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# The Crystal and Molecular Structure of a *trans* Square-Planar Complex of Tellurium Dibenzenethiosulphonate with Trimethylenethiourea

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The complex *trans*-dibenzenethiosulphonato-bis(trimethylenethiourea)tellurium(II), $Te(S{:}C{\cdot}NH{\cdot}[CH_2]_3{\cdot}NH)_2(S_2O_2C_6H_5)_2$, crystallizes in the space group $P\bar{1}$ (No. 2) with unit cell dimensions: $a = 8.790$ Å, $b = 10.178$ Å, $c = 8.004$ Å, $\alpha = 97.40°$, $\beta = 96.16°$, $\gamma = 99.96°$. The measured density is 1.69 g/cm³, and the calculated density, with one molecule per unit cell, is 1.69 g/cm³. The crystal and molecular structure has been determined by three-dimensional X-ray methods. The intensity data of 1692 independent, non-zero reflections were collected using integrated Weissenberg techniques. Least squares refinement procedures resulted in a conventional $R$-value of 0.061.

The tellurium atoms lie in centres of symmetry, and are bonded to two trimethylenethiourea sulphur atoms and two benzenethiosulphonate sulphur atoms in a *trans* square-planar arrangement. The $TeS_4$ group has the dimensions, with standard deviations in parentheses: Te–S(trimethylenethiourea) = 2.691(4) Å, Te–S (benzenethiosulphonate) = 2.668(3) Å, ∠S–Te–S = 88.85(9)°. The benzenethiosulphonate S–S bond is 2.018(4) Å. These dimensions may be explained in terms of a three-centre two-electron-pair bonding scheme, based on tellurium 5*p* orbitals.

This work forms part of a series of structure studies on square-planar complexes of divalent tellurium. Among the complexes of the type $TeL_2X_2$, the only thiosulphonate complex whose structure has been reported earlier is *trans*-dimethanethiosulphonato-bis(thiourea)tellurium(II), $Te(tu)_2(S_2O_2CH_3)_2$.[1] The present work on *trans*-dibenzenethiosulphonato-bis(trimethylenethiourea)-tellurium(II), $Te(S{:}C{\cdot}NH{\cdot}[CH_2]_3{\cdot}NH)_2(S_2O_2C_6H_5)_2$, was undertaken to get more data on the S–S bond in the thiosulphonate part of the complex. This bond length can be understood on the basis of the bonding around tellurium. The S–S bond in the complex may be compared with S–S bond lengths is uncomplexed tellurium thiosulphonates, and in ionic sodium methanethiosulphonate.

## EXPERIMENTAL

The benzenethiosulphonato complex, $Te(trtu)_2(S_2O_2C_6H_5)_2$, where trtu = trimethylenethiourea, was prepared from the chloro complex, as follows.

0.86 g dichloro-bis(trimethylenethiourea)tellurium(II) [2] and 1.24 g potassium benzenethiosulphonate dihydrate (25 % excess) were dissolved, by stirring and heating on a waterbath, in 3 ml of dimethylformamide. The resulting red solution was cooled to room temperature, 10 ml of methanol were added, and the now a little opaque solution was filtered by suction through a glass filter, while still at room temperature. Crystallization from the red filtrate set in on seeding or on scratching of the beaker walls. Yield, after cooling to about 0° in a refrigerator, about 1.1 g (78 %). The crystals were drained well on the filter, and washed with dry ether. They occur as well developed, yellow, triclinic prisms bounded by {110}, {1$\bar{1}$0}, {010}, and {01$\bar{1}$}. M.p. 146–148° (decomp.). (Found: Te 18.06. Calc. for $C_{20}H_{26}N_4O_4S_6Te$: Te 18.06.)

Unit cell dimensions were determined from zero-layer Weissenberg photographs taken at room temperature around the *a*, *b*, and *c* axes, using Cu$K\alpha_1$ radiation ($\lambda = 1.5405$ Å). Sodium chloride ($a = 5.6394$ Å) was used as an internal standard.[3] $2\theta$-values were measured for 86 reflections.

Intensity data were collected for the $0kl-5kl$, $h0l$ and $hk0$ layers, using multifilm integrating equi-inclination Weissenberg techniques with (Ni-filtered) Cu$K\alpha$-radiation. Crystal dimensions are shown in Table 1. Intensity measurements were made visually

*Table 1.* Distances (mm) from origin to faces for the three crystals used for collecting intensity data.

| Distance to | Crystal rotating about the *a* axis | Crystal rotating about the *b* axis | Crystal rotating about the *c* axis |
|---|---|---|---|
| {110} and {$\bar{1}\bar{1}$0} | 0.0594 | 0.0555 | 0.0488 |
| {1$\bar{1}$0} and {$\bar{1}$10} | 0.0962 | 0.0763 | 0.0644 |
| {010} and {0$\bar{1}$0} | 0.0367 | 0.0456 | 0.0432 |
| {01$\bar{1}$} and {0$\bar{1}$1} | 0.0388 | 0.0636 | 0.0384 |

with a scale of timed exposures having the same spot shape. Out of 1993 accessible, independent reflections, 1692 were strong enough to be measured. The intensities of the remaining 301 reflections were set equal to the observable limit. Estimated corrections for the splitting of $\alpha_1$ and $\alpha_2$ at high angles were applied.

Absorption and Lorentz-polarization corrections were done ($\mu = 132$ cm$^{-1}$). The absorption correction method described by Busing and Levy,[4] and modified by Coppens, Leiserowitz and Rabinovich,[5] was applied, using a $6 \times 6 \times 6$ grid for each of the crystals.

The calculated structure factors were based on the scattering curves listed in *International Tables* (Ref. 3, p. 202). The tellurium and sulphur scattering curves were corrected for anomalous dispersion, using the $\Delta f'$ and $\Delta f''$ values given by Cromer.[6]

The least squares refinement was carried out with a full-matrix program minimizing the function

$$r = \sum W(|F_o| - K|F_c|)^2$$

where $K$ is the scale factor and $W = 1/[(Ka_1)^2 + (a_2F_o)^2/4W_o]$. Here $W_o$ is an individual weight, related to the reliability with which the intensities were measured, and $a_1$ and $a_2$ are constants. Non-observed reflections for which $|F_c|$ exceeds the observable limit, are included in the refinement with $F_o$ equal to the observable limit.

The calculations were carried out on an IBM 360/50 H computer. Most computer programs were made available by the Weizmann Institute of Science, Rehovoth, Israel, and modified for use on the IBM computer by Dr. Dove Rabinovich. Two of the programs used, one of them correcting for extinction, and the other one for calculating weighted least squares planes, were written by Mr. Knut Maartmann-Moe, of this Institute.

## CRYSTAL DATA

The crystals of *trans*-dibenzenethiosulphonato-bis(trimethylenethiourea)-tellurium(II), $Te(trtu)_2(S_2O_2C_6H_5)_2$, are triclinic. Based on 86 measured $2\theta$-values a least squares procedure gave the following unit cell dimensions.

