)	479 (48)	223 (84)	663 (87)	0 (91)
C(6)	4245 (7)	2923 (5)	−980 (7)	615 (51)	484 (44)	390 (42)	152 (70)	485 (76)	86 (75)
C(7)	5080 (6)	3182 (4)	2998 (7)	442 (42)	335 (38)	394 (40)	130 (61)	358 (67)	25 (62)
C(8)	6162 (7)	2968 (6)	2767 (8)	495 (48)	682 (54)	431 (46)	150 (79)	214 (77)	40 (81)
C(9)	7220 (7)	3274 (7)	3811 (9)	499 (52)	1008 (74)	658 (60)	209 (105)	252 (92)	−21 (99)
C(10)	7208 (8)	3802 (6)	5092 (9)	639 (56)	703 (60)	576 (54)	464 (91)	−74 (89)	−122 (91)
C(11)	6127 (8)	4002 (6)	5330 (8)	933 (69)	613 (54)	383 (46)	175 (80)	205 (90)	−130 (96)
C(12)	5079 (7)	3702 (5)	4288 (8)	629 (52)	488 (47)	461 (46)	276 (74)	377 (80)	37 (77)
C(13)	1373 (6)	2670 (5)	3922 (8)	350 (41)	523 (45)	472 (44)	200 (72)	295 (69)	−57 (66)
C(14)	1685 (8)	1979 (6)	4856 (8)	707 (60)	731 (60)	442 (48)	96 (85)	134 (87)	−367 (94)
C(15)	1551 (9)	2130 (8)	6228 (9)	1019 (78)	1189 (85)	393 (51)	363 (107)	173 (100)	−821 (131)
C(16)	1092 (9)	2954 (9)	6672 (10)	831 (75)	1614 (110)	604 (64)	32 (134)	694 (115)	−176 (143)
C(17)	790 (9)	3653 (8)	5771 (11)	976 (83)	1415 (102)	687 (68)	−410 (131)	766 (124)	670 (145)
C(18)	912 (9)	3509 (7)	4382 (10)	951 (75)	940 (74)	574 (58)	165 (105)	563 (108)	520 (118)
C(19)	181 (6)	2848 (5)	988 (7)	462 (44)	472 (43)	416 (42)	204 (67)	413 (70)	242 (68)
C(20)	−873 (7)	2378 (6)	879 (9)	482 (48)	684 (56)	640 (54)	508 (89)	407 (83)	195 (81)
C(21)	−1946 (7)	2610 (6)	−28 (9)	487 (51)	809 (63)	608 (55)	256 (96)	98 (85)	199 (89)
C(22)	−1970 (8)	3342 (6)	−846 (9)	641 (59)	742 (62)	620 (57)	179 (96)	−66 (94)	496 (95)
C(23)	−934 (9)	3820 (6)	−767 (9)	952 (75)	631 (58)	622 (58)	537 (96)	−63 (105)	269 (103)
C(24)	136 (7)	3578 (5)	159 (8)	626 (55)	511 (48)	579 (52)	357 (80)	296 (85)	27 (81)
C(25)	2133 (6)	326 (5)	−610 (7)	365 (39)	403 (39)	437 (41)	243 (66)	318 (66)	−49 (63)
C(26)	2867 (7)	−175 (6)	−1298 (8)	475 (48)	764 (60)	489 (49)	−94 (86)	181 (79)	−36 (84)
C(27)	2440 (8)	−627 (7)	−2696 (9)	667 (59)	883 (67)	505 (52)	−127 (95)	417 (91)	−95 (100)
C(28)	1247 (8)	−586 (6)	−3422 (8)	714 (59)	737 (60)	405 (46)	−43 (83)	280 (85)	−279 (94)
C(29)	506 (7)	−103 (7)	−2752 (9)	475 (51)	994 (72)	616 (57)	374 (103)	63 (88)	67 (96)
C(30)	936 (7)	356 (6)	−1345 (8)	603 (55)	716 (57)	498 (50)	231 (86)	368 (85)	112 (88)
C(31)	3390 (6)	0 (5)	2269 (7)	508 (44)	322 (38)	416 (42)	126 (62)	441 (70)	186 (64)
C(32)	4592 (7)	−125 (6)	2705 (9)	582 (52)	580 (52)	716 (58)	439 (89)	473 (92)	287 (83)
C(33)	5071 (9)	−828 (7)	3571 (11)	780 (70)	939 (78)	918 (76)	610 (124)	258 (118)	706 (116)
C(34)	4365 (10)	−1412 (6)	4001 (10)	1355 (94)	572 (58)	645 (61)	421 (96)	452 (122)	531 (116)
C(35)	3169 (10)	−1302 (6)	3551 (10)	1422 (94)	365 (47)	721 (62)	399 (87)	863 (125)	83 (105)
C(36)	2668 (8)	−598 (6)	2682 (9)	761 (61)	531 (50)	724 (59)	611 (90)	569 (98)	−41 (88)

C···C, 3·464; C···H, 2·81; H···H, 2·32 Å, and none of the P atoms is less than 4·0 Å from any atom of a neighbouring molecule. The relationship between the two molecules in the unit cell, viewed along the normal to the mean planes of the P_3N_3 rings, is illustrated in Fig. 2.

Table 2. *Fractional coordinates* (× 10³) *and isotropic temperature factors* (Å²) *of the hydrogen atoms, their e.s.d.'s, and observed electron densities* (e.Å⁻³)

	x	y	z	B	ϱ_o
H(2)	305 (5)	459 (4)	72 (6)	0·3 (1·3)	0·43
H(3)	315 (6)	539 (5)	−115 (7)	1·6 (1·5)	0·42
H(4)	395 (7)	459 (5)	−298 (8)	3·2 (1·9)	0·33
H(5)	452 (5)	309 (4)	−291 (7)	1·0 (1·4)	0·39
H(6)	451 (6)	225 (5)	−85 (7)	1·9 (1·6)	0·35
H(8)	620 (7)	262 (5)	189 (8)	3·8 (2·0)	0·33
H(9)	799 (6)	323 (5)	361 (8)	3·0 (1·8)	0·33
H(10)	795 (6)	392 (5)	591 (8)	2·9 (1·8)	0·36
H(11)	607 (6)	429 (5)	627 (8)	2·8 (1·8)	0·35
H(12)	434 (5)	381 (4)	439 (6)	0·9 (1·4)	0·34
H(14)	204 (6)	136 (5)	444 (8)	2·6 (1·7)	0·33
H(15)	177 (7)	165 (6)	697 (9)	4·9 (2·3)	0·33
H(16)	91 (8)	309 (7)	772 (10)	6·6 (2·7)	0·30
H(17)	46 (9)	430 (7)	608 (11)	7·9 (3·0)	0·25
H(18)	79 (7)	392 (5)	372 (8)	3·1 (1·9)	0·33
H(20)	−79 (6)	180 (5)	137 (7)	1·7 (1·6)	0·44
H(21)	−277 (7)	226 (5)	−10 (8)	3·5 (1·9)	0·35
H(22)	−266 (8)	359 (6)	−146 (10)	6·4 (2·7)	0·24
H(23)	−116 (7)	438 (6)	−126 (8)	4·0 (2·1)	0·31
H(24)	97 (6)	390 (4)	20 (7)	1·3 (1·5)	0·33
H(26)	370 (6)	−27 (5)	−71 (8)	2·9 (1·8)	0·41
H(27)	297 (7)	−96 (5)	−325 (8)	3·2 (1·9)	0·26
H(28)	94 (5)	−90 (4)	−446 (6)	0·2 (1·2)	0·35
H(29)	−26 (8)	−4 (7)	−319 (10)	6·6 (2·7)	0·31
H(30)	41 (6)	81 (5)	−85 (7)	1·7 (1·6)	0·32
H(32)	513 (6)	28 (5)	247 (7)	2·6 (1·8)	0·37
H(33)	593 (7)	−83 (6)	384 (9)	4·6 (2·2)	0·30
H(34)	475 (10)	−195 (8)	447 (12)	9·4 (3·4)	—
H(35)	263 (6)	−170 (5)	382 (7)	2·6 (1·7)	0·28
H(36)	181 (6)	−54 (5)	234 (8)	2·6 (1·7)	0·34

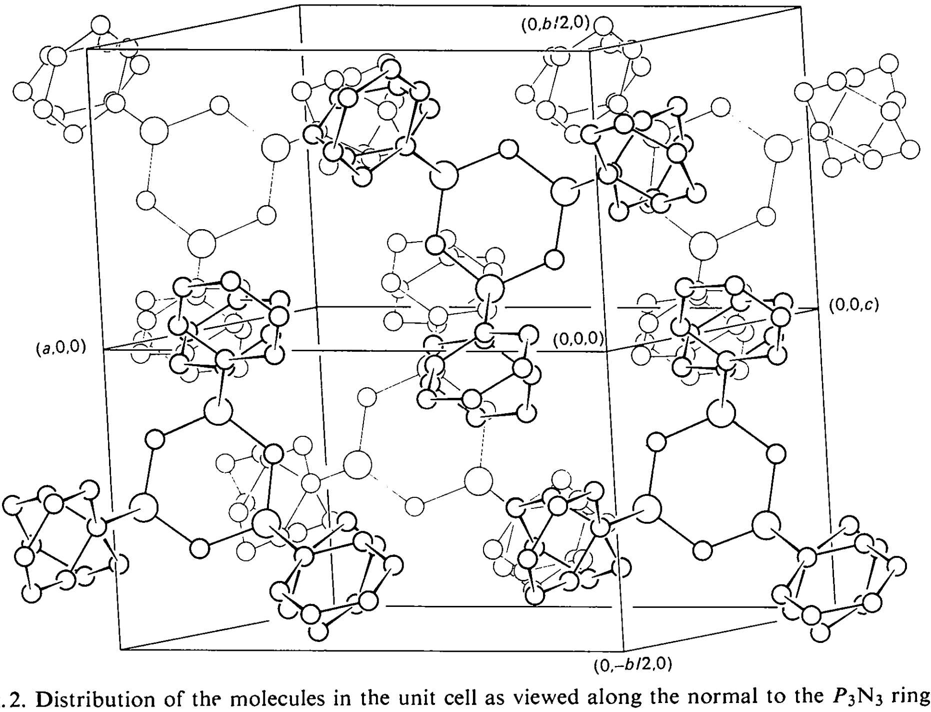

Fig. 2. Distribution of the molecules in the unit cell as viewed along the normal to the P_3N_3 rings.

Table 3. *Observed structure amplitudes and calculated structure factors* (×10)

* Indicates unobserved reflection and $|F_{th}|$ in place of $|F_o|$.