$a = 8.790(2)$ Å; $b = 10.178(2)$ Å; $c = 8.004(2)$ Å;
$\alpha = 97.40(4)°$; $\beta = 96.16(5)°$; $\gamma = 99.96(3)°$.

The uncertainties given in parentheses are standard deviations based on least squares, neglecting uncertainties in film radii.

$V = 693.1$ Å$^3$; $M = 706.44$; $F(000) = 328$; $Z = 1$.

The density obtained by flotation is 1.69 g/cm$^3$, the calculated density is 1.69 g/cm$^3$.

Possible space groups: $P1$ (No. 1) and $P\bar{1}$ (No. 2).

## STRUCTURE DETERMINATION

Assuming space group $P\bar{1}$ (No. 2), which requires that the tellurium atom lies in a centre of symmetry, the structure was solved in a straight-forward way through two-dimensional Fourier synthesis based on strong reflections with positive signs, working simultaneously with projections along the *a*, *b*, and *c* axis.

After a second Fourier synthesis, least squares refinement was started for the 0*kl*, *h*0*l* and *hk*0 reflections. Scale factors, positional parameters and isotropic thermal parameters for all non-hydrogen atoms were refined, to an *R* value of about 0.10. All reflections were then included in the refinement. After a few cycles of refinement on the parameters mentioned above, anisotropic temperature factors were introduced for tellurium and sulphur atoms, and scale factors were excluded from the refinement. The *R* value dropped to 0.069.

The data were then corrected for extinction according to Zachariasen.[7] The form

$$F_{corr} = KF_{obs}[1 + \beta(_{2\theta})CI_{obs}]$$

was used, where $F_{obs}$ is the observed structure factor, $F_{corr}$ the value corrected for secondary extinction, $I_{obs}$ the observed integrated intensity, $K$ and $C$ scale factors to be adjusted and $\beta_{(2\theta)} = 2(1+\cos^4 2\theta)/(1+\cos^2 2\theta)^2$. The absorption term in $\beta_{(2\theta)}$ was neglected. With $I_{obs}$ on an absolute scale, the value of $C$ was found to be $3.7 \times 10^{-6}$.

After some additional cycles, where an overall scale factor was introduced in the refinement, no shifts were greater than 0.16 times the standard deviation, and the refinement was terminated. The constants $a_1$ and $a_2$ in the weighting scheme were both put equal to unity during the last refinement cycles. The final value of *R*, including non-observed reflections when $|F_c|$ exceeds the observable limit, is 0.061. A final difference Fourier summation for the projection along the *a* axis showed no peaks higher than 1.0 e/Å$^2$ outside

the expected hydrogen positions. The successful refinement indicates that the choice of space group $P\bar{1}$ (No. 2) is the correct one.

The final atomic coordinates are listed in Table 2, together with the final isotropic thermal parameters for the light atoms. The final anisotropic thermal parameters for the tellurium and sulphur atoms are listed in Table 3. The structure factors calculated from the final parameters are listed in Table 4.

*Table 2.* Atomic coordinates in fractions of triclinic cell edges. Isotropic thermal parameters (Å²) in the form $\exp[-8\pi^2 U(\sin^2\theta/\lambda^2)]$. Standard deviations from least squares are given in parentheses.

| | $x$ | $y$ | $z$ | $U$ |
|---|---|---|---|---|
| Te | 0 | 0 | 0 | |
| S(1) | −0.25482(34) | 0.05375(26) | 0.13331(35) | |
| S(2) | 0.14950(34) | 0.24788(24) | 0.13650(32) | |
| S(3) | 0.26808(34) | 0.22742(26) | 0.35891(32) | |
| O(1) | 0.4281(10) | 0.2918(8) | 0.3604(11) | 0.0688(24) |
| O(2) | 0.2413(10) | 0.0891(8) | 0.3896(10) | 0.0614(21) |
| N(1) | −0.4288(11) | 0.2268(9) | 0.0518(12) | 0.0499(23) |
| N(2) | −0.3220(10) | 0.1264(8) | −0.1708(11) | 0.0443(20) |
| C(1) | −0.3382(12) | 0.1419(9) | −0.0086(13) | 0.0402(23) |
| C(2) | −0.3987(15) | 0.1972(12) | −0.2967(16) | 0.0630(33) |
| C(3) | −0.4195(14) | 0.3342(11) | −0.2076(15) | 0.0566(30) |
| C(4) | −0.5088(15) | 0.3065(12) | −0.0569(16) | 0.0613(32) |
| C(5) | 0.1883(12) | 0.3208(10) | 0.5195(13) | 0.0421(24) |
| C(6) | 0.0894(13) | 0.2532(11) | 0.6134(14) | 0.0500(27) |
| C(7) | 0.0262(16) | 0.3304(13) | 0.7383(17) | 0.0676(35) |
| C(8) | 0.0654(16) | 0.4701(13) | 0.7643(16) | 0.0648(33) |
| C(9) | 0.1665(14) | 0.5353(11) | 0.6659(15) | 0.0542(29) |
| C(10) | 0.2311(13) | 0.4618(11) | 0.5407(14) | 0.0496(26) |

*Table 3.* Anisotropic thermal parameters (Å²) in the form
$\exp[-2\pi^2(h^2a^{-2}U_{11}+\cdots+2hka^{-1}b^{-1}U_{12}+\cdots)]$.
All values have been multiplied by $10^4$. Standard deviations are given in parentheses.

| | $U_{11}$ | $U_{22}$ | $U_{33}$ | $U_{12}$ | $U_{23}$ | $U_{13}$ |
|---|---|---|---|---|---|---|
| Te | 346(6) | 356(5) | 340(5) | 101(4) | 49(4) | 20(5) |
| S(1) | 525(20) | 556(15) | 498(17) | 155(14) | 148(13) | 127(16) |
| S(2) | 568(20) | 444(13) | 393(15) | 96(13) | 13(11) | −5(15) |
| S(3) | 498(19) | 555(15) | 377(14) | 146(14) | −40(12) | 18(14) |

## RESULTS

Bond lengths and angles, as calculated from the coordinates of Table 2, are listed in Table 5. Coordinate covariances and standard deviations in unit cell dimensions have been neglected. When calculating weighted least squares planes through groups of atoms, the sulphur atoms were given four times the weight of the lighter atoms. A drawing of the molecule, with the principal bond lengths and angles, is reproduced in Fig. 1.

*Table 4.* Observed and calculated structure factors (×10). Unobserved reflections are indicated by a minus sign on $F(O)$ and included at the threshold values.

| H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 651 | 622 | 0 | 0 | 9 | 105 | 113 | 0 | 4 | -9 | 138 | 135 | 1 | 2 | 8 | -103 | 50 | 1 | -2 | 1 | 869 | 980 |
| 0 | 2 | 0 | 240 | -207 | 0 | 1 | 9 | 53 | -21 | 0 | 5 | -9 | 221 | 215 | 1 | 3 | 8 | 248 | 257 | 1 | -3 | 1 | 348 | 371 |
| 0 | 3 | 0 | 370 | 374 | 0 | 2 | 9 | 80 | 85 | 0 | 6 | -9 | 165 | 174 | 1 | 4 | 8 | 179 | 199 | 1 | -4 | 1 | 199 | 186 |
| 0 | 4 | 0 | 782 | 823 | 0 | 3 | 9 | 157 | 156 | 0 | 7 | -9 | 43 | 48 | 1 | 5 | 8 | -73 | 73 | 1 | -5 | 1 | 205 | 201 |
| 0 | 5 | 0 | 140 | 125 | 0 | 4 | 9 | 97 | 99 | 0 | 1 | -10 | 109 | 113 | 1 | 0 | 9 | -89 | 76 | 1 | -6 | 1 | 318 | 343 |
| 0 | 6 | 0 | 69 | 68 | 0 | 1 | -1 | 949 | 1089 | 0 | 2 | -10 | 110 | 126 | 1 | 1 | 9 | 86 | 106 | 1 | -7 | 1 | 157 | 149 |
| 0 | 7 | 0 | 78 | 81 | 0 | 2 | -1 | 739 | 716 | 0 | 3 | -10 | 85 | 101 | 1 | 2 | 9 | 130 | 194 | 1 | -8 | 1 | 136 | 126 |
| 0 | 8 | 0 | 242 | 229 | 0 | 3 | -1 | 330 | 291 | 0 | 4 | -10 | 48 | 51 | 1 | 3 | 9 | 108 | 146 | 1 | -9 | 1 | -90 | 70 |
| 0 | 9 | 0 | 243 | 255 | 0 | 4 | -1 | 407 | 412 | 1 | 1 | 0 | 158 | -187 | 1 | 0 | -1 | 496 | 567 | 1 | -10 | 1 | -96 | 93 |
| 0 | 10 | 0 | -50 | 7 | 0 | 5 | -1 | 840 | 826 | 1 | 2 | 0 | 935 | 940 | 1 | 1 | -1 | 992 | 1085 | 1 | -11 | 1 | 147 | 136 |
| 0 | 11 | 0 | -47 | 15 | 0 | 6 | -1 | 400 | 422 | 1 | 3 | 0 | 915 | 913 | 1 | 2 | -1 | 265 | 231 | 1 | -12 | 1 | 118 | 132 |
| 0 | 12 | 0 | 99 | 98 | 0 | 7 | -1 | 142 | 137 | 1 | 4 | 0 | 584 | 583 | 1 | 3 | -1 | 518 | 461 | 1 | -1 | 2 | 1336 | 1324 |
| 0 | 0 | 1 | 550 | 538 | 0 | 8 | -1 | 192 | 238 | 1 | 5 | 0 | 94 | 93 | 1 | 4 | -1 | 529 | 540 | 1 | -2 | 2 | 290 | 310 |
| 0 | 1 | 1 | 639 | 577 | 0 | 9 | -1 | 150 | 145 | 1 | 6 | 0 | 242 | 225 | 1 | 5 | -1 | 444 | 442 | 1 | -3 | 2 | 436 | 442 |
| 0 | 2 | 1 | 209 | 185 | 0 | 10 | -1 | 83 | 64 | 1 | 7 | 0 | 398 | 389 | 1 | 6 | -1 | 161 | 172 | 1 | -4 | 2 | 571 | 548 |
| 0 | 3 | 1 | 613 | 622 | 0 | 11 | -1 | -47 | 22 | 1 | 8 | 0 | 370 | 390 | 1 | 7 | -1 | 244 | 247 | 1 | -5 | 2 | 471 | 464 |
| 0 | 4 | 1 | 277 | 241 | 0 | 12 | -1 | 41 | 54 | 1 | 9 | 0 | 111 | 126 | 1 | 8 | -1 | 306 | 303 | 1 | -6 | 2 | 78 | 64 |
| 0 | 5 | 1 | 89 | -87 | 0 | 1 | -2 | 450 | 467 | 1 | 10 | 0 | 48 | 37 | 1 | 9 | -1 | 263 | 246 | 1 | -7 | 2 | -86 | 51 |
| 0 | 6 | 1 | 60 | 72 | 0 | 2 | -2 | 514 | 446 | 1 | 11 | 0 | 163 | 154 | 1 | 10 | -1 | 199 | 192 | 1 | -8 | 2 | -88 | 35 |
| 0 | 7 | 1 | 366 | 374 | 0 | 3 | -2 | 300 | 328 | 1 | 12 | 0 | 112 | 128 | 1 | 11 | -1 | 115 | 104 | 1 | -9 | 2 | 156 | 145 |
| 0 | 8 | 1 | 277 | 248 | 0 | 4 | -2 | 367 | 391 | 1 | 0 | 1 | 105 | -48 | 1 | 12 | -1 | 100 | 92 | 1 | -10 | 2 | 189 | 195 |
| 0 | 9 | 1 | -48 | 41 | 0 | 5 | -2 | 511 | 555 | 1 | 1 | 1 | 739 | 760 | 1 | 0 | -2 | 63 | 18 | 1 | -11 | 2 | -92 | 54 |
| 0 | 10 | 1 | -51 | 55 | 0 | 6 | -2 | 461 | 458 | 1 | 2 | 1 | 1118 | 1121 | 1 | 1 | -2 | 443 | 438 | 1 | -12 | 2 | -73 | 60 |
| 0 | 11 | 1 | 117 | 114 | 0 | 7 | -2 | 296 | 297 | 1 | 3 | 1 | 682 | 678 | 1 | 2 | -2 | 301 | 278 | 1 | -1 | 3 | 394 | 407 |
| 0 | 12 | 1 | 128 | 135 | 0 | 8 | -2 | 286 | 287 | 1 | 4 | 1 | 501 | 513 | 1 | 3 | -2 | 77 | -41 | 1 | -2 | 3 | 881 | 930 |
| 0 | 0 | 2 | 303 | 321 | 0 | 9 | -2 | 237 | 250 | 1 | 5 | 1 | 364 | 364 | 1 | 4 | -2 | 304 | 336 | 1 | -3 | 3 | 648 | 624 |
| 0 | 1 | 2 | 515 | 527 | 0 | 10 | -2 | 104 | 108 | 1 | 6 | 1 | 337 | 320 | 1 | 5 | -2 | 338 | 339 | 1 | -4 | 3 | 401 | 361 |
| 0 | 2 | 2 | 306 | 336 | 0 | 11 | -2 | -47 | 12 | 1 | 7 | 1 | 314 | 319 | 1 | 6 | -2 | 329 | 312 | 1 | -5 | 3 | 346 | 353 |
| 0 | 3 | 2 | 414 | 423 | 0 | 12 | -2 | 73 | 88 | 1 | 8 | 1 | -90 | 43 | 1 | 7 | -2 | 265 | 252 | 1 | -6 | 3 | 464 | 499 |
| 0 | 4 | 2 | 256 | 225 | 0 | 1 | -3 | 680 | 709 | 1 | 9 | 1 | -95 | 6 | 1 | 8 | -2 | 343 | 369 | 1 | -7 | 3 | 253 | 231 |
| 0 | 5 | 2 | 61 | 52 | 0 | 2 | -3 | 239 | 266 | 1 | 10 | 1 | 144 | 135 | 1 | 9 | -2 | 271 | 253 | 1 | -8 | 3 | -89 | 85 |