K	FO	FC
H=	0, L=	0
1	320	317
2	624	-587
3	1371	1406
4	46*	64
5	270	-295
6	57*	-61
7	192	182
8	180	179
9	72*	-38
10	77*	-59
11	150	156
12	96	108
13	90*	5
14	95*	9
15	99*	9
16	104*	-34
17	109*	-51
18	113*	-14
H=	1, L=	0
0	263	-267
1	575	-543
2	371	-351
3	400	390
4	330	326
5	84	77
6	181	185
7	204	-216
8	262	256
9	73*	15
10	102	-95
11	82*	-23
12	206	-184
13	128	-147
14	117	-115
15	100*	-92
16	104*	65
17	109*	47
18	113*	13
-1	923	886
-2	166	-178
-3	330	-321
-4	130	153
-5	449	477
-6	587	-567
-7	362	-376
-8	128	107
-9	72*	-31
-10	251	-231
-11	85	-102
-12	144	164
-13	118	114
-14	94*	-30
-15	98*	41
-16	103*	47
-17	107*	-15
-18	119	-123
H=	2, L=	0
0	415	-387
1	632	-640
2	397	-381
3	453	462
4	51*	22
5	300	302
6	60*	-3
7	250	242
8	70*	-11
9	279	-284
10	208	-212
11	83*	-23
12	88*	6
13	92*	-34
14	83	69
15	118	118
16	105*	-6
17	110*	-64
-1	274	-271
-2	132	128
-3	107	107
-4	112	-120
-5	106	105
-6	451	472
-7	96	-75
-8	111	118
-9	163	148
-10	173	187
-11	81*	38
-12	212	-213
-13	90*	30
-14	120	109
-15	99	-117
-16	103*	31
-17	166	169
-18	112*	64
H=	3, L=	0
0	45*	-46
1	841	-866
2	1012	1033
3	305	308
4	328	-332
5	123	-133
6	134	128
7	86	81
8	234	-230
9	162	-172
10	285	297
11	267	288
12	109	-84
13	104	90
14	251	249
15	102*	-24
16	100	-113
17	111*	49
-1	345	327
-2	50	-53
-3	104	-122
-4	135	107
-5	114	-114
-6	128	120
-7	419	412
-8	70*	31
-9	109	111
-10	101	94
-11	88	76
-12	87*	15
-13	155	-157
-14	96*	-3
-15	100*	20
-16	122	-134
-17	109*	-1
H=	4, L=	0
0	408	-408
1	561	590
2	697	705
3	57*	0
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13	147	-157
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12	130	-133
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9	200	-211
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12	128	134
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8	228	217
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7	72*	-73
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-13	119	-114
-14	110*	-29
H=	10, L=	1
0	171	183
1	250	252
2	91*	-34
3	91*	6
4	109	103
5	95*	-14
6	146	-136
7	131	-116
8	102*	11
9	104*	-29
10	108*	-54
11	109*	-4
12	112*	38
-1	89*	-54
-2	110	-96
-3	90*	27
-4	91*	-32
-5	143	-141
-6	94*	2
-7	152	131
-8	98*	36
-9	101*	-51
-10	103*	16
-11	118	106
-12	109*	-12
-13	112*	-100
H=	-10, L=	1
0	139	-160
1	84*	-21
2	85*	31
3	86*	-40
4	87*	10
5	251	250
6	175	187
7	93*	-19
8	95*	26
9	104	120
10	100*	42
11	96	-96
12	106*	-59
13	110*	-16
-1	85*	-19
-2	85*	60
-3	96	109
-4	124	111
-5	89*	22
-6	91*	45
-7	93*	-6
-8	95*	-59
-9	98*	-27
-10	100*	-66
-11	103*	-18
-12	107*	-9
-13	110*	19
H=	11, L=	1
0	191	186
1	95*	-52
2	96*	-59
3	97*	15
4	98*	-15
5	101*	-26
6	102*	-30
7	104*	28
8	107*	50
9	109*	77
10	112*	26
-1	150	173
-2	95*	-30
-3	96*	45
-4	118	112
-5	98*	-73
-6	169	-145
-7	101*	-34
-8	103*	64
-9	105*	-18
-10	108*	-85
-11	110*	40
H=	-11, L=	1
0	100	89
1	90*	-7
2	90*	-73
3	91*	2
4	92*	-68
5	140	-138
6	95*	74
7	98*	63
8	99*	2
9	102*	-15
10	104*	69
11	120	112
12	110*	-30
-1	90*	60
-2	91*	35
-3	91*	-9
-4	93*	-39
-5	94*	-87
-6	177	-163
-7	98*	-70
-8	100*	-24
-9	96	-86
-10	105*	46
-11	114	110
-12	111*	14
H=	12, L=	1
0	101*	-83
1	101*	-72
2	102*	-64
3	102*	-69
4	104*	48
5	106*	59
6	108*	-19
7	109*	43
8	112*	108
-1	101*	-44
-2	101*	-16
-3	101*	-11
-4	102*	64
-5	103*	74
-6	105*	-19
-7	106*	-26
-8	108*	-1
-9	110*	-4
-10	112*	-32
H=	-12, L=	1
0	95*	-4
1	95*	58
2	102	105
3	96*	58
4	97*	35
5	98*	-10
6	106	-98
7	103*	-5
8	104*	-18
9	107*	-67
10	108*	-42
11	111*	56
-1	96*	-33
-2	96*	41
-3	97*	-51
-4	163	-147
-5	100*	-51
-6	101*	45
-7	104*	17
-8	105*	-41
-9	107*	95
-10	155	143
H=	13, L=	1
0	107*	23
1	107*	-65
2	107*	-30
3	108	108
4	109*	41
5	111*	-50
6	113*	11
-1	106*	2
-2	106*	-92
-3	107*	-90
-4	107*	-11
-5	109*	22
-6	110*	-32
-7	111*	-17
H=	-13, L=	1
0	100*	-22
1	123	-109
2	101*	-11
3	125	121
4	103*	17
5	104*	11
6	105*	94
7	108*	54
8	109*	-2
9	112*	-43
-1	101*	80
-2	102*	-8
-3	102*	-74
-4	104*	16
-5	139	130
-6	107*	75
-7	109*	-22
-8	110*	67
H=	14, L=	1
0	112*	-27
1	112*	-2
2	114*	105
-1	112*	102
-2	112*	56
-3	112*	-66
H=	-14, L=	1
0	106*	75
1	106*	13
2	107*	-86
3	107*	-49
4	108*	75
5	109*	-37
6	111*	-57
-1	107*	7
-2	107*	-25
-3	107*	64
-4	109*	79
-5	110*	19
H=	0, L=	2
0	249	-233
1	1316	-1316
2	884	-880
3	86	-77
4	425	-447
5	274	257
6	339	335
7	78	82
8	71*	-45
9	75*	-10
10	116	121
11	66	61
12	174	-180
13	119	-106
14	98*	-46
15	108	-121
16	125	-109
17	111*	21
-1	149	-143
-2	721	697
-3	371	-366
-4	848	-838
-5	415	432
-6	392	-391
-7	709	-721
-8	157	143
-9	113	-117
-10	76*	-63
-11	80*	16
-12	84*	-23
-13	88*	-39
-14	92*	74
-15	97*	35
-16	101*	-53
-17	106*	-77
-18	110*	0
H=	1, L=	2
0	225	-210
1	128	106
2	409	396
3	143	128
4	196	197
5	307	302
6	143	155
7	157	-169
8	201	189
9	112	124
10	107	-85
11	108	-114
12	109	-99
13	94*	18
14	98*	34
15	103*	34
16	107*	84
17	112*	5
-1	441	-429
-2	240	235
-3	183	188
-4	255	239
-5	246	253
-6	423	427
-7	367	380
-8	201	-193
-9	131	-133
-10	77*	68
-11	81*	-6
-12	212	-212
-13	123	-135
-14	94*	75
-15	98*	59
-16	103*	-45
-17	107*	89
-18	112*	29
H=	-1, L=	2
0	878	888
1	403	-387
2	245	239
3	1108	1178
4	53*	-16
5	334	-344
6	188	166
7	189	192
8	70*	-21
9	109	-77
10	88	77
11	250	248
12	149	172
13	92*	-53
14	96*	5
15	100*	72
16	105*	-52
17	123	-118
-1	355	332
-2	1416	-1420
-3	399	-387
-4	450	-464
-5	582	-582
-6	201	-220
-7	376	-373
-8	269	-273
-9	180	185
-10	241	237
-11	236	215
-12	84*	-32
-13	108	90
-14	118	111
-15	145	-132
-16	119	-114
-17	106*	27
-18	110*	63
H=	2, L=	2
0	134	-123
1	429	435
2	76	-77
3	56*	16
4	125	144
5	129	-120
6	267	-268
7	231	-226
8	157	-155
9	120	-133
10	82*	42
11	86*	85
12	91*	4
13	101	96
14	161	146
15	104*	-58
16	108*	-58
17	113*	51
-1	113	-120
-2	496	-501
-3	142	145
-4	94	-95
-5	316	-322
-6	62*	-20
-7	183	194
-8	108	96
-9	248	-242
-10	117	-126
-11	203	229
-12	87*	42
-13	187	-195
-14	95*	-76
-15	99*	50
-16	104*	-49
-17	108*	-65
-18	112*	91
H=	-2, L=	2
0	317	301
1	280	-266
2	146	140
3	386	384
4	349	-341
5	164	-163
6	98	89
7	206	-216
8	71*	63
9	118	-114
10	215	-222
11	84*	-42
12	88*	60
13	92	83
14	96*	47
15	94	88
16	171	150
17	110*	11
-1	148	-122
-2	44*	-1
-3	693	-698
-4	355	-355
-5	103	121
-6	197	-183
-7	173	-170
-8	181	164
-9	218	229
-10	76*	-61
-11	368	-377
-12	146	-147
-13	150	136
-14	93*	-36
-15	97*	-15
-16	130	112
-17	124	138
-18	111*	-24
H=	3, L=	2
0	266	273
1	443	-441
2	305	293
3	64	55
4	575	-589
5	65*	6
6	77	-85
7	286	-294
8	85	-62
9	279	285
10	84*	9
11	168	-159
12	86	64
13	97*	56
14	113	-124
15	99	-99
16	110*	-5
-1	200	185
-2	420	-407
-3	128	-129
-4	131	105
-5	467	-469
-6	247	-242
-7	112	-114
-8	96	93
-9	214	218
-10	136	-146
-11	84*	-14
-12	327	344
-13	92*	39
-14	96*	-90
-15	101*	-28
-16	105*	34
-17	109*	-93
H=	-3, L=	2
0	46*	0
1	493	-498
2	196	-198
3	212	-195
4	182	-178
5	112	-88
6	64*	-20
7	157	144
8	102	-100
9	111	-97
10	80*	-57
11	94	-87
12	121	-120
13	93*	35
14	97*	-3
15	101*	-41
16	106*	49
17	129	115
-1	81	89
-2	48*	30
-3	253	264
-4	258	284
-5	420	422
-6	61*	-61
-7	65*	6
-8	329	331
-9	219	-211
-10	383	-389
-11	81*	-78
-12	148	156
-13	95	-77
-14	94*	-47
-15	98*	79
-16	103*	80
-17	107*	-54
-18	111*	-20
H=	4, L=	2
0	60*	34
1	61*	-17
2	276	-280
3	488	-490
4	136	134
5	69*	-52
6	73*	-13
7	190	195
8	385	394
9	83*	-37
10	177	-174
11	101	76
12	95*	-50
13	93	-91
14	103*	-21
15	107*	7
16	112*	60
-1	60*	-5
-2	142	-139
-3	189	204
-4	401	402
-5	210	211
-6	146	-130
-7	85	-69
-8	75*	30
-9	79*	-64
-10	182	-204
-11	86*	-89
-12	90*	2
-13	94*	47
-14	98*	28
-15	102*	18
-16	107*	39
-17	111	92
H=	-4, L=	2
0	93	115
1	322	334
2	463	-492
3	237	-253
4	139	-145
5	234	-233
6	295	-306
7	70*	27
8	287	284
9	150	155
10	119	103
11	86*	12
12	90*	-34
13	94*	-48
14	98*	-35
15	120	-101
16	107*	-49
17	112*	7
-1	593	-583
-2	52*	44
-3	554	553
-4	304	278
-5	61*	-35
-6	82	-97
-7	265	279
-8	72*	-20
-9	345	-352
-10	80*	36
-11	448	457
-12	87*	-19
-13	91*	19
-14	126	128
-15	100*	-61
-16	104*	-67
-17	108*	-39
H=	5, L=	2
0	150	166
1	66*	30
2	112	-134
3	270	270
4	176	165
5	82	-64
6	146	128
7	186	188
8	237	-240
9	214	-235
10	90*	30
11	94*	-16
12	97*	-5
13	102*	9
14	106*	69
15	110*	59
-1	394	394
-2	182	-196
-3	89	-103
-4	243	231
-5	247	246
-6	205	189
-7	76*	46
-8	283	276
-9	186	192
-10	218	-232
-11	141	-140
-12	93*	10
-13	97*	-81
-14	101*	-31
-15	105*	43
-16	109*	25
-17	113*	38
H=	-5, L=	2
0	105	-122
1	57*	46
2	604	618
3	217	210
4	63	54
5	164	136
6	128	133
7	357	-374
8	267	-268
9	268	205
10	187	195
11	88*	-35
12	92	92
13	140	137
14	100*	-2
15	104*	-18
16	108*	-24
-1	57*	41
-2	86	-83
-3	97	83
-4	320	-331
-5	545	-533
-6	124	103
-7	71*	-8
-8	74*	-40
-9	114	98
-10	105	96
-11	86*	6
-12	89*	46
-13	93	-91
-14	169	-170
-15	102*	4
-16	106*	-11
-17	110*	-65
H=	6, L=	2
0	97	-100
1	98	-110
2	340	334
3	75*	17
4	238	-240
5	78*	4
6	131	-124
7	296	-286
8	254	-234
9	90*	2
10	93*	-9
11	97*	-4
12	100*	27
13	105*	41
14	108*	-11
15	112*	-25
-1	97	91
-2	232	220
-3	123	-119
-4	174	-170
-5	113	-98
-6	77*	0
-7	218	-224
-8	192	-187
-9	196	212
-10	166	150
-11	92*	-36
-12	96*	-31
-13	99*	-41
-14	103*	-35
-15	131	-117
-16	111*	-36
H=	-6, L=	2
0	63*	55
1	104	-94
2	251	-231
3	127	156
4	131	134
5	159	-158
6	254	268
7	274	269
8	333	-350
9	203	-213
10	86*	-11
11	90*	39
12	163	-164
13	98*	-22
14	200	201
15	106*	27
16	110*	-74
-1	155	-142
-2	63*	-66
-3	64*	51
-4	67*	42
-5	154	154
-6	143	142
-7	168	168
-8	78*	43
-9	150	-154
-10	85*	-45
-11	94	88
-12	126	-118
-13	242	-245
-14	93	83
-15	104*	75
-16	108*	-18
H=	7, L=	2
0	76*	-15
1	77*	63
2	78*	-6
3	220	-213
4	82*	-6
5	113	-116
6	85*	-18
7	88*	49
8	90*	12
9	94*	-25
10	97*	72
11	100*	22
12	104*	-68
13	108*	-54
14	112*	-23
-1	76*	35
-2	81	70
-3	243	238

Table 3 (*cont.*)

K	FO	FC
H=	7, L=	2
-4	107	-110
-5	160	-153
-6	100	100
-7	116	116
-8	134	-140
-9	134	-124
-10	265	277
-11	249	246
-12	99*	-44
-13	103*	83
-14	164	150
-15	110*	23
H=	-7, L=	2
0	234	-226
1	68*	-38
2	163	-180
3	158	-148
4	81	-67
5	109	94
6	77*	27
7	126	144
8	173	181
9	96	-91
10	89*	8
11	93*	50
12	97*	-17
13	107	-102
14	104*	6
15	108*	70
16	112*	20
-1	68*	27
-2	296	303
-3	211	206
-4	173	165
-5	124	120
-6	185	174
-7	78*	-24
-8	200	-205
-9	104	111
-10	143	134
-11	91*	-51
-12	146	-139
-13	130	136
-14	125	124
-15	106*	-21
-16	110*	10
H=	8, L=	2
0	231	-246
1	154	-156
2	83	66
3	104	118
4	154	-170
5	182	196
6	196	206
7	92*	-3
8	95*	33
9	109	100
10	101*	83
11	104*	-62
12	108*	-79
13	112*	22
-1	81*	-50
-2	132	118
-3	82*	0
-4	83*	64
-5	169	167
-6	86*	70
-7	89*	54
-8	91*	67
-9	165	-146
-10	148	-151
-11	100*	62
-12	103*	46
-13	106*	-42
-14	109*	39
H=	-8, L=	2
0	160	135
1	130	-108
2	152	160
3	75*	-19
4	170	-169
5	101	-109
6	59	77
7	84*	-52
8	87*	61
9	118	116
10	93*	9
11	96*	79
12	100*	17
13	103*	-59
14	107*	-59
15	111*	-61
-1	386	401
-2	73*	22
-3	200	-187
-4	76	-67
-5	143	130
-6	80	-84
-7	218	-207
-8	247	237
-9	154	166
-10	92*	-35
-11	95*	-18
-12	139	144
-13	102*	86
-14	105*	-28
-15	109*	-25
H=	9, L=	2
0	87*	-59
1	87*	81
2	140	135
3	90*	-35
4	91*	71
5	97	91
6	95*	-74
7	98*	-70
8	99*	39
9	102*	33
10	91	-100
11	108*	-22
12	112*	61
-1	168	-188
-2	130	-140
-3	87*	-57
-4	88*	-36
-5	119	-116
-6	91*	18
-7	133	113
-8	96*	8
-9	98*	24
-10	100*	10
-11	104*	-57
-12	107*	-26
-13	110*	-68
H=	-9, L=	2
0	385	400
1	217	224
2	79*	-29
3	240	250
4	313	296
5	84*	-57
6	177	-162
7	124	106
8	91*	-26
9	93	-99
10	132	-118
11	100*	-24
12	103*	50
13	107*	38
14	110*	19
-1	120	-125
-2	379	-393
-3	98	-97
-4	104	87
-5	232	-214
-6	147	-142
-7	179	183
-8	90*	46
-9	93*	-46
-10	96*	-16
-11	99*	10
-12	102*	-58
-13	105*	-70
-14	109*	-14
H=	10, L=	2
0	314	331
1	94*	51
2	140	-116
3	101	84
4	96*	44
5	161	-163
6	100*	-44
7	102*	70
8	104*	30
9	107*	-47
10	110*	38
11	112*	62
-1	113	90
-2	113	-110
-3	93*	69
-4	94*	-7
-5	95*	-30
-6	128	-108
-7	99*	-59
-8	142	155
-9	102*	1
-10	105*	-72
-11	108	95
-12	111*	78
H=	-10, L=	2
0	89	-83
1	157	152
2	84*	15
3	86*	40
4	171	184
5	280	286
6	90*	35
7	122	-119
8	190	174
9	124	109
10	101*	-69
11	104*	-89
12	107*	27
13	110*	21
-1	135	-125
-2	111	115
-3	127	133
-4	114	114
-5	142	147
-6	89*	53
-7	92*	7
-8	94*	12
-9	97*	-41
-10	106	-104
-11	103*	-80
-12	106*	6
-13	109*	51
H=	11, L=	2
0	98*	-20
1	148	-131
2	99*	3
3	101*	24
4	129	-111
5	102*	50
6	105*	53
7	107*	0
8	109*	42
9	111*	45
-1	179	172
-2	109	99
-3	98*	-62
-4	99	101
-5	146	145
-6	102*	-69
-7	104	-113
-8	105*	49
-9	107*	89
-10	109*	-46
-11	112*	-47
H=	-11, L=	2
0	95	97
1	141	-149
2	138	-142
3	91*	-57
4	108	-94
5	144	-129
6	89	85
7	97*	31
8	99*	-87
9	102*	76
10	128	119
11	108*	-12
12	111*	-67
-1	88*	19
-2	89*	-13
-3	101	99
-4	91*	10
-5	93*	8
-6	94*	-76
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10	95	91
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13	139	132
14	102*	-38
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6	152	-134
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8	69	73
9	151	-135
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12	94	107
13	93*	39
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2	120	-127
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4	218	-219
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6	73*	-67
7	101	-111
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9	275	267
10	138	-145
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12	95*	65
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-6	193	-196
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4	363	-353
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7	70*	54
8	175	-185
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11	113	-136
12	89*	-82
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14	98*	-9
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16	108*	102
17	112*	43
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5	74*	-24
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8	83*	17
9	143	-161
10	90*	-56
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12	98*	-29
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H=	-4, L=	3
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2	292	-286
3	215	-217
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5	69	-70
6	224	-208
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8	297	306
9	106	-108
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-8	72*	43
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-17	107*	-21
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3	298	308
4	103	99
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6	166	178
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8	207	-208
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11	97*	2
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13	104*	64
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5	280	273
6	71*	-80
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9	343	356
10	108	-88
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12	153	146
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14	100*	-83
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-14	97*	-78
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2	171	166
3	249	-247
4	259	-256
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6	161	-188
7	183	-179
8	90*	12
9	81	94
10	96*	14
11	100*	28
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13	108*	-3
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-3	201	208
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7	78*	-30
8	516	-529
9	85*	36
10	202	211
11	175	-180
12	94*	-30
13	183	198
14	102*	59
15	114	-90
16	111*	-9
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7	91*	-20
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9	97*	0
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15	109*	47
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6	93*	40
7	122	-119
8	110	-90
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11	106	102
12	102*	5
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1	136	-133
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7	105*	59
8	107*	-15
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9	98*	-70
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13	109*	-4
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7	110*	-31
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2	210	-210
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6	95	77
7	97*	20
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9	107*	7
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H=	13, L=	3
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2	128	139
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6	105*	55
7	165	-163
8	109*	-87
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H=	-14, L=	3
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1	118	-114
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3	106*	62
4	107*	-39
5	108*	-17
6	151	142
7	112*	91
H=	-14, L=	3
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1	111*	-39
2	111*	-72
3	111*	-17
H=	-15, L=	3
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-2	110*	5
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H=	0, L=	4
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2	75	83
3	61*	-14
4	191	212
5	433	445
6	71*	-41
7	150	-152
8	122	101
9	242	247
10	136	-144
11	106	-103
12	129	108
13	98*	9
14	101*	-51
15	105*	34
16	163	137
-1	615	-626
-2	103	109
-3	572	571
-4	61*	-26
-5	379	373
-6	169	170
-7	69	53
-8	125	-120
-9	76*	-45
-10	80*	-42
-11	139	-150
-12	88*	44
-13	91*	22
-14	95*	8
-15	99*	53
-16	163	151
-17	108*	31
H=	1, L=	4
0	395	400
1	400	391
2	106	-99
3	63*	39
4	309	318
5	117	-116
6	204	-194
7	75*	10
8	131	109
9	231	-232
10	123	-146
11	97	70
12	95*	-10
13	99*	71
14	102*	38
15	106*	27
16	110*	3
-1	59*	18
-2	493	-512
-3	281	-288
-4	115	121
-5	249	-250
-6	68*	-33
-7	245	255
-8	221	216
-9	78*	-69
-10	81*	77
-11	85*	33
-12	89*	19
-13	113	-95
-14	96*	-58
-15	101*	-23
-16	105*	-35
-17	109*	53
H=	-1, L=	4
0	543	-535
1	56*	-34
2	156	-157
3	392	-396
4	487	-523
5	283	-298
6	78	100
7	74*	20
8	95	-86
9	125	117
10	328	338
11	89	-87
12	114	-102
13	97*	76
14	101*	-25
15	178	-156
16	109*	-16
-1	55*	48
-2	442	449
-3	303	-299
-4	60*	-24
-5	306	290
-6	65*	12
-7	360	-356
-8	130	124
-9	123	-109
-10	413	-430
-11	340	341
-12	112	130
-13	91*	-69
-14	95*	67
-15	144	142
-16	103*	-57
-17	101	-118
H=	2, L=	4
0	86	95
1	134	-130
2	90	111
3	160	135
4	174	-177
5	97	-100
6	139	123
7	106	-116
8	81*	-4
9	236	223
10	89*	4
11	93*	-5
12	168	149
13	101*	-51
14	103*	-69
15	107*	-30
-1	589	598
-2	153	165
-3	332	-350
-4	65*	55
-5	89	86
-6	70*	1
-7	129	-132
-8	157	159
-9	369	382
-10	146	-149
-11	86*	-12
-12	106	105
-13	94	83
-14	104	-84
-15	95	-83
-16	106*	-29
-17	110*	-33
H=	-2, L=	4
0	110	-105
1	212	-199
2	303	304
3	115	131
4	243	-253
5	66*	10
6	198	196
7	122	-128
8	77*	-8
9	81*	-46
10	85*	-25
11	199	215
12	93*	-6
13	97*	4
14	118	93
15	105*	25
16	145	-148
-1	55*	-18
-2	103	110
-3	227	220
-4	110	-134
-5	286	-290
-6	133	139
-7	324	334
-8	72*	15
-9	139	142
-10	700	725
-11	107	103
-12	82	-64
-13	91*	-59
-14	95*	-41
-15	99*	-45
-16	132	-119
-17	108*	-1
H=	3, L=	4
0	66*	37
1	199	-192
2	132	-130
3	146	-143
4	73*	33
5	74*	-12
6	161	-151
7	247	245
8	181	187
9	87*	-57
10	91*	-9
11	89	82
12	99*	-29
13	103*	-67
14	105*	10
15	109*	63
-1	94	97
-2	98	102
-3	395	405
-4	122	-106
-5	71*	41
-6	144	169
-7	253	-265
-8	306	-310
-9	120	105
-10	85*	7
-11	168	-173
-12	92*	-11
-13	96*	85
-14	205	204
-15	103*	-13
-16	108*	-4
-17	112*	86
H=	-3, L=	4
0	257	-277
1	487	-486
2	600	620
3	469	478
4	339	-347
5	311	322
6	195	198
7	194	-207
8	341	-339
9	81*	-54
10	85*	-55
11	138	-144
12	93*	-27
13	97*	18
14	101*	15
15	105*	13
16	110*	67
-1	158	151
-2	208	219
-3	102	-120
-4	464	-455
-5	347	359
-6	170	195
-7	70	-73
-8	136	151
-9	358	353
-10	80*	23
-11	85*	-42
-12	89*	-21
-13	92*	19
-14	96*	54
-15	100*	-41
-16	104*	55
-17	108*	37
H=	4, L=	4
0	90	-91
1	174	-174
2	72	65
3	335	350
4	101	87
5	77*	-11
6	291	288
7	83*	66
8	169	-167
9	159	-153
10	93*	-7
11	98*	2
12	101	-89
13	105*	25
14	107*	90
-1	66	70
-2	71	-70
-3	180	-178
-4	138	137
-5	111	129
-6	76*	39
-7	80*	-70
-8	108	106
-9	85*	-60
-10	98	-101
-11	91*	30
-12	94*	-38
-13	104	-100
-14	101*	18
-15	105*	74
-16	109*	8
H=	-4, L=	4
0	289	293
1	118	-137
2	233	-215
3	71	91
4	66*	-6
5	117	-117
6	130	152
7	286	296
8	104	110
9	311	-334
10	86*	8
11	90*	-35
12	210	-210
13	98*	-76
14	102*	28
15	106*	7
16	110*	0
-1	400	402
-2	135	-138
-3	339	-336
-4	229	252
-5	109	110
-6	159	-166
-7	101	-98
-8	75*	7
-9	300	-305
-10	334	-364
-11	122	-114
-12	114	-114
-13	93*	65
-14	97*	1
-15	101*	77
-16	105*	42
-17	109*	-20
H=	5, L=	4
0	75*	18
1	103	122
2	342	362
3	84	88
4	80*	-33
5	175	173
6	84*	58
7	189	-187
8	118	-134
9	93	98
10	96*	60
11	101*	-68
12	104*	42
13	108*	59
14	109*	-19
-1	75*	20
-2	75*	-7
-3	76*	-35
-4	241	-263
-5	235	-229
-6	80*	-31
-7	131	-112
-8	85*	-22
-9	173	179
-10	91*	-31
-11	94*	9
-12	97*	-10
-13	94	-75
-14	110	-102
-15	108*	-33
-16	112*	-20
H=	-5, L=	4
0	622	630
1	139	122
2	64*	-47
3	212	-237
4	69*	36
5	115	-115
6	393	-398
7	77*	12
8	323	338
9	133	133
10	88*	-84
11	159	153
12	95*	61
13	99*	-73
14	126	-103
15	107*	23
16	111*	20
-1	67	77
-2	77	-65
-3	514	521
-4	105	115
-5	68*	-35
-6	83	-90
-7	276	-257
-8	77*	32
-9	80*	-44
-10	84*	-36
-11	88*	32
-12	137	123
-13	94*	-14
-14	98*	51
-15	102*	-35
-16	106*	-44
-17	111*	44
H=	6, L=	4
0	146	160
1	239	250
2	81*	40
3	130	-112
4	85*	9
5	135	113
6	88*	-73
7	90*	8
8	208	186
9	132	116
10	100*	21
11	104*	45
12	107*	1
13	111*	-39
-1	80*	-36
-2	80*	-29
-3	215	235
-4	170	179
-5	83*	-63
-6	84*	-15
-7	169	152
-8	89*	-54
-9	177	-175
-10	94*	77
-11	145	152
-12	100*	52
-13	103*	1
-14	107*	43
-15	111*	-31
H=	-6, L=	4
0	84	100
1	67*	31
2	68*	-15
3	210	194
4	72*	-70
5	98	101
6	77*	48
7	281	-286
8	168	-169
9	173	193
10	90*	-8
11	94*	-85
12	178	178
13	118	116
14	105*	-28
15	109*	-66
-1	67*	-51
-2	356	-345
-3	280	-284
-4	105	101
-5	72*	3
-6	233	-227
-7	175	165
-8	259	265
-9	113	102
-10	129	-114
-11	84	95
-12	128	113
-13	96*	-19
-14	106	-124
-15	104*	-90
-16	108*	61
H=	7, L=	4
0	84	-78
1	134	-140
2	85*	-64
3	174	-174
4	89*	-51
5	100	98
6	92*	19
7	94*	7
8	97*	21
9	100*	0
10	103*	12
11	107*	-70
12	111*	-65
-1	85*	30
-2	85*	11
-3	85*	0
-4	96	89
-5	123	131
-6	88*	-19
-7	102	-104
-8	123	121
-9	95*	-69
-10	239	-240
-11	100*	-18
-12	103	93
-13	107*	-21
-14	110*	-52
H=	-7, L=	4
0	70*	-18
1	71*	-47
2	108	-98
3	73*	18
4	75*	78
5	106	83
6	80*	25
7	149	-140
8	86*	0
9	141	-150
10	92*	-72
11	90	-77
12	131	-115
13	103*	19
14	107*	51
15	110*	-33
-1	440	-447
-2	355	-358
-3	215	233
-4	140	124
-5	84	-100
-6	99	90
-7	116	109
-8	83*	1
-9	174	-187
-10	109	-90
-11	93*	84
-12	96*	-44
-13	93	-107
-14	103*	-21
-15	125	102
-16	111*	14
H=	8, L=	4
0	89*	-31
1	89*	-45
2	90*	8
3	92*	38
4	94*	-36
5	94*	45
6	96*	-36
7	130	-133
8	101*	15
9	104*	-14
10	120	-109
11	111*	-37
-1	110	-115
-2	90*	-58
-3	90*	-38
-4	96	-105
-5	92*	38
-6	99	100
-7	96*	70
-8	97*	31
-9	132	123
-10	102*	46
-11	138	-147
-12	107*	-53
-13	110*	65
H=	-8, L=	4
0	151	-149
1	75*	-29
2	76*	-12
3	168	-167
4	115	-104
5	95	87
6	187	187
7	86*	-37
8	89*	-65
9	264	260
10	95*	3
11	110	-112
12	102*	-32
13	105*	-1
14	109*	-36
-1	84	-107
-2	355	373
-3	342	351
-4	146	-147
-5	80*	-65
-6	126	115
-7	154	-156
-8	213	-218
-9	83	-72
-10	92*	32
-11	83	-80
-12	99*	-78
-13	102*	4
-14	105*	93
-15	109*	9
H=	9, L=	4
0	120	105
1	94*	48
2	95*	5
3	97*	69
4	99*	7
5	99	-88
6	101*	-61
7	103*	60

Table 3 (*cont.*)

K	FO	FC
H= 9, L= 4		
8	105•	24
9	108•	-48
10	112•	29
-1	95•	79
-2	95•	2
-3	95•	-46
-4	95•	-53
-5	96•	-73
-6	98•	-35
-7	100•	-46
-8	101•	-20
-9	104•	76
-10	106•	61
-11	108•	32
-12	111•	41
H= -9, L= 4		
0	88	-74
1	79•	-4
2	94	111
3	82•	21
4	214	-206
5	85•	-67
6	116	110
7	90•	63
8	86	-79
9	96•	1
10	197	196
11	130	119
12	105•	-4
13	108•	42
14	112•	84
-1	349	363
-2	257	285
-3	211	-212
-4	137	-154
-5	84	90
-6	86•	-56
-7	135	-128
-8	90•	51
-9	114	133
-10	96•	-10
-11	99•	85
-12	103•	45
-13	105•	-29
-14	108•	-4
H= 10, L= 4		
0	99	-92
1	127	-104
2	100•	7
3	102•	-45
4	102•	-85
5	103•	-39
6	106•	60
7	107•	29
8	110•	-26
-1	100•	64
-2	106	115
-3	100•	-16
-4	100•	-44
-5	101•	67
-6	103•	-36
-7	105	-117
-8	106•	-23
-9	109•	-33
-10	110•	-28
H= -10, L= 4		
0	84•	-22
1	200	-188
2	85•	-62
3	193	200
4	88•	44
5	197	-206
6	92•	-10
7	94•	43
8	96•	-19
9	137	-130
10	95	-84
11	105•	46
12	108•	21
13	111•	-59
-1	99	-114
-2	333	-349
-3	309	-313
-4	111	-86
-5	83	-63
-6	90•	-30
-7	92•	90
-8	94•	19
-9	97•	17
-10	117	116
-11	103•	-49
-12	124	-122
-13	108•	-9
H= 11, L= 4		
0	106	-88
1	105•	25
2	105•	-8
3	107•	-47
4	107•	7
5	108•	53
6	110•	-20
-1	134	-124
-2	105•	16
-3	106•	76
-4	105•	-23
-5	106•	-7
-6	108	89
-7	110•	27
-8	111•	-89
H= -11, L= 4		
0	89•	-59
1	148	-144
2	115	-93
3	91•	53
4	92•	88
5	94•	14
6	96•	28
7	115	105
8	100•	33
9	104•	8
10	106•	-50
11	108•	-32
12	111•	1
-1	90•	1
-2	89•	-11
-3	110	-110
-4	92•	-16
-5	195	183
-6	95•	48
-7	113	-128
-8	98•	71
-9	101•	56
-10	121	-120
-11	120	-98
-12	110•	31
H= 12, L= 4		
0	110•	23
1	110•	27
2	110•	30
-1	110•	-17
-2	110•	-57
-3	111•	-52
-4	111•	10
-5	111•	-33
H= -12, L= 4		
0	166	157
1	94•	-7
2	121	-121
3	96•	18
4	97•	-16
5	156	-139
6	100•	-44
7	102•	65
8	105•	26
9	108•	13
10	110•	29
-1	130	114
-2	94•	-35
-3	95•	25
-4	153	179
-5	98•	67
-6	127	-149
-7	101•	-44
-8	103•	27
-9	105•	-68
-10	108•	-85
-11	111•	83
H= -13, L= 4		
0	99•	85
1	140	136
2	100•	39
3	101•	-42
4	102•	22
5	103.	17
6	129	-134
7	113	-133
8	109•	26
9	113•	17
H= -13, L= 4		
-1	100•	-88
-2	100•	-19
-3	117	127
-4	102•	8
-5	171	-152
-6	104•	-34
-7	99	75
-8	108•	-2
-9	110•	-30
H= -14, L= 4		
0	156	-131
1	104•	4
2	105	95
3	106•	-3
4	107•	-23
5	133	134
6	117	117
7	112•	-84
H= -14, L= 4		
-1	105•	-61
-2	105•	30
-3	105•	-22
-4	107•	-66
-5	108•	-4
-6	110•	53
-7	111•	50
H= -15, L= 4		
0	109•	-11
1	110•	-43
2	110•	-21
3	111•	-5
H= -15, L= 4		
-1	111•	-2
-2	110•	29
-3	111•	64
H= 0, L= 5		
0	64•	-1
1	191	-186
2	247	-260
3	134	135
4	120	110
5	116	126
6	121	-103
7	79•	23
8	264	281
9	85•	0
10	273	-282
11	93•	2
12	119	121
13	101•	-58
14	105•	15
15	109	116
-1	344	-336
-2	325	-340
-3	142	-135
-4	108	-106
-5	68•	6
-6	71•	30
-7	104	111
-8	77•	-15
-9	174	192
-10	193	-191
-11	92	-99
-12	90•	-7
-13	101	-109
-14	99•	56
-15	103•	-5
-16	107•	54
-17	111•	104
H= 1, L= 5		
0	66•	1
1	286	-283
2	179	175
3	124	98
4	96	-75
5	360	-369
6	161	-137
7	113	111
8	114	-99
9	162	-177
10	90•	-15
11	146	132
12	98•	-28
13	102•	3
14	106•	35
15	110•	-26
-1	415	427
-2	477	-481
-3	407	-420
-4	69•	5
-5	71•	-81
-6	73•	-61
-7	76•	59
-8	205	205
-9	81•	65
-10	137	135
-11	88•	-53
-12	92•	27
-13	95•	-26
-14	99	-83
-15	103•	-91
-16	106•	-51
-17	110•	-21
H= -1, L= 5		
0	63•	27
1	71	-68
2	312	-313
3	150	150
4	158	159
5	95	95
6	165	175
7	135	-129
8	81•	44
9	138	142
10	89•	47
11	151	-161
12	97•	-24
13	101•	38
14	117	-120
15	109•	-74
-1	197	-203
-2	203	200
-3	64•	8
-4	143	134
-5	197	212
-6	70•	-45
-7	124	-148
-8	76•	43
-9	93	-87
-10	157	-148
-11	86•	10
-12	226	231
-13	197	188
-14	98•	-83
-15	140	14
-16	106•	98
-17	110•	-26
H= 2, L= 5		
0	259	-263
1	123	-117
2	284	288
3	138	-144
4	384	-390
5	102	110
6	80•	39
7	87	-77
8	108	111
9	88•	5
10	92	84
11	98•	43
12	100•	22
13	104•	-34
14	108•	-71
15	112•	-14
-1	289	304
-2	666	693
-3	70•	-38
-4	236	-239
-5	178	182
-6	130	126
-7	414	-418
-8	80•	-77
-9	266	257
-10	86•	-28
-11	90•	-6
-12	93•	-6
-13	149	137
-14	100	90
-15	104•	-23
-16	108•	-63
-17	112•	10
H= -2, L= 5		
0	314	328
1	149	155
2	105	99
3	315	-308
4	432	-435
5	149	-147
6	195	-200
7	272	-290
8	81•	-41
9	85•	42
10	89•	-57
11	93•	75
12	145	-124
13	100•	-39
14	104•	28
15	109•	-95
-1	62•	-34
-2	208	-213
-3	275	274
-4	65•	20
-5	157	-163
-6	116	-122
-7	73•	-62
-8	76•	0
-9	326	-341
-10	82•	-30
-11	270	271
-12	105	101
-13	167	-168
-14	98•	42
-15	102•	21
-16	113	-96
-17	110	-113
H= 3, L= 5		
0	156	-159
1	158	-159
2	74•	-26
3	76•	5
4	78•	-21
5	80•	61
6	197	185
7	116	126
8	87•	-30
9	91•	9
10	94•	-34
11	98•	18
12	102•	-58
13	107•	-69
14	110•	73
-1	199	-200
-2	103	-105
-3	260	270
-4	75•	42
-5	76•	-29
-6	258	269
-7	124	121
-9	321	-328
-9	95	97
-10	132	141
-11	92•	-25
-12	95•	-6
-13	99•	-8
-14	135	114
-15	105•	67
-16	109•	23
H= -3, L= 5		
0	179	-171
1	417	430
2	171	181
3	95	94
4	135	-147
5	271	276
6	169	173
7	391	-401
8	282	-275
9	90	91
10	89•	-37
11	114	-105
12	164	136
13	101•	68
14	105•	33
15	109•	35
-1	350	-360
-2	503	505
-3	258	265
-4	314	-313
-5	105	-103
-6	120	131
-7	199	206
-8	76•	-63
-9	264	260
-10	242	228
-11	86•	9
-12	196	-206
-13	157	-159
-14	99•	-41
-15	103•	-67
-16	107•	-24
-17	111•	42
H= 4, L= 5		
0	181	-190
1	71	-69
2	78•	68
3	116	-116
4	81•	6
5	102	76
6	86•	40
7	82	-65
8	197	-202
9	93•	-18
10	123	117
11	101•	-60
12	104•	-34
13	132	131
14	112•	39
-1	77•	-46
-2	175	-182
-3	142	-123
-4	161	-156
-5	80•	-5
-6	95	77
-7	83•	-73
-8	214	214
-9	88•	-28
-10	91	-102
-11	94•	17
-12	97•	-21
-13	128	-134
-14	104•	-49
-15	108•	15
-16	111•	21
H= -4, L= 5		
0	297	-299
1	278	-285
2	131	131
3	69•	24
4	163	-155
5	89	101
6	433	451
7	92	88
8	154	-151
9	86	-95
10	84	93
11	94•	-40
12	138	-133
13	101•	40
14	105•	74
15	109•	-21
-1	65•	-48
-2	117	115
-3	66•	-4
-4	67•	-42
-5	108	123
-6	236	221
-7	142	-131
-8	78•	-64
-9	99	-112
-10	157	-159
-11	155	-173
-12	121	-120
-13	96•	27
-14	100•	-47
-15	104•	30
-16	108•	40
-17	112•	19
H= 5, L= 5		
0	158	152
1	292	305
2	87	85
3	102	-119
4	85•	28
5	130	122
6	231	-229
7	244	-243
8	114	121
9	140	140
10	99•	-22
11	104•	-16
12	131	115
13	111•	21
-1	124	-120
-2	85	88
-3	91	95
-4	82•	-55
-5	102	-103
-6	85•	17
-7	87•	-33
-8	89•	-7
-9	91•	78
-10	94•	-16
-11	91	75
-12	100•	42
-13	103•	55
-14	106•	-59
-15	110•	-66
H= -5, L= 5		
0	132	137
1	90	-93
2	201	-206
3	87	77
4	73•	-51
5	293	-289
6	77•	35
7	337	338
8	119	118
9	87•	25
10	91•	-19
11	95•	77
12	98•	-56
13	125	-109
14	106•	-31
15	110•	35
-1	95	82
-2	93	82
-3	69•	-43
-4	70•	-24
-5	72•	35
-6	157	-146
-7	165	-170
-8	84	-81
-9	117	-104
-10	80	-64
-11	89•	-64
-12	93•	22
-13	97•	27
-14	134	117
-15	105•	32
-16	109•	-32
H= 6, L= 5		
0	313	312
1	84•	49
2	87•	-47
3	87•	-4
4	154	144
5	91•	46
6	104	-100
7	133	129
8	164	172
9	100•	-23
10	103•	-35
11	107•	37
12	110•	-45
-1	197	204
-2	85•	-55
-3	230	230
-4	255	268
-5	88•	5
-6	186	-187
-7	91•	35
-8	93•	8
-9	190	-194
-10	97•	-72
-11	100•	72
-12	103•	44
-13	106•	20
-14	109•	44
H= -6, L= 5		
0	70•	-38
1	71•	20
2	72•	20
3	125	-113
4	76•	15
5	77•	-55
6	368	-371
7	82•	-45
8	136	136
9	89•	-8
10	93•	40
11	96•	57
12	112	124
13	104•	-5
14	108•	-55
15	111•	7
-1	187	189
-2	71•	50
-3	291	-301
-4	280	-287
-5	172	160
-6	158	-145
-7	242	-233
-8	211	224
-9	251	253
-10	88•	-70
-11	91•	7
-12	95•	61
-13	131	122
-14	103•	-29
-15	151	-146
-16	110•	23
H= 7, L= 5		
0	89•	-57
1	89•	-64
2	90•	-35
3	102	102
4	93•	43
5	95•	40
6	103	100
7	98•	6
8	101•	-23
9	103•	-26
10	107•	-81
11	110•	-89
-1	90•	-36
-2	89•	-14
-3	110	-104
-4	91•	-60
-5	108	104
-6	93•	81
-7	95•	-62
-8	96•	78
-9	99	86
-10	107	-103
-11	191	-201
-12	107•	24
-13	109•	42
H= -7, L= 5		
0	150	156
1	144	-141
2	75•	-2
3	194	211
4	244	249
5	80•	-44
6	82•	46
7	85•	10
8	103	-88
9	91•	-17
10	95•	-52
11	98•	-65
12	102•	76
13	106•	92
14	109•	18
-1	74•	46
-2	511	-515
-3	332	-324
-4	236	240
-5	83	78
-6	80•	-30
-7	82•	66
-8	243	249
-9	87•	24
-10	192	-184
-11	94•	32
-12	108	107
-13	101•	-93
-14	178	-160
-15	109•	6
-16	112•	39
H= 8, L= 5		
0	94•	14
1	93•	19
2	89	82
3	96•	57
4	98•	15
5	99•	-9
6	102•	-42
7	102•	-9
8	105•	6
9	107•	-63
10	110•	-35
-1	94•	-24
-2	94•	-14
-3	95•	14
-4	96•	-52
-5	97•	-25
-6	124	123
-7	99•	26
-8	101•	-13
-9	178	162
-10	105	102
-11	108•	15
-12	110•	-44
H= -8, L= 5		
0	78•	-34
1	78•	-26
2	153	-151
3	90	-104
4	128	107
5	249	237
6	86•	-72
7	82	-83
8	140	154
9	105	112
10	109	-103
11	101•	-75
12	104•	-38
13	108•	-42
14	111•	-80
-1	255	-254
-2	143	-136
-3	290	309
-4	220	221
-5	82	-74
-6	83•	6
-7	85•	36
-8	128	-133
-9	200	-194
-10	93•	-26
-11	96•	22
-12	100•	-41
-13	104•	-45
-14	101	82
-15	111•	48
H= 9, L= 5		
0	99•	46
1	98•	-38
2	100•	37
3	101•	31
4	102	-97
5	104•	-63
6	106•	53
7	107•	49
8	109•	-42
-1	122	118
-2	99•	55
-3	99•	-6
-4	101•	-17
-5	101•	18
-6	102•	-63
-7	104•	-15
-8	105•	10
-9	107•	-28
-10	109•	53
-11	112•	61
H= -9, L= 5		
0	92	-72
1	137	134
2	144	136
3	221	-230
4	138	-128
5	179	182
6	89•	91
7	91•	-63
8	94•	-3
9	149	154
10	147	151
11	104•	-36
12	107•	18
13	110•	74
-1	92	94
-2	271	291
-3	138	117
-4	211	-214
-5	86•	-50
-6	87•	-49
-7	137	-148
-8	91•	-84
-9	94•	35
-10	97•	11
-11	100•	42
-12	103•	74
-13	107•	43
-14	110•	0
H= 10, L= 5		
0	105	-102
1	103•	32
2	104•	22
3	106•	-61
4	107•	-28
5	109•	86
6	111•	57
-1	104•	-38
-2	127	150
-3	104•	56
-4	106•	-25
-5	106•	47
-6	107•	49
-7	108•	-61
-8	110•	-72
-9	111•	-31
H= -10, L= 5		
0	86•	-30
1	87•	-57
2	177	188
3	88•	67
4	157	-166
5	91•	-66
6	93•	36
7	95•	-26
8	98	-99
9	100	-110
10	104•	61
11	107•	76
12	110•	-30
-1	86•	86
-2	87•	-55
-3	175	-170
-4	88•	-29
-5	149	-118
-6	91	-86
-7	93•	58
-8	95•	88
-9	98•	-18
-10	123	100
-11	179	171
-12	106•	-92
-13	110•	-106
H= 11, L= 5		
0	109•	-5
1	108•	34
2	109•	-10
3	111•	2
-1	109•	-91
-2	102	-86
-3	109•	37
-4	110•	36
-5	111•	-62
-6	112•	52
H= -11, L= 5		
0	147	-141