| 0 | 6 | 2 | 124 | 103 | 0 | 3 | -3 | 136 | 122 | 1 | 11 | 1 | 157 | 158 | 1 | 10 | -2 | 164 | 147 | 1 | -9 | 3 | -91 | 86 |
| 0 | 7 | 2 | 261 | 269 | 0 | 4 | -3 | 420 | 461 | 1 | 12 | 1 | -50 | 19 | 1 | 11 | -2 | 129 | 127 | 1 | -10 | 3 | 164 | 145 |
| 0 | 8 | 2 | 68 | 82 | 0 | 5 | -3 | 613 | 576 | 1 | 0 | 2 | 530 | 517 | 1 | 12 | -2 | 127 | 117 | 1 | -11 | 3 | 133 | 125 |
| 0 | 9 | 2 | 71 | 65 | 0 | 6 | -3 | 446 | 420 | 1 | 1 | 2 | 537 | 503 | 1 | 0 | -3 | 165 | 186 | 1 | -12 | 3 | -69 | 31 |
| 0 | 10 | 2 | 175 | 174 | 0 | 7 | -3 | 183 | 202 | 1 | 2 | 2 | 598 | 610 | 1 | 1 | -3 | 235 | 229 | 1 | -1 | 4 | 87 | -76 |
| 0 | 11 | 2 | 167 | 171 | 0 | 8 | -3 | 133 | 127 | 1 | 3 | 2 | 545 | 535 | 1 | 2 | -3 | 151 | 142 | 1 | -2 | 4 | 337 | 346 |
| 0 | 12 | 2 | 63 | 73 | 0 | 9 | -3 | 250 | 252 | 1 | 4 | 2 | 105 | 96 | 1 | 3 | -3 | 218 | 225 | 1 | -3 | 4 | 718 | 766 |
| 0 | 0 | 3 | 474 | 495 | 0 | 10 | -3 | 268 | 249 | 1 | 5 | 2 | 295 | 315 | 1 | 4 | -3 | 103 | 61 | 1 | -4 | 4 | 274 | 283 |
| 0 | 1 | 3 | 107 | -87 | 0 | 11 | -3 | 88 | 96 | 1 | 6 | 2 | 265 | 271 | 1 | 5 | -3 | 188 | 177 | 1 | -5 | 4 | 88 | 92 |
| 0 | 2 | 3 | 55 | -24 | 0 | 12 | -3 | 34 | 44 | 1 | 7 | 2 | -89 | 43 | 1 | 6 | -3 | -83 | 14 | 1 | -6 | 4 | 286 | 286 |
| 0 | 3 | 3 | 201 | 201 | 0 | 1 | -4 | 134 | 148 | 1 | 8 | 2 | -93 | 40 | 1 | 7 | -3 | 220 | 230 | 1 | -7 | 4 | 541 | 537 |
| 0 | 4 | 3 | 248 | 283 | 0 | 2 | -4 | 422 | 444 | 1 | 9 | 2 | 98 | 105 | 1 | 8 | -3 | 248 | 251 | 1 | -8 | 4 | 249 | 245 |
| 0 | 5 | 3 | 177 | 174 | 0 | 3 | -4 | 279 | 262 | 1 | 10 | 2 | 174 | 148 | 1 | 9 | -3 | 245 | 258 | 1 | -9 | 4 | 94 | 97 |
| 0 | 6 | 3 | 120 | 120 | 0 | 4 | -4 | 123 | -104 | 1 | 11 | 2 | 72 | 76 | 1 | 10 | -3 | 140 | 119 | 1 | -10 | 4 | 105 | 102 |
| 0 | 7 | 3 | 213 | 212 | 0 | 5 | -4 | 242 | 262 | 1 | 0 | 3 | 110 | 114 | 1 | 11 | -3 | 137 | 116 | 1 | -11 | 4 | 177 | 161 |
| 0 | 8 | 3 | 229 | 230 | 0 | 6 | -4 | 511 | 503 | 1 | 1 | 3 | 336 | 313 | 1 | 12 | -3 | 115 | 116 | 1 | -12 | 4 | 75 | 51 |
| 0 | 9 | 3 | 178 | 158 | 0 | 7 | -4 | 311 | 325 | 1 | 2 | 3 | 557 | 556 | 1 | 1 | -4 | 473 | 467 | 1 | -1 | 5 | 151 | 145 |
| 0 | 10 | 3 | 155 | 152 | 0 | 8 | -4 | -47 | 43 | 1 | 3 | 3 | 259 | 252 | 1 | 2 | -4 | 462 | 449 | 1 | -2 | 5 | 75 | 47 |
| 0 | 11 | 3 | 123 | 116 | 0 | 9 | -4 | 227 | 237 | 1 | 4 | 3 | -73 | -36 | 1 | 3 | -4 | -68 | 59 | 1 | -3 | 5 | 168 | 183 |
| 0 | 0 | 4 | 148 | -114 | 0 | 10 | -4 | 273 | 244 | 1 | 5 | 3 | 163 | 169 | 1 | 4 | -4 | 105 | 101 | 1 | -4 | 5 | 474 | 511 |
| 0 | 1 | 4 | 97 | -46 | 0 | 11 | -4 | 143 | 160 | 1 | 6 | 3 | 228 | 244 | 1 | 5 | -4 | 299 | 278 | 1 | -5 | 5 | 350 | 350 |
| 0 | 2 | 4 | 517 | 521 | 0 | 12 | -4 | 58 | 62 | 1 | 7 | 3 | 196 | 183 | 1 | 6 | -4 | 299 | 285 | 1 | -6 | 5 | 178 | 177 |
| 0 | 3 | 4 | 258 | 280 | 0 | 1 | -5 | 75 | -62 | 1 | 8 | 3 | -98 | 68 | 1 | 7 | -4 | -90 | 5 | 1 | -7 | 5 | 206 | 214 |
| 0 | 4 | 4 | 75 | 61 | 0 | 2 | -5 | 265 | 270 | 1 | 9 | 3 | 110 | 105 | 1 | 8 | -4 | -90 | 3 | 1 | -8 | 5 | 310 | 306 |
| 0 | 5 | 4 | 185 | 159 | 0 | 3 | -5 | 262 | 277 | 1 | 10 | 3 | 93 | 85 | 1 | 9 | -4 | 188 | 150 | 1 | -9 | 5 | 145 | 149 |
| 0 | 6 | 4 | 468 | 497 | 0 | 4 | -5 | 66 | 51 | 1 | 11 | 3 | 93 | 87 | 1 | 10 | -4 | 184 | 175 | 1 | -10 | 5 | 101 | 101 |
| 0 | 7 | 4 | 242 | 260 | 0 | 5 | -5 | 91 | -82 | 1 | 0 | 4 | 282 | 254 | 1 | 11 | -4 | 86 | 89 | 1 | -11 | 5 | 138 | 134 |
| 0 | 8 | 4 | 139 | 127 | 0 | 6 | -5 | 136 | 165 | 1 | 1 | 4 | 589 | 593 | 1 | 1 | -5 | 325 | 312 | 1 | -12 | 5 | 83 | 110 |
| 0 | 9 | 4 | 90 | 91 | 0 | 7 | -5 | 164 | 166 | 1 | 2 | 4 | 434 | 453 | 1 | 2 | -5 | 540 | 512 | 1 | -1 | 6 | -84 | 82 |
| 0 | 10 | 4 | 133 | 133 | 0 | 8 | -5 | 270 | 269 | 1 | 3 | 4 | -73 | -48 | 1 | 3 | -5 | 270 | 275 | 1 | -2 | 6 | -84 | 7 |
| 0 | 0 | 5 | 294 | 281 | 0 | 9 | -5 | 118 | 116 | 1 | 4 | 4 | -80 | 15 | 1 | 4 | -5 | 181 | 168 | 1 | -3 | 6 | 136 | 135 |
| 0 | 1 | 5 | 644 | 630 | 0 | 10 | -5 | 120 | 132 | 1 | 5 | 4 | 218 | 205 | 1 | 5 | -5 | -86 | 55 | 1 | -4 | 6 | 296 | 299 |
| 0 | 2 | 5 | 181 | 198 | 0 | 11 | -5 | 139 | 142 | 1 | 6 | 4 | 277 | 286 | 1 | 6 | -5 | 155 | 151 | 1 | -5 | 6 | 165 | 173 |