1	91•	-75
2	92•	23
3	109	115
4	93•	-17
5	95•	-25
6	97•	67
7	99•	2
8	102•	-53
9	104•	-54
10	107•	-82
11	110•	-15
-1	91•	-84
-2	91•	39
-3	92•	-1
-4	160	-161
-5	94•	50
-6	229	230
-7	97•	11
-8	99•	-66
-9	108	99
-10	104•	51
-11	200	-178
-12	110•	-91
H= -12, L= 5		
0	96•	69
1	180	-193
2	96•	11
3	97	101
4	142	-136
5	105	-87
6	134	130
7	103	109
8	106•	12
9	109•	10
10	111•	32
H= -12, L= 5		
-1	237	258
-2	107	119
-3	97•	-42
-4	133	114
-5	278	279
-6	100•	5
-7	102•	-67
-8	104•	50
-9	106•	6
-10	101	-106
-11	111•	-29
H= -13, L= 5		
0	174	174
1	101•	42
2	101•	-78
3	102•	69
4	102•	29
5	151	-137
6	118	-122
7	107•	9
8	110•	62
H= -13, L= 5		
-1	101•	29
-2	101•	-74
-3	101•	25
-4	120	105
-5	104•	-69
-6	105•	-87
-7	106•	-25
-8	108•	7
-9	110•	-20
H= -14, L= 5		
0	106•	-29
1	92	90
2	106•	33
3	107•	-16
4	107•	82
5	127	114
6	111•	-33
H= -14, L= 5		
-1	118	-102
-2	106•	-30
-3	106•	-6
-4	107•	-74
-5	109•	-2
-6	110•	-9
-7	111•	10
H= -15, L= 5		
0	111•	-1
1	111•	-40
2	111•	-25
H= -15, L= 5		
-1	111•	-45
-2	111•	-59
-3	112•	31
H= 0, L= 6		
0	76	-57
1	72•	31
2	89	89
3	121	115
4	76•	46
5	158	-141
6	107	-85
7	114	112
8	92	-80
9	161	-177
10	93•	-36
11	96•	56
12	100•	43
13	90	-77
14	109•	77
-1	139	-150
-2	338	-342
-3	300	-296
-4	107	-96
-5	75•	32
-6	77•	10
-7	79•	58
-8	81•	7
-9	94	124
-10	87•	15
-11	90•	-57
-12	174	-158
-13	97•	-81
-14	100•	-28
-15	104•	-36
-16	108•	-50
H= 1, L= 6		
0	73	-63
1	98	-100
2	180	185
3	82	-74
4	318	-331
5	80•	16
6	101	104
7	124	-130
8	167	-151
9	91•	18
10	94	94
11	98	90
12	101•	-38
13	105•	39
14	110•	32
-1	349	364
-2	181	188
-3	163	-167
-4	168	-178
-5	77•	12
-6	79•	-55
-7	128	-120
-8	102	-107
-9	86•	38
-10	104	114
-11	92•	-64
-12	96•	0
-13	99•	-35
-14	103•	8
-15	106•	-73
-16	110•	-54
H= -1, L= 6		
0	78	-71
1	71•	-20
2	71•	-4
3	73•	-57
4	161	151
5	77•	54
6	129	117
7	154	153
8	111	115
9	90•	-50
10	93•	-82
11	98•	-41
12	102•	-6
13	104•	-3
14	108•	-62
-1	131	141
-2	129	106
-3	71•	39
-4	219	225
-5	105	107
-6	203	201
-7	78•	-18
-8	90	82
-9	121	135
-10	110	-116
-11	216	-217
-12	93•	-25
-13	163	178
-14	100•	60
-15	103•	-38
-16	152	128
-17	131	119
H= 2, L= 6		
0	210	-219
1	205	209
2	102	-99
3	197	-221
4	106	102
5	82•	-17
6	84•	43
7	87•	-47
8	90•	-34
9	123	121
10	96•	15
11	105	-111
12	103•	-32
13	106•	-25
-1	113	-109
-2	388	409
-3	251	260
-4	140	-146
-5	169	-164
-6	271	303
-7	150	-170
-8	289	-303
-9	88•	25
-10	91	100
-11	88	81
-12	97•	-41
-13	101•	48
-14	143	127
-15	108•	51
-16	112•	-43
H= -2, L= 6		
0	112	103
1	78	73
2	151	-149
3	72•	-44
4	98	-107
5	201	-225
6	183	-181
7	82•	19
8	87•	-38
9	90•	-3
10	93•	12
11	97•	0
12	100•	-20
13	104•	-7
14	108•	-71
-1	102	103
-2	191	179
-3	115	105
-4	172	189
-5	186	184
-6	266	-272
-7	203	-189
-8	80•	52
-9	83•	-73
-10	203	-234
-11	89•	51
-12	423	429
-13	96•	-24
-14	117	-125
-15	103•	87
-16	108•	-3
-17	111	-110
H= 3, L= 6		
0	79•	2
1	210	-205
2	80•	25
3	82•	58
4	85•	10
5	182	189
6	87•	-1
7	89•	-6
8	92•	37
9	95•	-37
10	98•	-84
11	102•	-73
12	105•	-21
13	108•	-19
-1	197	-198
-2	201	-219
-3	143	138
-4	80•	-17
-5	83•	-1
-6	122	126
-7	125	134
-8	88•	18
-9	90•	-41
-10	99	-105
-11	113	102
-12	99•	-33
-13	103	-116
-14	106•	32
-15	110•	64
H= -3, L= 6		
0	183	190
1	222	233
2	83	78
3	63	-79
4	75•	37
5	112	99
6	299	-312
7	232	-232
8	216	216
9	95	83
10	93•	-29
11	97•	60
12	100•	93
13	104•	5
14	108•	9
-1	257	-259
-2	186	-191
-3	347	356
-4	72•	-64
-5	307	-298
-6	76•	12
-7	215	215
-8	80•	-25
-9	168	-169
-10	86•	13
-11	134	129
-12	150	-245
-13	132	-134
-14	100•	-85
-15	104•	-88
-16	108•	-86
-17	112•	-32
H= 4, L= 6		
0	140	-120
1	83•	-23
2	84•	17
3	85•	35
4	86•	7
5	88•	-32
6	90•	-65
7	139	-118
8	95•	-13
9	98•	54
10	101•	-18
11	104•	-3
12	107•	55
-1	127	-123
-2	228	-240
-3	251	-244
-4	157	-155
-5	74	-51
-6	111	-111
-7	89•	-17
-8	179	180
-9	93•	19
-10	96•	-29
-11	99•	-25
-12	88	77
-13	105•	-3
-14	108•	-85
-15	112•	-75
H= -4, L= 6		
0	204	-206
1	71•	14
2	282	280
3	78	-53
4	103	105
5	609	630
6	248	259
7	198	-202
8	87•	29
9	127	118
10	94•	2
11	98•	-74
12	101•	16
13	128	140
14	108•	16
-1	97	-118
-2	195	195
-3	72•	-15
-4	164	-153
-5	75•	-55
-6	252	250
-7	154	153
-8	81•	83
-9	115	110
-10	87•	53
-11	90•	-44
-12	93•	-53
-13	91	-98
-14	94	-81
-15	104•	30
-16	109•	84
H= 5, L= 6		
0	143	149
1	87•	47
2	152	-159
3	104	-83
4	89•	18
5	91•	-61
6	162	-156
7	96•	36
8	222	210
9	101•	13
10	104•	-39
11	107	100
12	110•	83
-1	86•	-76
-2	86•	-1
-3	123	124
-4	87•	45
-5	89•	-65
-6	91•	-57
-7	163	-162
-8	94•	28
-9	96•	53
-10	99•	-25
-11	102•	71
-12	105•	33
-13	108•	82
-14	111•	23
H= -5, L= 6		
0	72•	-84
1	248	-261
2	73•	-20
3	75•	-4
4	176	-178
5	174	183
6	228	228
7	136	131
8	88•	37
9	91•	-1
10	95•	32
11	99•	-25
12	165	-143
13	105•	-38
14	109•	40
-1	73•	24
-2	173	-168
-3	74•	29
-4	75•	-1
-5	77•	36
-6	79•	-29
-7	174	-163
-8	165	-137
-9	200	-200
-10	88•	-7
-11	102	101
-12	95•	-14
-13	98•	-17
-14	102•	121
-15	124	108
-16	110•	-4
H= 6, L= 6		
0	96	76
1	150	-155
2	79	-64
3	93•	1
4	93•	-42
5	95•	-28
6	97•	45
7	149	146
8	102•	12
9	104•	-74
10	107•	20
11	110•	14
-1	123	122
-2	78	-77
-3	85	-70
-4	91•	93
-5	119	98
-6	94•	-86
-7	96•	-32
-8	98•	-47
-9	100•	-12
-10	125	-126
-11	111	-122
-12	108•	34
-13	111•	23
H= -6, L= 6		
0	144	140
1	144	156
2	75•	-46
3	77•	-81
4	108	-89
5	176	-183
6	117	-101
7	85•	-35
8	90•	31
9	93•	-15
10	96•	39
11	100	97
12	103•	10
13	107•	-75
14	110•	-15
-1	75•	19
-2	262	266
-3	76•	66
-4	383	-384
-5	79•	-48
-6	81•	25
-7	305	-279
-8	182	-190
-9	245	253
-10	127	113
-11	93•	-72
-12	96•	-2
-13	145	156
-14	146	145
-15	107•	-61
-16	111•	-75
H= 7, L= 6		
0	100	-97
1	95•	-18
2	117	112
3	97•	37
4	97•	-9
5	99	101
6	101•	55
7	103•	-82
8	105•	-52
9	108•	-21
-1	94•	11
-2	95•	34
-3	95•	7
-4	112	-93
-5	104	78
-6	181	168
-7	100•	-48
-8	102•	5
-9	104•	75
-10	106•	55
-11	94	-107
-12	111•	-83
H= -7, L= 6		
0	95	90
1	177	-192
2	309	312
3	281	290
4	272	-271
5	83•	-1
6	124	118
7	107	-95
8	92•	-25
9	95•	-5
10	98•	-16
11	102•	52
12	105•	81
13	108•	61
-1	286	302
-2	79•	5
-3	450	-465
-4	80•	14
-5	342	348
-6	84•	-42
-7	121	-132
-8	316	335
-9	173	188
-10	122	-116
-11	117	-95
-12	98•	10
-13	102•	50
-14	105•	-100
-15	102	-116
H= 8, L= 6		
0	99•	84
1	99•	60
2	100•	13
3	101•	31
4	101•	-35
5	103•	-26
6	105•	-43
7	107•	-57
8	109•	-26
-1	99•	-65
-2	99•	34
-3	100•	42
-4	117	-101
-5	125	-113
-6	103•	50
-7	104•	38
-8	106•	-63
-9	108•	57
-10	116	119
-11	112•	40
H= -8, L= 6		
0	81•	82
1	108	-117
2	115	-129
3	197	217
4	207	222
5	86•	-65
6	88•	-8
7	128	136
8	95•	84
9	97•	-59
10	142	-141
11	104•	-8
12	107•	-8
13	110•	-58
-1	82•	-45
-2	340	-344
-3	146	165
-4	269	265
-5	95	88
-6	87•	71
-7	89•	66
-8	115	100
-9	92•	-39
-10	106	-105
-11	98•	-34
-12	101•	12
-13	104•	-42
-14	108•	-18
-15	111•	18
H= 9, L= 6		
0	104•	-47
1	104•	-6
2	105•	18
3	106•	-65
4	106•	-63
5	107•	-7
6	109•	17
-1	104•	63
-2	90	87
-3	104•	15
-4	105•	34
-5	107•	18
-6	107•	-67
-7	108•	1
-8	110•	-24
-9	112•	-61
H= -9, L= 6		
0	84•	-26
1	85•	-22
2	177	-169
3	140	-125
4	88•	15
5	89•	36
6	91•	-24
7	114	-129
8	98•	69
9	180	177
10	103•	-51
11	100	-81
12	109•	59
-1	154	-157
-2	148	159
-3	156	168
-4	87•	-55
-5	89•	-14
-6	90•	-72
-7	98	-98
-8	110	-124
-9	126•	-59
-10	98•	-99
-11	101•	15
-12	104•	92
-13	107•	82
-14	110•	30
H= 10, L= 6		
0	109•	-24
1	109•	86
2	110•	-21
3	111•	-35
-1	109•	-95
-2	109•	9
-3	109•	100
-4	110•	11
-5	111•	-26
-6	112•	68
H= -10, L= 6		
0	99	99
1	144	131
2	88•	46
3	90•	-22
4	91•	-85
5	93•	-51
6	94•	-12
7	98•	-55
8	101•	-79
9	103•	42
10	135	113
11	110•	22
-1	136	134
-2	90•	76
-3	90•	-58
-4	91•	49
-5	103	-95
-6	94	-93
-7	96•	22
-8	119	102
-9	99•	-31
-10	101•	19
-11	180	184
-12	107•	107
-13	110•	-91
H= -11, L= 6		
0	104	-86
1	93•	44
2	93•	-6
3	94•	-26
4	95•	39
5	97•	20
6	98•	-7
7	102•	-80
8	104•	-72
9	107•	-53
10	110•	-69
H= -11, L= 6		
-1	162	-168
-2	94•	-32
-3	146	151
-4	117	-112
-5	97•	-53
-6	166	157
-7	158	162
-8	101•	21
-9	103•	-7
-10	149	150
-11	108•	37
-12	179	-175
H= -12, L= 6		
0	175	-194
1	98•	-58
2	97•	98
3	98•	-61
4	106	-85
5	101•	73
6	165	161
7	106•	58
8	108•	-75
9	110•	14
H= -12, L= 6		
-1	98•	52
-2	206	205
-3	99	-101
-4	100•	-38
-5	168	185
-6	120	121
-7	104•	2
-8	105•	-45
-9	107•	54
-10	109•	-28
-11	111•	-87
H= -13, L= 6		
0	102	105
1	102•	-34
2	101•	-3
3	103•	92
4	104•	-94
5	139	-129
6	106•	45
7	110•	97
H= -13, L= 6		
-1	121	113
-2	103•	-17
-3	104•	-12
-4	105•	26
-5	106•	-15
-6	107•	-30
-7	144	-118
-8	109•	-37
-9	111•	-8
H= -14, L= 6		
0	107•	19
1	121	96
2	106•	38
3	107•	6
4	115	85
5	109•	-20
H= -14, L= 6		
-1	108•	-30
-2	108•	-14
-3	109•	-43
-4	109•	-99
-5	110•	-19
-6	112•	-64
H= -15, L= 6		
0	112•	-39
H= -15, L= 6		
-1	113•	3
H= 0, L= 7		
0	78•	40
1	78•	-5
2	153	145
3	155	159
4	82•	-59
5	84•	-55
6	89•	58
7	89•	-36
8	92•	-62
9	107	-98
10	98•	38
11	102•	72
12	105•	-7
13	109•	42
-1	78	69
-2	78•	45
-3	78•	14
-4	108	-100
-5	157	-154
-6	82•	50
-7	167	169
-8	86•	-16
-9	89•	12
-10	92•	67
-11	142	134
-12	97•	-70
-13	171	-172
-14	104•	-7
-15	108•	5
-16	111•	-81
H= 1, L= 7		
0	169	-175
1	208	208
2	216	217
3	270	-293
4	107	-102
5	176	174
6	88•	-45
7	91•	-45
8	94•	58
9	133	116
10	100•	47
11	103•	31
12	107•	31
13	111•	21
-1	94	78
-2	259	268
-3	256	266
-4	206	-213
-5	234	-241
-6	84	86
-7	114	-125
-8	152	-148
-9	90•	38
-10	93•	-8
-11	96•	70
-12	105	101
-13	102•	-4
-14	105•	13
-15	109•	-3
H= -1, L= 7		
0	122	-122
1	78•	-54
2	79•	8
3	81•	23
4	81•	69
5	84•	56
6	86•	-51
7	89•	-10
8	92•	44
9	95•	-37
10	120	-91
11	101•	2
12	105•	-12
13	109•	-65
-1	171	-176
-2	173	166
-3	77•	-3
-4	129	-154
-5	162	168
-6	356	377
-7	83•	74
-8	85•	-70
-9	88•	62
-10	91	91
-11	151	-150
-12	167	-168
-13	100•	18
-14	121	101
-15	107•	-42
-16	111•	-23
H= 2, L= 7		
0	159	143
1	109	-94
2	114	-118
3	84•	-44
4	86•	-25
5	88•	69