| 0 | 3 | 5 | 75 | 70 | 0 | 1 | -6 | 292 | 282 | 1 | 7 | 4 | -98 | -29 | 1 | 7 | -5 | 187 | 169 | 1 | -6 | 6 | 162 | 170 |
| 0 | 4 | 5 | 175 | 190 | 0 | 2 | -6 | 117 | 130 | 1 | 8 | 4 | -101 | 50 | 1 | 8 | -5 | -95 | 88 | 1 | -7 | 6 | 280 | 242 |
| 0 | 5 | 5 | 371 | 379 | 0 | 3 | -6 | 112 | 109 | 1 | 9 | 4 | 169 | 174 | 1 | 9 | -5 | -95 | -19 | 1 | -8 | 6 | 211 | 211 |
| 0 | 6 | 5 | 186 | 209 | 0 | 4 | -6 | 104 | 114 | 1 | 10 | 4 | 182 | 177 | 1 | 10 | -5 | 149 | 136 | 1 | -9 | 6 | 94 | 90 |
| 0 | 7 | 5 | 179 | 162 | 0 | 5 | -6 | 128 | 119 | 1 | 0 | 5 | 411 | 419 | 1 | 11 | -5 | 129 | 123 | 1 | -10 | 6 | 148 | 146 |
| 0 | 8 | 5 | 92 | 97 | 0 | 6 | -6 | 114 | 113 | 1 | 1 | 5 | 245 | 246 | 1 | 2 | -6 | 335 | 345 | 1 | -11 | 6 | 119 | 130 |
| 0 | 9 | 5 | 184 | 170 | 0 | 7 | -6 | 151 | 160 | 1 | 2 | 5 | -77 | -57 | 1 | 3 | -6 | 579 | 550 | 1 | -1 | 7 | -92 | 60 |
| 0 | 10 | 5 | 94 | 113 | 0 | 8 | -6 | 117 | 82 | 1 | 3 | 5 | -82 | 42 | 1 | 4 | -6 | 310 | 292 | 1 | -2 | 7 | -92 | -33 |
| 0 | 0 | 6 | 408 | 392 | 0 | 9 | -6 | 64 | 61 | 1 | 4 | 5 | 268 | 288 | 1 | 5 | -6 | -91 | 22 | 1 | -3 | 7 | 187 | 179 |
| 0 | 1 | 6 | 233 | 259 | 0 | 10 | -6 | 80 | 85 | 1 | 5 | 5 | 199 | 209 | 1 | 6 | -6 | -94 | 72 | 1 | -4 | 7 | 242 | 226 |
| 0 | 2 | 6 | 131 | 133 | 0 | 11 | -6 | 97 | 108 | 1 | 6 | 5 | -108 | 4 | 1 | 7 | -6 | 204 | 172 | 1 | -5 | 7 | -98 | 99 |
| 0 | 3 | 6 | 189 | 186 | 0 | 1 | -7 | 203 | 219 | 1 | 7 | 5 | -102 | 55 | 1 | 8 | -6 | -98 | 69 | 1 | -6 | 7 | -100 | -2 |
| 0 | 4 | 6 | 310 | 323 | 0 | 2 | -7 | 182 | 201 | 1 | 8 | 5 | 174 | 170 | 1 | 9 | -6 | -90 | 80 | 1 | -7 | 7 | -100 | 83 |
| 0 | 5 | 6 | 212 | 213 | 0 | 3 | -7 | 135 | 133 | 1 | 9 | 5 | 216 | 216 | 1 | 10 | -6 | 74 | 65 | 1 | -8 | 7 | 148 | 132 |
| 0 | 6 | 6 | 105 | 88 | 0 | 4 | -7 | 102 | 95 | 1 | 0 | 6 | -83 | 40 | 1 | 11 | -6 | 61 | 65 | 1 | -9 | 7 | 169 | 172 |
| 0 | 7 | 6 | 98 | 95 | 0 | 5 | -7 | 151 | 144 | 1 | 1 | 6 | 170 | 150 | 1 | 4 | -7 | 244 | 239 | 1 | -10 | 7 | 60 | 66 |
| 0 | 8 | 6 | 191 | 193 | 0 | 6 | -7 | 108 | 99 | 1 | 2 | 6 | 169 | 186 | 1 | 5 | -7 | 170 | 171 | 1 | -1 | 8 | 321 | 291 |
| 0 | 9 | 6 | 138 | 146 | 0 | 7 | -7 | 132 | 127 | 1 | 3 | 6 | 199 | 216 | 1 | 6 | -7 | 195 | 155 | 1 | -2 | 8 | -102 | 58 |
| 0 | 0 | 7 | 192 | 194 | 0 | 8 | -7 | 121 | 113 | 1 | 4 | 6 | 188 | 186 | 1 | 7 | -7 | 221 | 196 | 1 | -3 | 8 | -102 | 24 |
| 0 | 1 | 7 | 321 | 322 | 0 | 9 | -7 | -41 | 35 | 1 | 5 | 6 | 214 | 199 | 1 | 8 | -7 | 144 | 132 | 1 | -4 | 8 | 135 | 136 |
| 0 | 2 | 7 | 290 | 280 | 0 | 10 | -7 | -31 | 12 | 1 | 6 | 6 | -103 | 74 | 1 | 9 | -7 | -76 | 65 | 1 | -5 | 8 | 208 | 201 |
| 0 | 3 | 7 | 204 | 194 | 0 | 1 | -8 | 181 | 194 | 1 | 7 | 6 | 145 | 132 | 1 | -2 | 0 | 462 | 393 | 1 | -6 | 8 | -96 | 52 |
| 0 | 4 | 7 | 172 | 157 | 0 | 2 | -8 | 65 | 65 | 1 | 8 | 6 | 143 | 161 | 1 | -3 | 0 | 236 | -214 | 1 | -7 | 8 | -88 | -30 |
| 0 | 5 | 7 | 115 | 108 | 0 | 3 | -8 | 212 | 200 | 1 | 0 | 7 | 269 | 262 | 1 | -4 | 0 | 465 | 428 | 1 | -8 | 8 | -73 | 48 |
| 0 | 6 | 7 | 77 | 75 | 0 | 4 | -8 | 297 | 272 | 1 | 1 | 7 | 172 | 154 | 1 | -5 | 0 | 508 | 545 | 1 | -9 | 8 | 85 | 111 |
| 0 | 7 | 7 | 111 | 120 | 0 | 5 | -8 | 175 | 156 | 1 | 2 | 7 | 139 | 135 | 1 | -6 | 0 | 155 | 154 | 1 | -1 | 9 | 102 | 118 |
| 0 | 0 | 8 | 343 | 306 | 0 | 6 | -8 | -51 | 44 | 1 | 3 | 7 | 178 | 181 | 1 | -7 | 0 | -81 | 11 | 1 | -2 | 9 | 242 | 236 |
| 0 | 1 | 8 | 208 | 207 | 0 | 7 | -8 | 77 | 82 | 1 | 4 | 7 | 231 | 214 | 1 | -8 | 0 | 119 | 130 | 1 | -3 | 9 | 90 | 95 |
| 0 | 2 | 8 | 86 | 82 | 0 | 8 | -8 | 102 | 105 | 1 | 5 | 7 | 122 | 136 | 1 | -9 | 0 | 184 | 202 | 1 | -4 | 9 | -86 | 20 |
| 0 | 3 | 8 | 111 | 99 | 0 | 9 | -8 | 60 | 63 | 1 | 6 | 7 | 114 | 125 | 1 | -10 | 0 | 125 | 119 | 1 | -5 | 9 | 80 | 85 |
| 0 | 4 | 8 | 143 | 142 | 0 | 1 | -9 | 209 | 215 | 1 | 7 | 7 | 65 | 81 | 1 | -11 | 0 | 136 | 121 | 1 | -6 | 9 | 124 | 133 |
| 0 | 5 | 8 | 74 | 90 | 0 | 2 | -9 | 209 | 197 | 1 | 0 | 8 | 193 | 198 | 1 | -12 | 0 | 134 | 135 | 1 | -7 | 9 | -57 | 31 |
| 0 | 6 | 8 | -51 | 28 | 0 | 3 | -9 | -48 | 29 | 1 | 1 | 8 | -103 | 20 | 1 | -1 | 1 | 103 | -60 | 1 | -1 | 10 | 83 | 98 |

*Table 4. Continued.*

| H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -2 | 10 | 96 | 110 | 2 | 5 | 3 | 313 | 322 | 2 | 5 | -5 | 466 | 461 | 2 | -2 | 7 | 157 | 163 | 3 | 5 | 1 | 154 | 134 |
| 1 | -3 | 10 | 91 | 114 | 2 | 6 | 3 | 271 | 256 | 2 | 6 | -5 | 386 | 404 | 2 | -3 | 7 | -88 | 59 | 3 | 6 | 1 | 172 | 163 |
| 1 | -1 | -1 | 118 | 85 | 2 | 7 | 3 | 130 | 143 | 2 | 7 | -5 | 143 | 141 | 2 | -4 | 7 | 162 | 158 | 3 | 7 | 1 | 139 | 133 |
| 1 | -2 | -1 | 514 | -523 | 2 | 8 | 3 | -91 | 46 | 2 | 8 | -5 | -87 | 30 | 2 | -5 | 7 | 310 | 300 | 3 | 8 | 1 | 198 | 201 |
| 1 | -3 | -1 | 65 | 77 | 2 | 9 | 3 | 96 | 90 | 2 | 9 | -5 | 142 | 112 | 2 | -6 | 7 | 186 | 159 | 3 | 9 | 1 | 233 | 223 |
| 1 | -4 | -1 | 380 | 396 | 2 | 10 | 3 | 106 | 110 | 2 | 10 | -5 | 110 | 112 | 2 | -7 | 7 | 91 | 80 | 3 | 10 | 1 | 129 | 125 |
| 1 | -5 | -1 | 360 | 347 | 2 | 0 | 4 | 632 | 641 | 2 | 11 | -5 | -56 | 42 | 2 | -8 | 7 | 152 | 141 | 3 | 11 | 1 | 61 | 68 |
| 1 | -6 | -1 | -76 | 31 | 2 | 1 | 4 | 499 | 503 | 2 | 2 | -6 | 360 | 367 | 2 | -9 | 7 | 229 | 232 | 3 | 0 | 2 | 139 | -138 |
| 1 | -7 | -1 | 184 | 195 | 2 | 2 | 4 | 254 | 242 | 2 | 3 | -6 | 265 | 269 | 2 | -10 | 7 | 127 | 129 | 3 | 1 | 2 | 361 | 374 |
| 1 | -8 | -1 | 389 | 415 | 2 | 3 | 4 | 106 | 95 | 2 | 4 | -6 | 155 | 135 | 2 | -1 | 8 | 141 | 150 | 3 | 2 | 2 | 421 | 451 |
| 1 | -9 | -1 | 248 | 246 | 2 | 4 | 4 | 312 | 332 | 2 | 5 | -6 | 274 | 282 | 2 | -2 | 8 | 200 | 210 | 3 | 3 | 2 | 97 | 66 |
| 1 | -10 | -1 | 98 | 97 | 2 | 5 | 4 | 357 | 343 | 2 | 6 | -6 | 314 | 301 | 2 | -3 | 8 | -96 | 32 | 3 | 4 | 2 | 111 | 103 |
| 1 | -11 | -1 | 129 | 124 | 2 | 6 | 4 | -87 | 36 | 2 | 7 | -6 | 220 | 210 | 2 | -4 | 8 | -93 | -21 | 3 | 5 | 2 | 339 | 356 |
| 1 | -12 | -1 | 181 | 177 | 2 | 7 | 4 | 92 | -61 | 2 | 8 | -6 | 125 | 106 | 2 | -5 | 8 | 157 | 143 | 3 | 6 | 2 | 295 | 281 |
| 1 | -1 | -2 | 212 | -231 | 2 | 8 | 4 | 135 | 118 | 2 | 9 | -6 | 88 | 84 | 2 | -6 | 8 | 182 | 180 | 3 | 7 | 2 | 189 | 195 |
| 1 | -2 | -2 | 336 | 320 | 2 | 9 | 4 | 159 | 151 | 2 | 10 | -6 | 124 | 122 | 2 | -7 | 8 | 139 | 124 | 3 | 8 | 2 | 136 | 124 |
| 1 | -3 | -2 | 671 | 661 | 2 | 0 | 5 | 323 | 297 | 2 | 4 | -7 | 268 | 245 | 2 | -8 | 8 | 101 | 100 | 3 | 9 | 2 | 183 | 163 |
| 1 | -4 | -2 | 155 | 162 | 2 | 1 | 5 | 87 | 67 | 2 | 5 | -7 | 199 | 202 | 2 | -9 | 8 | 110 | 130 | 3 | 10 | 2 | 154 | 148 |
| 1 | -5 | -2 | 182 | 174 | 2 | 2 | 5 | 111 | 112 | 2 | 6 | -7 | 162 | 141 | 2 | -1 | 9 | -78 | 28 | 3 | 0 | 3 | 459 | 467 |
| 1 | -6 | -2 | 362 | 359 | 2 | 3 | 5 | 236 | 259 | 2 | 7 | -7 | 182 | 149 | 2 | -2 | 9 | 111 | 106 | 3 | 1 | 3 | 504 | 500 |
| 1 | -7 | -2 | 555 | 540 | 2 | 4 | 5 | 308 | 294 | 2 | 8 | -7 | 126 | 105 | 2 | -3 | 9 | 122 | 132 | 3 | 2 | 3 | 174 | 171 |
| 1 | -8 | -2 | 232 | 253 | 2 | 5 | 5 | -89 | 22 | 2 | 9 | -7 | 120 | 118 | 2 | -4 | 9 | -74 | 36 | 3 | 3 | 3 | 148 | 137 |
| 1 | -9 | -2 | 96 | 100 | 2 | 6 | 5 | -94 | 53 | 2 | -1 | 0 | 588 | 606 | 2 | -5 | 9 | -69 | -6 | 3 | 4 | 3 | 283 | 264 |
| 1 | -10 | -2 | -98 | 87 | 2 | 7 | 5 | 137 | 136 | 2 | -2 | 0 | 325 | 340 | 2 | -6 | 9 | 67 | 72 | 3 | 5 | 3 | 455 | 476 |