Table 3 (*cont.*)

K	FC	FC
H=	2, L=	7
6	90•	-11
7	93•	4
8	76	84
9	99•	-10
10	102•	-43
11	105•	-43
12	108•	-26
-1	270	-274
-2	137	-137
-3	486	495
-4	212	214
-5	134	-130
-6	161	161
-7	143	141
-8	90•	-39
-9	138	-139
-10	95•	17
-11	97•	45
-12	100•	-74
-13	104•	-36
-14	107•	68
-15	111•	52
H=	-2, L=	7
0	76•	27
1	125	-139
2	127	-102
3	80•	38
4	153	-161
5	83•	56
6	279	278
7	88•	78
8	91•	82
9	100	113
10	97•	-10
11	101•	-29
12	104•	-35
13	108•	-30
-1	307	323
-2	119	113
-3	104	-100
-4	77•	-43
-5	357	376
-6	177	169
-7	246	-241
-8	85•	72
-9	210	191
-10	124	-115
-11	143	-130
-12	123	140
-13	186	195
-14	103•	-14
-15	107•	-5
-16	123	119
H=	3, L=	7
0	85•	83
1	85•	33
2	86•	-7
3	87•	61
4	89•	49
5	90•	-45
6	92•	-29
7	96•	-39
8	98•	-79
9	101•	-92
10	104•	-36
11	107•	-7
12	110•	0
-1	86•	-2
-2	204	-193
-3	118	-112
-4	141	149
-5	132	133
-6	89•	37
-7	91•	24
-8	108	99
-9	95•	92
-10	181	-188
-11	100•	-39
-12	103•	67
-13	106•	-68
-14	122	-105
H=	-3, L=	7
0	349	365
1	154	142
2	78	-86
3	113	124
4	153	161
5	143	-153
6	135	-128
7	88•	18
8	91•	68
9	94•	-10
10	97•	27
11	101•	87
12	104•	15
13	108•	-61
-1	89	-75
-2	214	-224
-3	76•	-40
-4	116	119
-5	119	-94
-6	405	-426
-7	179	-189
-8	85•	-75
-9	88•	-22
-10	90•	-46
-11	109	103
-12	132	144
-13	100•	-65
-14	103•	-33
-15	107•	-37
-16	123	-125
H=	4, L=	7
0	88•	58
1	89•	19
2	89	87
3	90•	-27
4	92•	49
5	91•	26
6	167	-152
7	98•	-39
8	101•	14
9	104•	1
10	107•	3
11	110•	44
-1	175	178
-2	89•	-36
-3	110	-117
-4	101	-99
-5	91•	41
-6	92•	-57
-7	144	-140
-8	95•	57
-9	154	137
-10	93	69
-11	102•	-30
-12	105•	13
-13	108•	94
-14	111•	0
H=	-4, L=	7
0	77•	43
1	396	390
2	153	148
3	80•	52
4	192	197

K	FO	FC
5	279	297
6	86•	-44
7	242	-232
8	91•	42
9	94	109
10	142	-129
11	101•	-27
12	152	134
13	108•	43
-1	307	-306
-2	76•	60
-3	77•	-27
-4	79•	-50
-5	80•	-6
-6	81•	-1
-7	83•	12
-8	186	203
-9	88•	37
-10	91•	-83
-11	94•	-80
-12	97•	-42
-13	100•	31
-14	104•	-81
-15	107•	-77
-16	111•	95
H=	5, L=	7
0	92•	54
1	118	-103
2	126	-122
3	94•	14
4	95•	9
5	102	-96
6	99•	-27
7	119	126
8	113	87
9	107•	-40
10	109•	30
-1	93•	70
-2	93•	-47
-3	114	-107
-4	94•	-36
-5	94•	-63
-6	95•	-67
-7	137	-121
-8	85	-77
-9	100•	-45
-10	103•	11
-11	105•	10
-12	108•	-4
-13	111•	61
H=	-5, L=	7
0	170	-160
1	153	-148
2	117	-105
3	81•	-40
4	92	-79
5	84•	53
6	184	176
7	89•	-20
8	92•	-58
9	95•	-2
10	98•	-20
11	102•	-72
12	105•	-54
13	109•	72
-1	78•	47
-2	150	-146
-3	133	125
-4	242	242
-5	81•	-12
-6	112	-101
-7	168	168
-8	122	106
-9	118	-136
-10	103	-90
-11	95•	27
-12	98	82
-13	101•	-64
-14	105•	-34
-15	153	158
H=	6, L=	7
0	140	-142
1	170	-191
2	96•	34
3	97•	47
4	98•	-60
5	100•	75
6	109	110
7	105•	8
8	107•	-6
9	110•	0
-1	97•	-34
-2	97•	0
-3	97•	-38
-4	98•	-60
-5	98•	58
-6	105	98
-7	101•	11
-8	88	-94
-9	104•	12
-10	106•	-10
-11	108	-108
-12	111•	-56
H=	-6, L=	7
0	80	80
1	128	-109
2	185	-186
3	147	-149
4	84•	-67
5	152	-140
6	88•	-73
7	91•	87
8	94•	28
9	97•	37
10	100•	50
11	103•	-4
12	106•	-18
13	110•	-58
-1	217	-229
-2	171	163
-3	348	348
-4	145	-146
-5	181	-179
-6	84•	18
-7	86•	19
-8	192	-195
-9	111	-98
-10	99	121
-11	152	144
-12	99•	-57
-13	103•	10
-14	150	130
-15	110•	6
H=	7, L=	7
0	100•	-73
1	133	142
2	100•	75
3	101•	-7
4	102•	53
5	104•	52
6	107•	-6
7	109•	-37
-1	118	-97
-2	101•	89
-3	101•	55
-4	114	-101
-5	102•	-49

K	FO	FC
-6	103•	43
-7	104	84
-8	106•	-3
-9	108•	4
-10	103	112
H=	-7, L=	7
0	224	-234
1	188	189
2	225	230
3	117	-120
4	86•	-73
5	88•	15
6	90•	-92
7	93•	-59
8	95•	-77
9	98•	-25
10	101•	64
11	104•	37
12	108•	31
13	112•	37
-1	300	289
-2	359	370
-3	330	-330
-4	258	-259
-5	86•	54
-6	211	203
-7	103	-124
-8	90•	20
-9	200	199
-10	96	86
-11	98•	-25
-12	101•	-26
-13	104•	56
-14	108•	4
-15	111•	-76
H=	8, L=	7
0	104•	60
1	105•	45
2	104•	-40
3	105•	-33
4	106•	-51
5	108•	-52
6	111•	-29
-1	105•	-50
-2	105•	-51
-3	106•	44
-4	106•	19
-5	136	-125
-6	107•	-45
-7	109•	-8
-8	110•	-26
-9	111•	-40
H=	-8, L=	7
0	148	116
1	155	-155
2	87•	44
3	278	288
4	88•	26
5	115	-115
6	118	96
7	106	94
8	98•	-28
9	118	-102
10	103•	-37
11	106•	29
12	110•	-29
-1	84•	58
-2	261	-269
-3	91	-68
-4	87•	-25
-5	212	219
-6	186	167
-7	91•	50
-8	93•	41
-9	96•	66
-10	98•	8
-11	101	-109
-12	104•	-71
-13	107•	-66
-14	110•	-19
H=	9, L=	7
0	109•	-29
1	109•	-17
2	109•	-36
3	110•	-91
-1	110•	-20
-2	110•	5
-3	110•	2
-4	111•	28
-5	111•	35
-6	112•	-62
H=	-9, L=	7
0	113	-106
1	138	-136
2	84	-94
3	208	-196
4	91•	36
5	99	77
6	155	-155
7	98•	12
8	146	127
9	103•	3
10	106	-99
11	109•	-33
-1	116	-118
-2	88•	30
-3	89•	19
-4	90•	56
-5	107	89
-6	92•	10
-7	129	-104
-8	101	-103
-9	99•	12
-10	101•	-49
-11	103•	-61
-12	106•	-49
-13	109•	94
H=	-10, L=	7
0	92•	29
1	93•	3
2	94•	-6
3	94•	-52
4	121	-129
5	97•	17
6	99•	-16
7	101•	-86
8	103•	43
9	106•	83
10	108•	48
11	111•	12
H=	-10, L=	7
-1	107	97
-2	92•	-37
-3	92•	-8
-4	94•	51
-5	95•	-57
-6	95•	-66
-7	172	-173
-8	99•	26
-9	102•	59
-10	104•	-48
-11	106•	21
-12	189	188

K	FO	FC
H=	-11, L=	7
0	96•	80
1	132	150
2	97•	70
3	98•	22
4	115	97
5	100•	1
6	102•	-70
7	104•	-45
8	106•	-33
9	109•	-36
H=	-11, L=	7
-1	95•	-71
-2	96•	-48
-3	90	85
-4	98•	-14
-5	99•	-32
-6	105	-98
-7	124	112
-8	154	165
-9	105•	2
-10	108•	7
-11	129	143
H=	-12, L=	7
0	146	-150
1	101•	-24
2	102•	60
3	102•	-54
4	102•	-41
5	160	179
6	106•	84
7	108•	-105
8	110•	-49
H=	-12, L=	7
-1	127	-124
-2	93	108
-3	100•	25
-4	102•	-77
-5	103•	-40
-6	103•	89
-7	105•	73
-8	107•	-38
-9	109•	-47
-10	111•	-21
H=	-13, L=	7
0	104•	-11
1	105•	-61
2	106•	30
3	106•	22
4	150	-150
5	108•	-24
6	160	154
H=	-13, L=	7
-1	132	122
-2	104•	57
-3	105•	8
-4	106•	-2
-5	107•	13
-6	107•	24
-7	109•	-76
-8	111•	-69
H=	-14, L=	7
0	109•	76
1	110•	38
2	110•	-5
3	109•	35
4	111•	3
H=	-14, L=	7
-1	108•	4
-2	109•	4
-3	109•	-14
-4	111•	-82
-5	112•	-34
H=	0, L=	8
0	166	177
1	86•	51
2	222	232
3	89•	-68
4	89•	-66
5	91•	38
6	93•	46
7	95•	-49
8	120	-93
9	101•	60
10	104•	83
11	107•	4
12	110•	12
-1	202	207
-2	107	-118
-3	84•	-18
-4	95	83
-5	140	-127
-6	162	-163
-7	90•	11
-8	93•	51
-9	93•	-5
-10	96•	-3
-11	174	173
-12	108	124
-13	117	-93
-14	108•	-39
-15	111•	60
H=	1, L=	8
0	86•	31
1	157	163
2	158	-161
3	99	-102
4	93•	104
5	150	146
6	95•	-27
7	97•	-41
8	132	128
9	102•	101
10	105•	11
11	108•	-17
-1	150	-145
-2	102	111
-3	182	192
-4	103	-82
-5	89•	-31
-6	90•	34
-7	86	-66
-8	115	-109
-9	96•	-27
-10	98•	26
-11	101•	-9
-12	104•	56
-13	107	95
-14	110•	-15
H=	-1, L=	8
0	110	-109
1	126	136
2	85•	-65
3	86•	-24
4	111	92

K	FO	FC
5	89•	39
6	91•	-68
7	94•	-23
8	90	-87
9	157	-157
10	103•	-56
11	106•	17
12	109•	-38
-1	260	-275
-2	83•	-40
-3	83•	65
-4	83•	24
-5	217	-197
-6	87•	80
-7	118	132
-8	92•	13
-9	92•	23
-10	96•	62
-11	98•	50
-12	178	-176
-13	155	-143
-14	107•	71
-15	110•	-19
H=	2, L=	8
0	89•	-18
1	109	-94
2	95	-93
3	91•	57
4	127	130
5	95•	-22
6	97•	-24
7	99•	77
8	102•	39
9	104•	-21
10	107•	-72
11	110•	-25
-1	89•	-14
-2	148	-145
-3	89•	-24
-4	186	195
-5	91•	49
-6	98	89
-7	94•	80
-8	96•	17
-9	98•	-87
-10	133	-133
-11	103•	16
-12	106•	-26
-13	109•	-86
-14	112•	31
H=	-2, L=	8
0	309	-316
1	83•	-49
2	154	170
3	86•	-97
4	86•	-73
5	113	111
6	140	128
7	93•	54
8	96•	30
9	99•	13
10	102•	-3
11	105•	-40
12	108•	-29
-1	158	145
-2	119	102
-3	82•	5
-4	83•	2
-5	94	87
-6	106	114
-7	88•	52
-8	151	-139
-9	92•	-28
-10	94•	-5
-11	233	-228
-12	100•	-44
-13	133	125
-14	106•	49
-15	110•	1
H=	3, L=	8
0	91•	3
1	103	-112
2	122	135
3	105	98
4	95•	-56
5	97•	-33
6	99•	-7
7	101•	-31
8	104•	-45
9	107•	-37
10	109•	-5
-1	92•	96
-2	92•	43
-3	98	-70
-4	114	-122
-5	152	168
-6	116	124
-7	97•	-31
-8	167	149
-9	170	158
-10	103•	6
-11	105•	-45
-12	108•	-5
-13	111•	33
H=	-3, L=	8
0	366	361
1	120	-109
2	84•	-46
3	150	166
4	86•	-60
5	220	-242
6	90•	66
7	174	180
8	96•	21
9	99•	13
10	102•	48
11	105•	40
12	108•	-27
-1	108	102
-2	82•	16
-3	82•	44
-4	109	-104
-5	84•	-63
-6	86•	-46
-7	156	-142
-8	91•	-47
-9	97	81
-10	94•	-76
-11	97•	21
-12	112	121
-13	103•	39
-14	106•	34
-15	110•	9
H=	4, L=	8
0	95•	52
1	112	119
2	96•	-11
3	97•	-31
4	98•	-43
5	100•	-72
6	108	-93
7	104•	38
8	107•	79
9	109•	-31
-1	95•	30
-2	199	199
-3	122	115