| 1 | -11 | -2 | 218 | 211 | 2 | 8 | 5 | 158 | 147 | 2 | -3 | 0 | 438 | 439 | 2 | -7 | 9 | 99 | 118 | 3 | 6 | 3 | 227 | 222 |
| 1 | -12 | -2 | 121 | 140 | 2 | 9 | 5 | -53 | 20 | 2 | -4 | 0 | 240 | 247 | 2 | -1 | -1 | 1015 | 1053 | 3 | 7 | 3 | -97 | -10 |
| 1 | -1 | -3 | 486 | 484 | 2 | 0 | 6 | 175 | 161 | 2 | -5 | 0 | 363 | 350 | 2 | -2 | -1 | 369 | 415 | 3 | 8 | 3 | 199 | 169 |
| 1 | -2 | -3 | 672 | 680 | 2 | 1 | 6 | 187 | 190 | 2 | -6 | 0 | 514 | 529 | 2 | -3 | -1 | 271 | 234 | 3 | 9 | 3 | 198 | 204 |
| 1 | -3 | -3 | 280 | 289 | 2 | 2 | 6 | -82 | 71 | 2 | -7 | 0 | 311 | 304 | 2 | -4 | -1 | 583 | 562 | 3 | 10 | 3 | 85 | 85 |
| 1 | -4 | -3 | 330 | 319 | 2 | 3 | 6 | 162 | 140 | 2 | -8 | 0 | 178 | 162 | 2 | -5 | -1 | 676 | 732 | 3 | 0 | 4 | 473 | 483 |
| 1 | -5 | -3 | 305 | 318 | 2 | 4 | 6 | 92 | 106 | 2 | -9 | 0 | 262 | 277 | 2 | -6 | -1 | 250 | 290 | 3 | 1 | 4 | 243 | 207 |
| 1 | -6 | -3 | 390 | 385 | 2 | 5 | 6 | 151 | 130 | 2 | -10 | 0 | 266 | 287 | 2 | -7 | -1 | 95 | 107 | 3 | 2 | 4 | 83 | 76 |
| 1 | -7 | -3 | 158 | 167 | 2 | 6 | 6 | -90 | 65 | 2 | -11 | 0 | 117 | 121 | 2 | -8 | -1 | 159 | 171 | 3 | 3 | 4 | 275 | 286 |
| 1 | -8 | -3 | 209 | 211 | 2 | 7 | 6 | 151 | 131 | 2 | -12 | 0 | 92 | 104 | 2 | -9 | -1 | 376 | 373 | 3 | 4 | 4 | 395 | 398 |
| 1 | -9 | -3 | 112 | 129 | 2 | 8 | 6 | -52 | 58 | 2 | -1 | 1 | 157 | -66 | 2 | -10 | -1 | 229 | 205 | 3 | 5 | 4 | 201 | 207 |
| 1 | -10 | -3 | 188 | 173 | 2 | 0 | 7 | 187 | 169 | 2 | -2 | 1 | 367 | 354 | 2 | -11 | -1 | -85 | 54 | 3 | 6 | 4 | -97 | 79 |
| 1 | -11 | -3 | 131 | 131 | 2 | 1 | 7 | -91 | -30 | 2 | -3 | 1 | 126 | 108 | 2 | -12 | -1 | 71 | 72 | 3 | 7 | 4 | 220 | 188 |
| 1 | -1 | -4 | -60 | 7 | 2 | 2 | 7 | -93 | 13 | 2 | -4 | 1 | 146 | 173 | 2 | -1 | -2 | 352 | 369 | 3 | 8 | 4 | 201 | 209 |
| 1 | -2 | -4 | 278 | 337 | 2 | 3 | 7 | 135 | 122 | 2 | -5 | 1 | 94 | 84 | 2 | -2 | -2 | 271 | -210 | 3 | 9 | 4 | 106 | 105 |
| 1 | -3 | -4 | 644 | 635 | 2 | 4 | 7 | 149 | 139 | 2 | -6 | 1 | 285 | 251 | 2 | -3 | -2 | 397 | 462 | 3 | 0 | 5 | 375 | 365 |
| 1 | -4 | -4 | 412 | 408 | 2 | 5 | 7 | -84 | 61 | 2 | -7 | 1 | 75 | 82 | 2 | -4 | -2 | 975 | 1010 | 3 | 1 | 5 | 208 | 207 |
| 1 | -5 | -4 | 168 | 154 | 2 | 6 | 7 | 97 | 89 | 2 | -8 | 1 | 214 | 239 | 2 | -5 | -2 | 459 | 456 | 3 | 2 | 5 | 310 | 277 |
| 1 | -6 | -4 | 291 | 280 | 2 | 0 | 8 | -94 | -36 | 2 | -9 | 1 | 398 | 391 | 2 | -6 | -2 | -76 | -35 | 3 | 3 | 5 | 316 | 304 |
| 1 | -7 | -4 | 300 | 294 | 2 | 1 | 8 | -93 | 35 | 2 | -10 | 1 | 278 | 254 | 2 | -7 | -2 | 322 | 319 | 3 | 4 | 5 | 204 | 205 |
| 1 | -8 | -4 | -101 | 104 | 2 | 2 | 8 | 192 | 177 | 2 | -11 | 1 | 155 | 152 | 2 | -8 | -2 | 446 | 439 | 3 | 5 | 5 | -100 | 67 |
| 1 | -9 | -4 | -99 | 92 | 2 | 3 | 8 | 163 | 152 | 2 | -12 | 1 | 85 | 91 | 2 | -9 | -2 | 179 | 162 | 3 | 6 | 5 | 212 | 195 |
| 1 | -10 | -4 | 108 | 116 | 2 | 4 | 8 | -71 | 49 | 2 | -1 | 2 | 723 | 742 | 2 | -10 | -2 | -91 | 25 | 3 | 7 | 5 | 147 | 158 |
| 1 | -11 | -4 | 82 | 86 | 2 | 5 | 8 | -52 | 35 | 2 | -2 | 2 | 820 | 851 | 2 | -11 | -2 | -79 | 59 | 3 | 8 | 5 | 84 | 79 |