K	FO	FC
-4	122	-108
-5	97•	-11
-6	98•	62
-7	99•	-16
-8	101•	-41
-9	103•	70
-10	129	136
-11	108•	15
-12	110•	-42
H=	-4, L=	8
0	82•	-13
1	166	145
2	107	-86
3	85•	-27
4	118	124
5	88•	14
6	370	-383
7	151	-143
8	136	128
9	99•	-77
10	102•	-67
11	105•	94
12	108•	91
-1	108	-89
-2	82•	-41
-3	105	-88
-4	109	-85
-5	189	-180
-6	87•	-10
-7	108	-112
-8	85	-78
-9	92•	41
-10	95•	52
-11	97•	-25
-12	100•	-35
-13	103•	30
-14	107•	-31
-15	135	-141
H=	5, L=	8
0	98•	-12
1	116	-105
2	99•	-59
3	100•	8
4	102	-87
5	103•	-66
6	105•	85
7	107•	54
8	110•	-37
-1	99•	-46
-2	99•	-40
-3	99•	53
-4	99•	45
-5	100•	-4
-6	101•	-18
-7	103•	-37
-8	104•	-53
-9	106•	-96
-10	108•	-11
-11	111•	22
H=	-5, L=	8
0	83•	-46
1	212	-218
2	85•	-35
3	86•	-42
4	87•	-10
5	126	116
6	91•	22
7	148	-142
8	97•	20
9	99•	35
10	102•	-71
11	106•	-35
12	109•	32
-1	83•	-24
-2	296	-310
-3	83•	-11
-4	84•	34
-5	251	230
-6	132	135
-7	89•	70
-8	126	115
-9	93•	50
-10	96•	-93
-11	111	-102
-12	101•	83
-13	104•	25
-14	120	-92
-15	111•	42
H=	6, L=	8
0	102•	-34
1	102•	30
2	103•	59
3	104•	-33
4	105•	22
5	146	137
6	109•	29
7	111•	-58
-1	102•	-50
-2	102•	-5
-3	103•	35
-4	103•	4
-5	104•	-29
-6	105•	69
-7	106•	81
-8	108•	-39
-9	110•	28
-10	112•	38
H=	-6, L=	8
0	85•	21
1	109	-98
2	221	-237
3	148	-148
4	88•	-4
5	90•	33
6	92•	-3
7	95•	62
8	109	88
9	100•	41
10	103•	-3
11	106•	-13
12	110•	-34
-1	211	-215
-2	84•	34
-3	104	124
-4	174	191
-5	87•	9
-6	89•	-81
-7	91•	0
-8	94•	-10
-9	94•	-55
-10	97•	-48
-11	132	139
-12	102•	8
-13	99	-89
-14	110•	60
H=	7, L=	8
0	112	118
1	106•	90
2	107•	-9
3	108•	33
4	109•	69
5	111•	15
-1	106•	-46
-2	106•	-76
-3	107•	59

K	FC	FC
-4	107•	-14
-5	108•	-75
-6	109•	-6
-7	110•	39
-8	112•	15
H=	-7, L=	8
0	87•	16
1	185	193
2	88•	27
3	89•	-66
4	115	-123
5	92•	78
6	94•	-17
7	123	-119
8	99•	-6
9	102•	14
10	105•	33
11	108•	3
-1	86•	-53
-2	216	205
-3	137	158
-4	278	-266
-5	175	-178
-6	85	67
-7	131	-114
-8	95•	-52
-9	96•	68
-10	197	192
-11	101•	22
-12	104•	-29
-13	107•	71
-14	110•	-3
H=	8, L=	8
0	110•	54
1	111•	-39
2	111•	-39
-1	111•	67
-2	111•	-10
-3	111•	-29
-4	111•	40
-5	112•	9
H=	-8, L=	8
0	89•	-57
1	90•	-25
2	261	271
3	102	93
4	139	-118
5	94•	-44
6	107	129
7	99•	-35
8	134	-140
9	104•	-46
10	107•	5
11	110•	16
-1	99	99
-2	89•	-18
-3	134	-121
-4	222	-223
-5	85	73
-6	93•	50
-7	95•	-34
-8	98•	51
-9	98•	76
-10	101•	-60
-11	103•	-13
-12	106•	-25
-13	109•	-82
H=	-9, L=	8
0	92•	-88
1	92•	-59
2	94•	-50
3	88	68
4	95•	57
5	97•	-20
6	99•	-6
7	129	115
8	103•	83
9	106•	-64
10	109•	-52
H=	-9, L=	8
-1	145	-122
-2	86	72
-3	92•	-56
-4	93•	46
-5	94•	77
-6	96•	85
-7	99•	64
-8	100•	-32
-9	102•	-83
-10	103•	-40
-11	106•	-44
-12	133	-134
-13	111•	-5
H=	-10, L=	8
0	95•	-11
1	112	-88
2	90	-78
3	97•	-48
4	98•	-83
5	100•	-13
6	101•	-11
7	104•	-28
8	106•	68
9	108•	53
H=	-10, L=	8
-1	111	102
-2	95•	17
-3	95•	39
-4	96•	-27
-5	97•	-1
-6	99•	39
-7	114	-119
-8	103	-102
-9	104•	3
-10	106•	15
-11	109•	-73
-12	112•	70
H=	-11, L=	8
0	181	178
1	121	108
2	100•	34
3	101	96
4	101•	84
5	103•	-83
6	104•	-54
7	107•	-23
8	109•	-19
H=	-11, L=	8
-1	98•	45
-2	99•	-42
-3	98•	-22
-4	99•	26
-5	101•	62
-6	131	-120
-7	105•	-57
-8	113	102
-9	107•	58
-10	109•	-39

K	FO	FC
H=	-12, L=	8
0	102•	-11
1	96	93
2	104•	2
3	104•	-54
4	128	121
5	140	136
6	108•	-79
7	110•	-81
H=	-12, L=	8
-1	125	-120
-2	102•	-35
-3	102•	61
-4	103•	49
-5	104	-102
-6	107•	16
-7	102	103
-8	110•	12
-9	111•	-41
H=	-13, L=	8
0	119	-121
1	107•	-9
2	108•	-9
3	107•	-97
4	109•	-76
5	110•	106
H=	-13, L=	8
-1	106•	-39
-2	100	83
-3	106•	37
-4	107•	-39
-5	108•	46
-6	111•	35
-7	113•	-44
H=	-14, L=	8
0	111•	32
1	111•	-9
H=	-14, L=	8
-1	111•	41
-2	111•	14
-3	110•	31
H=	0, L=	9
0	111	114
1	92•	-30
2	93•	11
3	94•	-32
4	95•	-89
5	97•	7
6	99•	-34
7	101•	-81
8	104•	37
9	106	90
10	109•	18
-1	91•	-16
-2	91•	34
-3	91•	40
-4	91•	-9
-5	92•	-82
-6	105	-85
-7	95•	-50
-8	97•	7
-9	99•	78
-10	101•	-74
-11	104•	39
-12	228	204
-13	109•	23
H=	1, L=	9
0	93•	4
1	94•	-37
2	95•	-41
3	107	-82
4	97•	70
5	99•	18
6	101•	-52
7	103•	39
8	105	105
9	108•	4
-1	93•	29
-2	148	-148
-3	221	229
-4	142	140
-5	117	-118
-6	97•	34
-7	98•	-4
-8	122	-103
-9	108	-96
-10	104•	-69
-11	106•	-63
-12	109•	-55
-13	111•	78
H=	-1, L=	9
0	89•	67
1	114	110
2	91•	-69
3	93•	30
4	95•	79
5	97•	-39
6	139	-125
7	101•	-2
8	105•	-44
9	109•	-65
10	108•	23
-1	114	-108
-2	134	-133
-3	90•	28
-4	90•	-30
-5	170	-163
-6	92•	-26
-7	94•	75
-8	122	122
-9	98•	-63
-10	100•	-3
-11	158	147
-12	105•	-16
-13	108	-109
-14	111•	-36
H=	2, L=	9
0	111	99
1	96•	-41
2	97•	3
3	189	174
4	99•	13
5	101•	-16
6	103•	26
7	105•	70
8	107•	-54
9	110•	-109
-1	96•	-80
-2	117	-112
-3	97•	-43
-4	97•	-52
-5	98•	55
-6	97•	12
-7	106	-99
-8	102•	58
-9	104•	-5
-10	92	-92
-11	108•	-28

K	FO	FC
-12	111•	-77
H=	-2, L=	9
0	153	-176
1	89•	-46
2	90•	-8
3	103	-102
4	94•	42
5	152	145
6	97•	65
7	102	-108
8	104•	-10
9	108•	-16
10	107•	-58
11	110•	-13
-1	83	-88
-2	89•	35
-3	109	101
-4	126	-127
-5	90•	-23
-6	86	95
-7	93•	42
-8	130	-110
-9	97•	-74
-10	99•	7
-11	102•	-71
-12	143	-154
-13	107•	-65
-14	110•	18
H=	3, L=	9
0	98•	-15
1	99•	45
2	149	162
3	100•	-19
4	102•	-53
5	103•	41
6	105•	19
7	107•	-60
8	110•	-30
-1	135	115
-2	85	77
-3	131	-119
-4	117	-99
-5	101•	9
-6	101•	51
-7	103•	15
-8	104•	-15
-9	125	125
-10	133	107
-11	111•	-24
H=	-3, L=	9
0	88•	65
1	99	-101
2	89•	-3
3	92•	0
4	156	-164
5	96•	-31
6	137	153
7	119	116
8	104•	-6
9	107•	91
10	107•	101
11	110•	3
-1	88•	40
-2	153	160
-3	89•	-1
-4	89•	37
-5	165	137
-6	137	134
-7	93	-91
-8	142	-148
-9	97•	49
-10	99•	-42
-11	102•	-44
-12	104•	60
-13	107•	34
-14	110•	73
H=	4, L=	9
0	101•	4
1	102•	1
2	103•	-86
3	103•	-51
4	105•	21
5	106•	-55
6	108•	-36
7	110•	59
-1	102•	-2
-2	102•	12
-3	96	96
-4	103•	5
-5	104•	-45
-6	104•	26
-7	106•	25
-8	107•	-62
-9	109•	-70
-10	118	101
H=	-4, L=	9
0	88•	5
1	89•	77
2	145	-156
3	92•	0
4	94•	2
5	200	-196
6	124	-123
7	101•	77
8	104•	54
9	107•	-76
10	107•	25
11	116	107
-1	88•	-7
-2	88	-94
-3	133	-133
-4	104	-115
-5	110	-106
-6	112	-108
-7	93•	-61
-8	95•	61
-9	97•	56
-10	145	162
-11	102•	50
-12	105•	-62
-13	107•	38
-14	110•	66
H=	5, L=	9
0	104•	-49
1	139	-134
2	106•	-16
3	106•	1
4	108•	-67
5	109•	46
-1	105•	21
-2	105•	-16
-3	106•	12
-4	92	80
-5	107•	19
-6	108•	29
-7	109•	60
-8	110•	-3
-9	112•	-37
H=	-5, L=	9
0	89•	-53
1	89•	-64
2	90•	36
3	92•	63

K	FO	FC
4	94	84
5	96•	42
6	98•	-36
7	102•	-98
8	104•	26
9	108•	-41
10	100	-114
11	110•	19
-1	113	-114
-2	126	-142
-3	110	-110
-4	131	-113
-5	85	63
-6	92•	30
-7	94•	-14
-8	95•	-6
-9	165	171
-10	100•	1
-11	145	-137
-12	105•	18
-13	108•	67
-14	111•	-36
H=	6, L=	9
0	108•	-14
1	109•	60
2	109•	16
3	110•	-3
-1	102	-79
-2	109•	-5
-3	109•	10
-4	110•	-39
-5	111•	-20
-6	111•	25
-7	112•	63
H=	-6, L=	9
0	90•	58
1	90•	-30
2	91•	-29
3	87	68
4	89	97
5	97•	33
6	98•	-22
7	103•	84
8	105•	52
9	109•	-29
10	108•	-55
-1	90•	-7
-2	90•	16
-3	91•	-6
-4	225	249
-5	192	193
-6	93•	-27
-7	95•	-6
-8	132	130
-9	99•	-89
-10	156	-164
-11	103•	25
-12	106•	74
-13	109•	7
H=	7, L=	9
-2	112•	-23
H=	-7, L=	9
0	112	86
1	92•	69
2	93•	-88
3	95•	-81
4	97•	10
5	99•	17
6	100•	-76
7	104•	-72
8	107•	67
9	110•	66
10	109•	-12
-1	97	96
-2	92•	14
-3	291	290
-4	122	115
-5	250	-247
-6	95•	-33
-7	103	80
-8	125	-126
-9	106	-106
-10	96	84
-11	105•	51
-12	108•	-31
-13	110•	-7
H=	-8, L=	9
0	93•	-37
1	159	171
2	116	113
3	103	-101
4	99•	-60
5	101•	56
6	102•	30
7	130	-124
8	109•	-91
9	112•	27
H=	-8, L=	9
-1	93	-83
-2	179	189
-3	95•	-52
-4	299	-311
-5	96•	-10
-6	97•	38
-7	99•	-50
-8	100•	-16
-9	96	91
-10	104•	32
-11	107•	25
-12	109•	30
H=	-9, L=	9
0	96•	-22
1	96•	-64
2	103	100
3	99	106
4	101•	6
5	103•	32
6	116	98
7	108•	90
8	111•	-63
9	114•	-44
H=	-9, L=	9
-1	96•	-37
-2	108	-88
-3	97•	7
-4	97•	27
-5	98•	-26
-6	117	114
-7	101•	72
-8	102•	18
-9	104•	-66
-10	107•	3
-11	109•	32
H=	-10, L=	9
0	99•	-58
1	99•	-1
2	100•	-33
3	102•	-56
4	104•	-40

K	FO	FC
5	106•	15
6	106•	10
7	110•	33
8	114•	63
H=	-10, L=	9
-1	99•	19
-2	117	109
-3	100•	93
-4	100•	-25
-5	101•	50
-6	125	129
-7	104•	5
-8	123	-113
-9	107•	-2
-10	109•	32
H=	-11, L=	9
0	102•	67
1	102•	-60
2	104•	41
3	105•	20
4	107•	-90
5	133	-109
6	109•	-20
7	113•	13
H=	-11, L=	9
-1	165	137
-2	103•	-7
-3	103•	-70
-4	103•	2
-5	104•	59
-6	106•	-49
-7	120	-134
-8	108•	10
-9	110•	92
H=	-12, L=	9
0	134	115
1	106•	71
2	107•	-50
3	108•	107
4	183	189
5	112•	-21
H=	-12, L=	9
-1	106•	-93
-2	99	-102
-3	107•	10
-4	107•	39
-5	108•	-27
-6	109•	-64
-7	111•	41
H=	-13, L=	9
0	109•	-85
1	109•	13
2	111•	-37
H=	-13, L=	9
-1	116	-101
-2	110•	-12
-3	111•	29
-4	110•	-24
-5	111•	-11
H=	0, L=	10
0	102	84
1	109	-100
2	120	-113
3	96	-69
4	101•	-20
5	103•	-16
6	105•	-44
7	107•	31
8	109•	45
-1	97•	-12
-2	97•	-51
-3	98•	77
-4	98•	5
-5	99•	-42
-6	112	95
-7	113	-104
-8	103•	-80
-9	105•	81
-10	107•	-23
-11	109•	-37
-12	112•	62
H=	1, L=	10
0	98•	-34
1	114	-103
2	100•	-36
3	101•	14
4	103•	39
5	104•	0
6	106•	0
7	108•	66
-1	100•	-12
-2	100•	-40
-3	100•	-23
-4	100•	44
-5	101	84
-6	102•	-56
-7	103•	44
-8	105•	-11
-9	151	-126
-10	108•	-7
-11	111•	-24
H=	-1, L=	10
0	95•	60
1	96•	77
2	97•	-14
3	98•	67
4	100•	41
5	102•	-50
6	104•	-57
7	107•	-11
8	109•	15
-1	96•	70
-2	148	-142
-3	132	-109
-4	90	99
-5	97•	-9
-6	139	-150
-7	100•	-35
-8	130	137
-9	104•	60
-10	106•	-22
-11	108•	100
-12	103	99
H=	2, L=	10
0	101•	-27
1	101•	30
2	102•	46
3	97	98
4	105•	-22
5	107•	-41
6	108•	71
-1	102•	40
-2	102•	8
-3	102•	-65
-4	96	-86

K	FO	FC
-5	103•	-29
-6	97	90
-7	105•	-4
-8	107•	9
-9	109•	36
-10	110•	-41
H=	-2, L=	10
0	94•	33
1	95•	29
2	96•	29
3	97•	-44
4	136	134
5	107	99
6	103•	-61
7	106•	-32
8	108•	30
9	111•	-22
-1	111	-129
-2	157	-152
-3	121	101
-4	96•	33
-5	123	-119
-6	98•	5
-7	144	148
-8	101•	14
-9	103•	-7
-10	105•	-4
-11	107•	-26
-12	110•	-64
H=	3, L=	10
0	103•	25
1	104•	47
2	105	83
3	106•	-49
4	107•	-51
5	109•	19
-1	105•	-14
-2	105•	99
-3	105•	80
-4	112	-99
-5	112	-87
-6	107•	-5
-7	108•	-10
-8	109•	-57
-9	111•	-25
H=	-3, L=	10
0	124	-142
1	95•	27
2	96•	-15
3	114	-110
4	99•	-36
5	155	127
6	114	107
7	105•	-17
8	108•	-8
9	110•	65
-1	94•	-64
-2	183	193
-3	95•	60
-4	95•	-18
-5	96•	5
-6	97•	68
-7	98•	-58
-8	100•	-61
-9	102•	-44
-10	104•	-47
-11	107•	-31
-12	109•	-15
H=	4, L=	10
0	106•	20
1	107•	-26
2	108•	-51
3	109•	-13
-1	108•	-7
-2	108•	-10
-3	108•	81
-4	101	81
-5	109•	-18
-6	109•	-79
-7	111•	29
H=	-4, L=	10
0	94•	56
1	95•	-60
2	95•	41
3	97•	78
4	156	-141
5	100	-111
6	102•	53
7	105•	43
8	108•	-34
9	110•	21
-1	116	124
-2	94•	-35
-3	95•	59
-4	95•	7
-5	96•	-59
-6	97•	2
-7	98•	31
-8	100•	-38
-9	102•	-11
-10	105•	61
-11	125	123
-12	109•	55
H=	5, L=	10
0	109•	-10
1	110•	11
-1	111•	-33
-2	111•	-37
-3	111•	-22
-4	111•	37
-5	113•	34
H=	-5, L=	10
0	94•	51
1	95•	56
2	96•	46
3	97•	18
4	99•	40
5	101•	-72
6	103•	-82
7	105•	-36
8	108•	-39
9	110•	-82
-1	95•	-18
-2	95•	25
-3	95•	-57
-4	211	-222
-5	102	-89
-6	129	109
-7	99•	27
-8	101•	-55
-9	131	110
-10	117	129
-11	107•	-50
-12	117	-105
H=	-6, L=	10
0	95•	4
1	90	-93
2	97•	56
3	159	145
4	100•	5
5	101•	-18

Table 3 (*cont.*)

K	FO	FC
H= -6, L= 10		
6	103•	46
7	106•	57
8	109•	-37
9	111•	-69
-1	147	125
-2	96•	9
-3	96•	-87
-4	145	142
-5	246	248
-6	110	107
-7	100•	-64
-8	102•	50
-9	104•	59
-10	106•	-89
-11	108•	-86
-12	111•	45
H= -7, L= 10		
0	128	135
1	97•	-54
2	170	-162
3	99•	30
4	101•	65
5	103•	-59
6	104•	-80
7	120	94
8	123	114
H= -7, L= 10		
-1	97•	30
-2	97•	-45
-3	146	150
-4	213	214
-5	99•	69
-6	137	-125
-7	101•	25
-8	103•	0
-9	170	-145
-10	107•	-37
-11	109•	51
H= -8, L= 10		
0	98•	63
1	116	113
2	100•	-43
3	142	-125
4	102•	45
5	104•	51
6	106•	-79
7	108•	-82
8	111•	53
H= -8, L= 10		
-1	92	-102
-2	99•	-6
-3	126	118
-4	122	-131
-5	198	-195
-6	102•	43
-7	103•	-51
-8	105•	-49
-9	107•	80
-10	109•	31
-11	111•	-6
H= -9, L= 10		
0	100•	-6
1	101•	51
2	102•	58
3	103•	39
4	104•	3
5	106•	61
6	108•	48
7	111•	-37
H= -9, L= 10		
-1	113	-101
-2	101•	-56
-3	101•	-54
-4	102•	-37
-5	103•	-46
-6	104•	-66
-7	105•	90
-8	141	117
-9	109•	-27
-10	111•	3
H= -10, L= 10		
0	103•	-66
1	103•	60
2	104•	-24
3	105•	-74
4	107•	48
5	127	112
6	110•	1
H= -10, L= 10		
-1	103	-110
-2	103•	80
-3	168	168
-4	104•	-19
-5	105•	-41
-6	140	134
-7	114	108
-8	109•	-70
-9	111•	-60
H= -11, L= 10		
0	106•	-62
1	106•	-38
2	107•	53
3	108•	-73
4	177	-164
H= -11, L= 10		
-1	106•	84
-2	106•	101
-3	107•	-39
-4	107•	-93
-5	108•	41
-6	109•	56
-7	111•	-107
H= -12, L= 10		
0	109•	81
1	109•	-33
2	110•	35
H= -12, L= 10		
-1	110•	40
-2	110•	-72
-3	103	-96
-4	110•	-15
-5	111•	8
H= 0, L= 11		
0	103•	7
1	104•	-59
2	105•	-60
3	106•	7
4	107•	-41
5	109•	-16
-1	105•	-6
-2	104•	23
-3	104•	34
-4	105•	20
-5	105•	-29
-6	105•	21
-7	107•	-2
-8	108	-93
-9	110•	-30
H= 1, L= 11		
0	105•	-48
1	106•	-46
2	107•	60
3	108•	33
4	109•	29
-1	106•	-28
-2	106•	-71
-3	106•	-27
-4	107•	-21
-5	107•	-5
-6	108•	49
-7	109•	20
-8	111•	51
H= -1, L= 11		
0	103•	41
1	104•	-50
2	105•	61
3	106•	18
4	108•	-68
5	109•	-57
6	111•	-15
-1	200	180
-2	103•	-3
-3	103•	-65
-4	103•	-6
-5	104•	100
-6	104•	-45
-7	139	-130
-8	107•	67
-9	115	88
-10	110•	-53
H= 2, L= 11		
0	107•	-27
1	108•	75
2	109•	69
-1	109•	-36
-2	108•	40
-3	109•	-2
-4	109	-113
-5	110•	5
-6	110•	13
-7	112•	-8
H= -2, L= 11		
0	125	134
1	103•	4
2	104•	-26
3	123	131
4	113	130
5	108•	-59
6	110•	-59
-1	102•	3
-2	164	-136
-3	102•	-14
-4	130	140
-5	103•	-27
-6	103•	-53
-7	104•	84
-8	99	91
-9	107•	9
-10	109•	12
H= 3, L= 11		
0	110•	57
-1	111•	-32
-2	111•	3
-3	111•	82
-4	111•	42
H= -3, L= 11		
0	101•	-29
1	102•	3
2	103•	-59
3	117	-90
4	106•	49
5	107•	98
6	109•	-46
7	111•	-20
-1	107	-109
-2	101•	-42
-3	101•	70
-4	101•	-19
-5	102•	-24
-6	103•	67
-7	104•	11
-8	105•	-18
-9	107•	-21
-10	109•	-63
H= -4, L= 11		
0	101•	4
1	102•	-22
2	103•	-29
3	104•	-49
4	106•	-93
5	107•	-17
6	109•	54
7	111•	-15
H= -4, L= 11		
-1	101•	83
-2	101•	59
-3	101•	78
-4	101	113
-5	102•	-17
-6	103•	-96
-7	104•	16
-8	105•	-30
-9	107•	-76
-10	109•	-15
H= -5, L= 11		
0	101•	85
1	96	97
2	103•	-11
3	104•	-19
4	106•	2
5	107•	-51
6	109•	-74
7	111•	-21
H= -5, L= 11		
-1	101•	-67
-2	101•	33
-3	143	129
-4	102•	-61
-5	165	-148
-6	145	117
-7	110	114
-8	105•	-49
-9	107•	7
-10	168	149
H= -6, L= 11		
0	120	-98
1	103•	-37
2	116	115
3	105•	31
4	106•	-68
5	108•	46
6	110•	79
H= -6, L= 11		
-1	102•	-9
-2	102•	36
-3	102•	-96
-4	149	-161
-5	115	94
-6	171	146
-7	105•	2
-8	106•	2
-9	108•	84
-10	110•	13
H= -7, L= 11		
0	103•	-41
1	104	-86
2	105•	-35
3	124	106
4	107•	37
5	109•	-41
6	111•	49
H= -7, L= 11		
-1	103•	39
-2	103•	-24
-3	103•	-57
-4	103•	98
-5	97	91
-6	104•	-19
-7	106•	-62
-8	107•	-31
-9	109•	-18
H= -8, L= 11		
0	98	84
1	105•	-15
2	106•	-38
3	107•	-4
4	109•	17
5	110•	-14
H= -8, L= 11		
-1	105•	42
-2	104•	-29
-3	104•	34
-4	105•	4
-5	105•	-88
-6	106•	-82
-7	107•	-67
-8	109•	-73
-9	110•	-46
H= -9, L= 11		
0	106•	62
1	107•	35
2	108•	-4
3	109•	17
4	111•	12
H= -9, L= 11		
-1	106•	-46
-2	106•	-59
-3	106•	-55
-4	107•	-54
-5	107•	17
-6	108•	-70
-7	109•	-43
-8	103	122
H= -10, L= 11		
0	109•	11
1	110•	19
2	110•	-86
3	111•	6
H= -10, L= 11		
-1	102	-90
-2	121	-101
-3	108•	80
-4	128	118
-5	109	-100
-6	110•	-9
H= -11, L= 11		
0	112•	-10
H= -11, L= 11		
-1	111•	-43
-2	111•	78
-3	130	129
H= 0, L= 12		
-1	110•	-38
-2	110•	-27
-3	124	100
-4	112•	11
H= -1, L= 12		
0	110•	-25
1	110•	-19
H= -1, L= 12		
-1	109•	50
-2	121	109
-3	110•	7
-4	110•	-44
-5	111•	33
-6	111•	54
H= -2, L= 12		
0	109•	54
1	109•	-61
2	110•	51
H= -2, L= 12		
-1	132	108
-2	109•	-58
-3	109•	-69
-4	109•	17
-5	110•	21
-6	110•	-7
-7	112•	-29
H= -3, L= 12		
0	108•	-16
1	109•	-34
2	109•	-48
3	111•	39
H= -3, L= 12		
-1	107•	-62
-2	108•	-71
-3	108•	-21
-4	108•	-7
-5	109•	36
-6	110•	48
-7	111•	11
H= -4, L= 12		
0	108•	-18
1	108•	-32
2	109•	-74
3	110•	-52
H= -4, L= 12		
-1	107•	-14
-2	107•	5
-3	108•	-41
-4	108•	37
-5	109•	69
-6	109•	-60
-7	111•	-78
H= -5, L= 12		
0	108•	105
1	108•	30
2	109•	-17
3	110•	-4
H= -5, L= 12		
-1	107•	64
-2	108•	-49
-3	132	119
-4	121	114
-5	133	-134
-6	110•	-80
-7	111•	57
H= -6, L= 12		
0	108•	-4
1	115	104
2	110•	58
3	111•	-7
H= -6, L= 12		
-1	137	-111
-2	108•	27
-3	108•	2
-4	144	-138
-5	109•	-65
-6	110•	39
-7	111•	71
H= -7, L= 12		
0	115	-98
1	109•	-29
2	110•	58
H= -7, L= 12		
-1	108•	8
-2	109•	-4
-3	109•	-68
-4	109•	-6
-5	110•	5
-6	111•	28
H= -8, L= 12		
0	110•	12
1	111•	-65
H= -8, L= 12		
-1	109•	62
-2	110•	23
-3	110•	59
-4	111•	7
-5	111•	-8
H= -9, L= 12		
-2	112•	22

Table 4. *Summary of the agreement between the chemically equivalent bonds* (Å) *and angles* (°)

Bond	Number	Range	σ(r.m.s.)	Mean	χ^2	*P* limits
P–N	6	1·584–1·610	0·006	1·597	10·65	0·10–0·05
P–C	6	1·799–1·811	0·007	1·804	2·11	0·95–0·50
Angle						
N–P–N	3	117·4–118·2	0·3	117·8	3·56	0·20–0·10
P–N–P	3	121·3–123·0	0·4	122·1	9·14	0·05–0·01
C–P–C	3	103·3–104·4	0·3	103·8	6·78	0·05–0·01
C–P–N	12	108·2–109·4	0·3	108·6	21·67	0·05–0·01

Discussion

Bond lengths and angles

All atoms of the same molecule of hexaphenylcyclotriphosphazene are crystallographically independent, whereas there is a plane of symmetry through a P···N diagonal and normal to the cyclotriphosphazene ring in the hexafluoro, hexachloro, and hexabromo analogues. The hexaphenyl derivative, therefore, has six crystallographically independent P–N bonds, while each of the three hexahalogen compounds has three only.

The agreement among chemically equivalent bonds and angles in the hexaphenyl molecule is summarized in Table 4, where the values of χ^2 and *P* indicate clearly that the observed discrepancies among chemically equivalent bonds are not significant. Some of the observed differences among the chemically equivalent angles, however, are in the possibly significant range with a maximum deviation of 0·9° (σ=0·4). The thirty-six C–C bonds vary in length from 1·357 to 1·397 Å, with a mean of 1·379 Å which is virtually the same as that (1·377 Å) for the diphenyl and tetraphenyl molecules (Mani, Ahmed & Barnes, 1965, 1966). The difference of 0·015 Å between the mean C–C bond length in hexaphenylcyclotriphosphazene and 1·394 Å for a C–C aromatic bond (Sutton, 1965) can be attributed to the omission of thermal-vibration corrections in the present investigation.

Planarity of the rings

The equations for the unweighted mean planes through the cyclotriphosphazene and each of the six phenyl rings, calculated by the method of Blow (1960), and referred to orthogonal axes, x' along a, y' in the ab plane, and z' along c^* (where x',y',z' are in Å) are as follows:

Cyclotriphosphazene [N(1) to P(6)]

$$0{\cdot}2181x'-0{\cdot}2209y'+0{\cdot}9506z'-1{\cdot}4521=0\,, \tag{1}$$

Phenyl I [C(1) to C(6)]

$$0{\cdot}7952x'+0{\cdot}2866y'+0{\cdot}5344z'-4{\cdot}9672=0\,, \tag{2}$$

Phenyl II [C(7) to C(12)]

$$0{\cdot}1175x'+0{\cdot}9046y'-0{\cdot}4097z'-3{\cdot}2246=0\,, \tag{3}$$

Phenyl III [C(13) to C(18)]

$$0{\cdot}8577x'+0{\cdot}3622y'+0{\cdot}3650z'-2{\cdot}9562=0\,, \tag{4}$$

Phenyl IV [C(19) to C(24)]

$$0{\cdot}3685x'-0{\cdot}5698y'-0{\cdot}7345z'+2{\cdot}9167=0\,, \tag{5}$$

Phenyl V [C(25) to C(30)]

$$0{\cdot}3022x'+0{\cdot}8845y'-0{\cdot}3554z'-1{\cdot}4778=0\,, \qquad (6)$$

Phenyl VI [C(31) to C(36)]

$$0{\cdot}1701x'-0{\cdot}5493y'-0{\cdot}8181z'+0{\cdot}9995=0\,. \qquad (7)$$

For these planes, $\chi^2=377$, 1·3, 2·3, 1·8, 1·1, 1·4, 2·9, respectively, and therefore only the atoms of the P_3N_3 ring deviate significantly from their mean plane; the six C atoms of each phenyl ring are coplanar within the accuracy of the present determination.

A projection of the molecule (excluding the H atoms) along a normal to plane (1) showing the perpendicular distances of the atoms from this plane is presented in Fig. 3. The four atoms, N(1), P(2), P(4), N(5) are exactly coplanar while N(3) and P(6) are off this plane on opposite sides with P(6) at a greater distance (+0·072 Å) than N(3) (−0·031 Å). The P_3N_3 ring, therefore, has an irregular slight chair form with a mirror plane normal to the mean plane of the ring and through the P(6)···N(3) diagonal. The deviation from planarity cannot be attributed to intermolecular interactions because there are no abnormally short intermolecular distances. Each N atom, however, is situated approximately half way between two H atoms of the same molecule at distances which are slightly shorter than the sum (2·7 Å) of the van der Waals radii, thus N(1)···H(6), 2·62; N(1)···H(32), 2·65; N(3)···H(12), 2·60; N(3)···H(24), 2·55; N(5)···H(14), 2·54; N(5)···H(30), 2·57 Å. The relatively even distribution of these distances, and the small, but significant, departure of the P_3N_3 ring from exact planarity, may be the result of weak intramolecular interactions between each N atom and the two nearest H atoms.

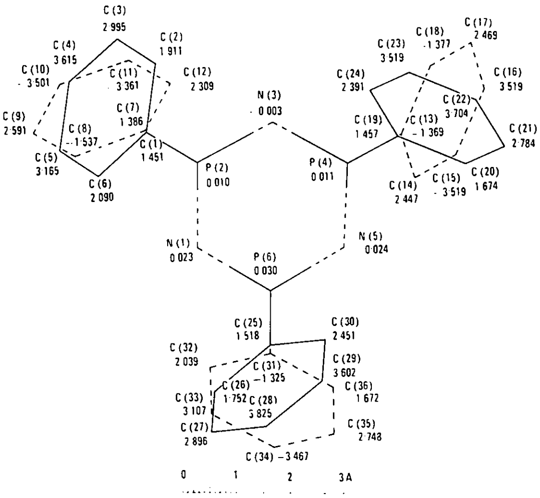
C (3)
2 995
C (2)
1 911
C (4)
3 615
C (10)
- 3 501
C (11)
3 361
C (12)
2 309
C (9)
2 591
C (7)
1 386
C (8)
-1 537
C (1)
1 451
C (5)
3 165
C (6)
2 090
N (3)
0 003
P (2)
0 010
P (4)
0 011
C (17)
2 469
C (18)
1 377
C (23)
3 519
C (24)
2 391
C (16)
3 519
C (22)
3 704
C (19)
1 457
C (13)
- 1 369
C (21)
2 784
C (14)
2 447
C (15)
- 3 519
C (20)
1 674
N (1)
0 023
P (6)
0 030
N (5)
0 024
C (25)
1 518
C (30)
2 451
C (32)
2 039
C (31)
−1 325
C (29)
3 602
C (26)
1 752
C (28)
3 825
C (36)
1 672
C (33)
3 107
C (27)
2 896
C (35)
2 748
C (34) −3 467
0
1
2
3 Å

Fig. 3. Normal projection of the molecule onto the unweighted mean plane of the P_3N_3 ring, and distances (Å) of the atoms from it. E.s.d.'s of the normal distances are 0·002, 0·006 and 0·007 Å for P, N and C, respectively.

The dihedral angles between the cyclotriphosphazene ring and each of the six phenyl rings vary from 51·7 to 63·0°, with a mean of 57·5°, compared with mean values of 54·4° in the tetraphenyldichloro, and 51·8° in the diphenyltetrachloro molecules. Those between each pair of phenyl rings attached to the same P atom vary from 80·9 to 82·3°, with a mean of 81·6°, compared with mean values of 87·5 and 83·7° in the other two derivatives, respectively. Finally, the dihedral angles between pairs of adjacent phenyl rings which are *cis* with respect to the P_3N_3 ring vary from 69·4 to 82·4°, with a mean of 75·8°, compared with a mean of 86·4° in the two molecules of the asymmetric unit of the tetraphenyldichloro compound.

Residual electron-density distribution

A difference synthesis evaluated at the end of the refinement, and with all atoms subtracted, shows a

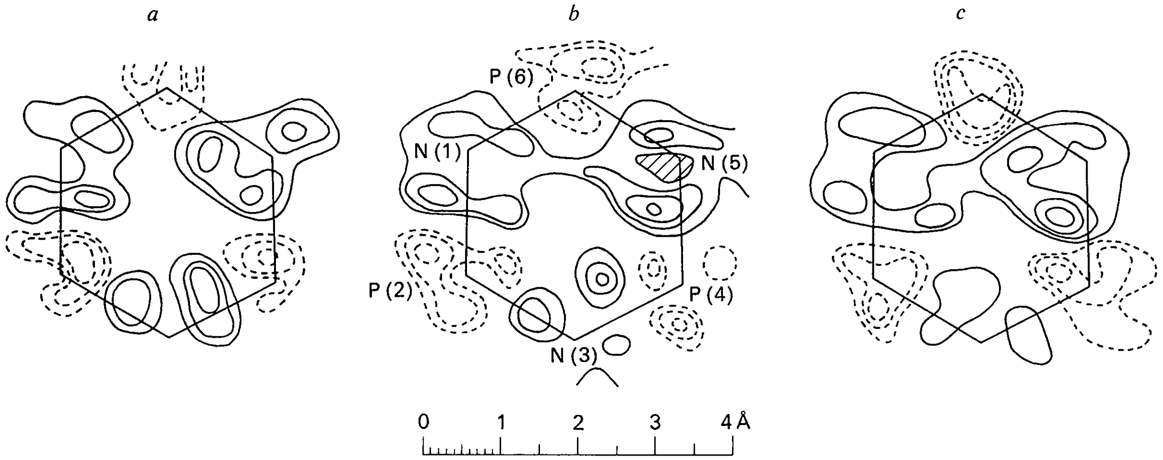

Fig. 4. Residual electron-density distribution (*a*) at +0·4 Å from the mean plane of the P_3N_3 ring, (*b*) in the plane of the P_3N_3 ring, (*c*) at −0·4 Å from the mean plane of the P_3N_3 ring; first contour at ±0·1 e.Å^{-3}, then at intervals of ±0·05 e.Å^{-3}.

residual electron-density distribution of less than ±0·25 e.Å^{-3} [$\sigma(\Delta\varrho)=0{\cdot}09$]. The largest positive concentrations occur on, or near, the P–N bonds close to the sites of the N atoms, and on some of the P–C bonds near the sites of the C atoms, while the largest negative ones appear near the sites of the three P atoms. Three sections (in the mean plane of the P_3N_3 ring and at ±0·4 Å from it) are shown in Fig. 4. The residual concentrations of electron density near the sites of the N atoms may be indicative of delocalization of the lone pair of electrons of each of these atoms as previously mentioned (Mani, Ahmed & Barnes, 1965, p. 697) in connection with the diphenyltetrachloro derivative.

Effects of the ligands on the cyclotriphosphazene ring

The electronegativities of the ligands on the phosphonitrilic trimers, $(R_2PN)_3$, where R = C_6H_5 (present paper), Br (Giglio & Puliti, 1967), Cl (Pompa & Ripamonti, 1959; Giglio, 1960; Wilson & Carroll, 1960), F (Dougill, 1963), are 2·5 (for C), 2·8, 3·0, 4·0, respectively, and cover half of the electronegativity scale of Pauling (1960, p. 93). The effect of the ligands' electronegativity on the P–N bond lengths, the exocyclic R–P–R angles, and the internal N–P–N and P–N–P angles is shown in Fig. 5 [(*a*), (*b*) and (*c*), respectively], where the circles represent the weighted mean values and the vertical lines designate their e.s.d.'s. (The results of Giglio, 1960, and Wilson & Carroll, 1960, have been combined for R = Cl.) It is clear from Fig. 5(*a*) that an increase in the ligands' electronegativity results in a systematic decrease in the P–N bond length, which can be accounted for by more efficient overlap of the orbitals of the P and N atoms with a consequent increase in the P–N bond strength and total bond energy. At the same time, there is a systematic decrease in the exocyclic R–P–R angle (103·8, 102·6, 102·1, 99·2°) as demonstrated in Fig. 5(*b*). This is accompanied by a tendency for the internal N–P–N angle to increase (117·8, 117·2, 119·2, 119·4°) and the P–N–P angle to decrease (122·1, 122·4, 121·6, 120·5°), as illustrated in Fig. 5(*c*), but these changes are neither systematic nor uniform, although the average internal angle in each P_3N_3 ring remains very close to 120° regardless of R [see the dotted line in Fig. 5(*c*)]. Consequently, the P_3N_3 ring has a *slight* chair form when R = C_6H_5, Br, or Cl, and becomes planar when R = F.

In the cyclotriphosphazenes with mixed substituents, the two P–N bonds in a P–N–P segment are, in general, dependent on the relative electronegativities of the two pairs of substituents on the two bordering P atoms of the segment. When the two pairs of ligands are the same, the two intermediate P–N bonds are of equal lengths (as in the $(R_2PN)_3$ molecules). However, when the two pairs of ligands are different, the P–N bond on the side of the P atom with the more electronegative pair of substituents is appreciably shorter than that on the other side, but the overall mean of both bonds decreases as the overall mean electronegativity of both pairs of ligands increases.

In $(C_6H_5)_2Cl_4P_3N_3$ (Mani, Ahmed & Barnes, 1965) the mean P–N bond length is 1·555 Å on the Cl, Cl side, and 1·613 Å on the C_6H_5, C_6H_5 side, of N in the same P–N–P segment; the average electronegativity of all four ligands is $\frac{1}{2}$(3·0 for Cl + 2·5 for C) = 2·75, and the mean of both bond lengths is 1·584 Å shown as cross (1) in Fig. 5(*a*). In $(C_6H_5)_4Cl_2P_3N_3$ (Mani, Ahmed & Barnes, 1966) the corresponding mean bond lengths are 1·556 and 1·609 Å, respectively, and the overall mean is 1·582 Å shown as cross (2) in Fig. 5(*a*). In $(C_6H_5)_2F_4P_3N_3$ (Allen, Moeller & Paul, 1968) they are 1·537 (F, F replacing Cl, Cl) and 1·599 Å, respectively, and the overall mean is 1·568 Å shown as cross (3) in Fig. 5(*a*); the average electronegativity in this case is $\frac{1}{2}$(4·0 for F + 2·5 for C) = 3·25. All three crosses, (1), (2), (3), are within $\pm 0{\cdot}001_5$ Å of the 'P–N bond length *versus* electronegativity' curve.

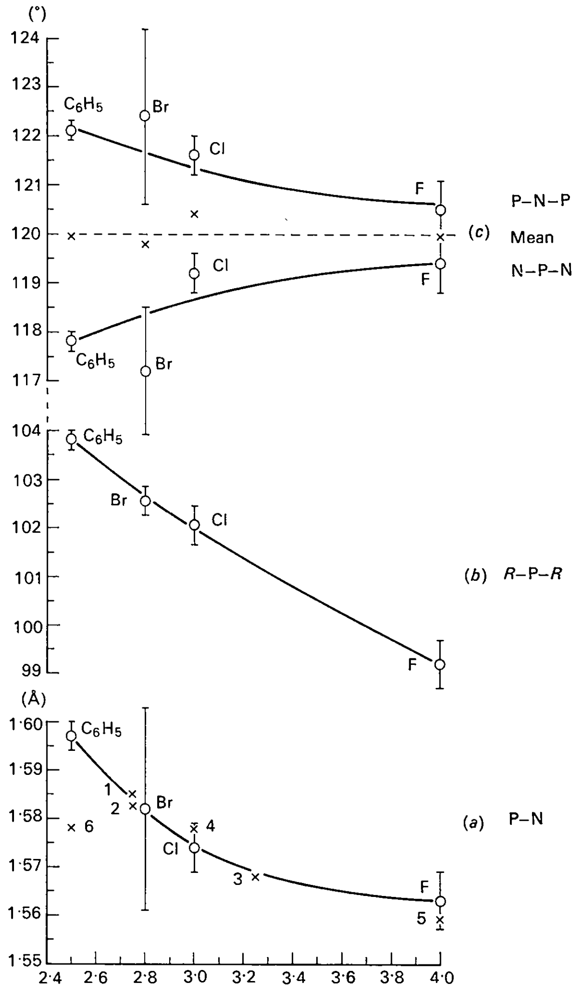

Fig. 5. Graphs of (*a*) P–N bond lengths (Å), (*b*) R–P–R bond angles (°) and (*c*) N–P–N and P–N–P bond angles (°) *versus* the mean electronegativity of the substituents when R = C_6H_5, Br, Cl, F in the trimeric phosphonitriles $(R_2PN)_3$. Vertical lines represent e.s.d.'s of weighted means. See text for crosses (1) to (6).

In the P–N–P segment of the P_3N_3 ring in $(C_6H_5)_2Cl_4P_3N_3$, where all four substituents on the P atoms are Cl atoms, the two P–N bonds have the same length, 1·578 Å ($\sigma_m=0{\cdot}003_5$), and in the corresponding segment in $(C_6H_5)_2F_4P_3N_3$ the two bonds also have equal lengths, 1·559 Å ($\sigma_m=0{\cdot}01$); these two bond lengths are shown as crosses (4) and (5) in Fig. 5(*a*) and are off the curve by only 0·003 and 0·004 Å, respectively.

All the aforementioned results are consistent in confirming that the mean P–N bond length in a P–N–P segment is uniformly dependent on the average electronegativity of the four substituents on the two P atoms bordering the segment. This rule, however, does not appear to be directly applicable when the four substituents are similar and *less* electronegative than the remaining two ligands of the P_3N_3 ring. Such a configuration occurs in the $(C_6H_5)_4Cl_2P_3N_3$ molecules, where the two P–N bonds in the $P(C_6H_5)_2$–N–$P(C_6H_5)_2$ segment are 1·580, 1·579 Å in molecule I, 1·582, 1·573 Å in molecule II, and the overall mean is 1·578 Å ($\sigma_m=0{\cdot}004$) which is significantly shorter than the value of 1·597 Å ($\sigma_m=0{\cdot}003$) for the mean P–N bond length in $(C_6H_5)_6P_3N_3$ by 0·019 Å ($t=3{\cdot}8$); see cross (6) in Fig. 5(*a*). Furthermore, the P–N–P angle in this segment is 124·9° ($\sigma_m=0{\cdot}4$) which is appreciably larger than the corresponding value of 122·1° ($\sigma_m=0{\cdot}2$) in $(C_6H_5)_6P_3N_3$. According to Craig & Paddock (1962), however, an increase in this angle is indicative of increased migration of the lone-pair electrons of the N atoms. This may account for both observed features (short P–N bonds, and large P–N–P angle) of the $P(C_6H_5)_2$–N–$P(C_6H_5)_2$ segment in $(C_6H_5)_4Cl_2P_3N_3$. It is noteworthy also that the mean length of the adjacent P–N bonds, which have the P atoms of this segment in common, is 1·609 Å so that the overall mean value of the P–N bonds in, and adjacent to, the segment is 1·594 Å which is less than the P–N bond length in $(C_6H_5)_6P_3N_3$ by only 0·003 Å. The tendency of the P atoms in a N–$P(C_6H_5)_2$–N–$P(C_6H_5)_2$–N segment to gain electrons from the adjacent N atoms, therefore, appears to be the same in $(C_6H_5)_4Cl_2P_3N_3$ as in $(C_6H_5)_6P_3N_3$ but is not distributed uniformly in the former, presumably because of the greater electronegativity of the pair of Cl atoms on the third P of the P_3N_3 ring compared with that of the pair of C_6H_5 groups in the hexaphenyl derivative. It would be interesting to find out if these features occur in $(C_6H_5)_4F_2P_3N_3$.

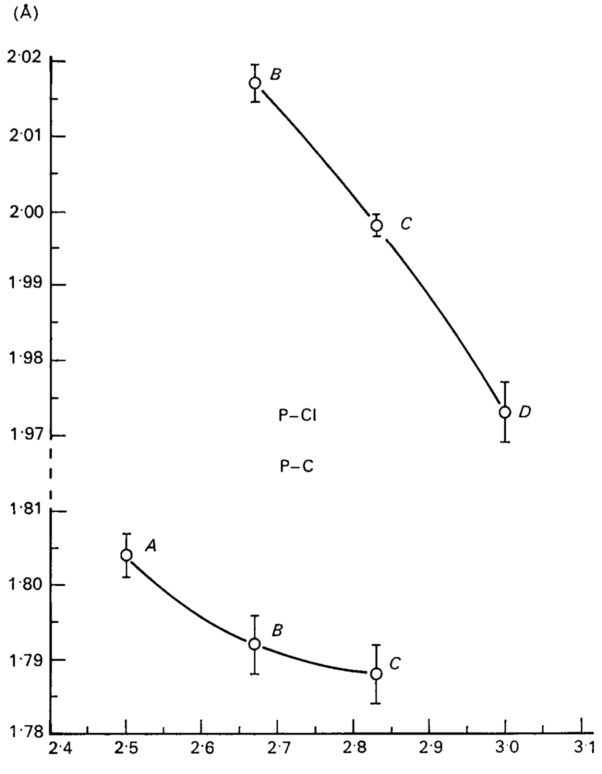

Fig. 6. The weighted mean P–C and P–Cl bond lengths (Å) *versus* the overall mean electronegativity of the six substituents in the molecules of (*A*) hexaphenyl-, (*B*) tetraphenyldichloro- (*C*) diphenyltetrachloro-, and (*D*) hexachlorocyclotriphosphazene; e.s.d.'s of means indicated by vertical lines.

Finally, in the phenylchlorocyclotriphosphazene series, $(C_6H_5)_xCl_yP_3N_3$, where $x=0,2,4,6$, $y=6,4,2,0$, and $x+y=6$, the P–C and P–Cl bond lengths, particularly the latter, appear to be influenced by the mean electronegativity [$\frac{1}{6}(x\times 2{\cdot}5$ for C $+\,y\times 3{\cdot}0$ for Cl$)=2{\cdot}50$ when $x=6, y=0$; 2·67 when $x=4, y=2$; 2·83 when $x=2, y=4$; 3·00 when $x=0, y=6$] of all six ligands. Thus, the weighted mean P–C bond length is 1·804 Å ($\sigma_m=0{\cdot}003$) in $(C_6H_5)_6P_3N_3$, 1·792 Å ($\sigma_m=0{\cdot}004$) in $(C_6H_5)_4Cl_2P_3N_3$, and 1·788 Å ($\sigma_m=0{\cdot}004$) in $(C_6H_5)_2Cl_4P_3N_3$, and the weighted mean P–Cl bond length is 2·017 Å ($\sigma_m=0{\cdot}003$) in $(C_6H_5)_4Cl_2P_3N_3$, 1·998 Å ($\sigma_m=0{\cdot}001$) in $(C_6H_5)_2Cl_4P_3N_3$, and 1·973 Å ($\sigma_m=0{\cdot}004$) in $Cl_6P_3N_3$. These results are shown graphically in Fig. 6 where the P–R bond lengths (R = C, Cl) have been plotted against the overall mean electronegativity of the six ligands. Both the mean P–C and the mean P–Cl bond lengths decrease regularly with increassing average electronegativity of all the exocyclic groups.

Further analysis and interpretation of the results of the crystal structure investigations of the cyclotriphosphazenes is left to those actively engaged in molecular orbital theory.

Crystals for the present investigation were supplied by Dr R. A. Shaw, and some preliminary work on the space group was carried out by Dr N. V. Mani. The computer programs for the IBM 360 system were written by Ahmed, Hall, Pippy & Huber (1966). Data preparation was carried out by Mrs M. E. Pippy, and the programs were run by the staff of the N.R.C. Computation Centre. A copy of a forthcoming paper on diphenylphosphonitrilic fluoride trimer (diphenyltetrafluorocyclotriphosphazene) by Allen, Moeller & Paul (1968) was courteously provided by Dr C. W. Allen.

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Crystal Structure of *N*-Salicylideneglycinatoaquocopper(II) Tetrahydrate

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N-Salicylideneglycinatoaquocopper(II) tetrahydrate, $[\mathrm{Cu(C_9H_7NO_3).(H_2O)}].4\mathrm{H_2O}$, crystallizes in the monoclinic space group $C2/c$, with eight formula units per unit cell, of dimensions, $a=10{\cdot}721$, $b=17{\cdot}769$, $c=13{\cdot}895$ Å, $\beta=94{\cdot}71$ °. Intensity data were collected on a diffractometer with Mo $K\alpha$ radiation. The molecular structure of the complex is essentially the same as that found by other workers in *N*-salicylideneglycinatoaquocopper(II) hemihydrate. The environment of the copper(II) ion is a square pyramid, with four short and one long coordination bond. The crystal structure of the tetrahydrate is entirely different from that of the hemihydrate; the complexes are not bound together by coordination bonds, but are connected by nine hydrogen bonds to form a three-dimensional network. The bond distances of N–C(3) of the salicylaldimine residue and C(2)–N of the glycine residue are 1·302 Å and 1·461 Å respectively. A comparison on these bonds of the related compounds was also made in relation to the transamination reactions.

Introduction

Kishita, Nakahara & Kubo (1964) prepared complexes from copper(II) ion and *N*-salicylideneglycine at various temperatures. Below 10°C they obtained *N*-salicylideneglycinatoaquocopper(II) tetrahydrate $[\mathrm{Cu(C_9H_7NO_3).(H_2O)}]\,.\,4\mathrm{H_2O}$ (SGCT) and above 30 °C they obtained the hemihydrate (SGCH). The structures of the complexes were discussed on the basis of the magnetic susceptibility. The value of the magnetic moment obtained, 1·86 Bohr magnetons, suggested that the copper(II) ions were separated from each other so as not to permit appreciable spin interaction between them.

In this laboratory the crystal structure of SGCH was established (Ueki, Ashida, Sasada & Kakudo, 1967) and it was found that the complex had a five-coordinated square pyramid configuration. In the structure the fifth weak coordination bond is formed by the 'free' carboxyl oxygen atom of an adjacent complex. Therefore, the crystal structure of SGCT, especially the hydrogen bonding system of the free crystallization water molecules [water molecules which do not coordinate to the copper(II) ion] and the coordination configuration of the copper(II) ion, were of much interest.

Since this complex is expected to be a catalytic intermediate in the non-enzymatic transamination reactions (Eichhorn & Marchand, 1956: Longenecker & Snell, 1957), the bond distances concerning the nitrogen atom are also of interest.

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