| 1 | -1 | -5 | 406 | 406 | 2 | 0 | 9 | -75 | 47 | 2 | -3 | 2 | 207 | 164 | 2 | -12 | -2 | 102 | 100 | 3 | 0 | 6 | 403 | 399 |
| 1 | -2 | -5 | 602 | 654 | 2 | 1 | 9 | 155 | 158 | 2 | -4 | 2 | 303 | -264 | 2 | -1 | -3 | 275 | 290 | 3 | 1 | 6 | 281 | 247 |
| 1 | -3 | -5 | 337 | 329 | 2 | 2 | 9 | 155 | 163 | 2 | -5 | 2 | 289 | 310 | 2 | -2 | -3 | 681 | 688 | 3 | 2 | 6 | 114 | 112 |
| 1 | -4 | -5 | -84 | 62 | 2 | 0 | -1 | 299 | 303 | 2 | -6 | 2 | 314 | 325 | 2 | -3 | -3 | 545 | 559 | 3 | 3 | 6 | 147 | 129 |
| 1 | -5 | -5 | 317 | 320 | 2 | 1 | -1 | 401 | -374 | 2 | -7 | 2 | 86 | 83 | 2 | -4 | -3 | 358 | 367 | 3 | 4 | 6 | 191 | 164 |
| 1 | -6 | -5 | 324 | 321 | 2 | 2 | -1 | 59 | 21 | 2 | -8 | 2 | -81 | 46 | 2 | -5 | -3 | 202 | 192 | 3 | 5 | 6 | 99 | 104 |
| 1 | -7 | -5 | 162 | 147 | 2 | 3 | -1 | 422 | 433 | 2 | -9 | 2 | 167 | 161 | 2 | -6 | -3 | 352 | 367 | 3 | 6 | 6 | -86 | 29 |
| 1 | -8 | -5 | -101 | -36 | 2 | 4 | -1 | 445 | 418 | 2 | -10 | 2 | 298 | 292 | 2 | -7 | -3 | 168 | 177 | 3 | 7 | 6 | 74 | 89 |
| 1 | -9 | -5 | -86 | 17 | 2 | 5 | -1 | 73 | 59 | 2 | -11 | 2 | 159 | 144 | 2 | -8 | -3 | 187 | 172 | 3 | 0 | 7 | 99 | 95 |
| 1 | -10 | -5 | 90 | 103 | 2 | 6 | -1 | -72 | 6 | 2 | -12 | 2 | -68 | 44 | 2 | -9 | -3 | -93 | 28 | 3 | 1 | 7 | -101 | 56 |
| 1 | -2 | -6 | 256 | 252 | 2 | 7 | -1 | 217 | 202 | 2 | -1 | 3 | 138 | 118 | 2 | -10 | -3 | -88 | 89 | 3 | 2 | 7 | 205 | 194 |
| 1 | -3 | -6 | -87 | -30 | 2 | 8 | -1 | 285 | 308 | 2 | -2 | 3 | 377 | 395 | 2 | -11 | -3 | 98 | 99 | 3 | 3 | 7 | 219 | 210 |
| 1 | -4 | -6 | 112 | 116 | 2 | 9 | -1 | 136 | 136 | 2 | -3 | 3 | 550 | 599 | 2 | -1 | -4 | 562 | 552 | 3 | 4 | 7 | -92 | 5 |
| 1 | -5 | -6 | 288 | 297 | 2 | 10 | -1 | 106 | 101 | 2 | -4 | 3 | -62 | 62 | 2 | -2 | -4 | 212 | 210 | 3 | 5 | 7 | -78 | 7 |
| 1 | -6 | -6 | 204 | 193 | 2 | 11 | -1 | 150 | 151 | 2 | -5 | 3 | 108 | -120 | 2 | -3 | -4 | 361 | 366 | 3 | 6 | 7 | 62 | 79 |
| 1 | -7 | -6 | -101 | -40 | 2 | 12 | -1 | 132 | 162 | 2 | -6 | 3 | 258 | 256 | 2 | -4 | -4 | 239 | 243 | 3 | 0 | 8 | -97 | 72 |
| 2 | 0 | 0 | 77 | -97 | 2 | 0 | -2 | 771 | 772 | 2 | -7 | 3 | 394 | 412 | 2 | -5 | -4 | 137 | 114 | 3 | 1 | 8 | 155 | 132 |
| 2 | 1 | 0 | 635 | -600 | 2 | 1 | -2 | 587 | 575 | 2 | -8 | 3 | 130 | 115 | 2 | -6 | -4 | -84 | 24 | 3 | 2 | 8 | 191 | 176 |
| 2 | 2 | 0 | 71 | 39 | 2 | 2 | -2 | 53 | 44 | 2 | -9 | 3 | -84 | 4 | 2 | -7 | -4 | 176 | 166 | 3 | 3 | 8 | -77 | 55 |
| 2 | 3 | 0 | 663 | 693 | 2 | 3 | -2 | 182 | 182 | 2 | -10 | 3 | 107 | 103 | 2 | -8 | -4 | 93 | 97 | 3 | 4 | 8 | -59 | 3 |
| 2 | 4 | 0 | 279 | 283 | 2 | 4 | -2 | 456 | 468 | 2 | -11 | 3 | 174 | 157 | 2 | -9 | -4 | 146 | 118 | 3 | 0 | 9 | 80 | 94 |
| 2 | 5 | 0 | 207 | 201 | 2 | 5 | -2 | 299 | 304 | 2 | -12 | 3 | 106 | 100 | 2 | -10 | -4 | 109 | 96 | 3 | 1 | 9 | 89 | 101 |
| 2 | 6 | 0 | 414 | 421 | 2 | 6 | -2 | -74 | 18 | 2 | -1 | 4 | 398 | 406 | 2 | -11 | -4 | 97 | 86 | 3 | 0 | -1 | 418 | 431 |
| 2 | 7 | 0 | 405 | 413 | 2 | 7 | -2 | -78 | 27 | 2 | -2 | 4 | 252 | 271 | 2 | -1 | -5 | -65 | 49 | 3 | 1 | -1 | 177 | 153 |
| 2 | 8 | 0 | 184 | 198 | 2 | 8 | -2 | 158 | 133 | 2 | -3 | 4 | 362 | 380 | 2 | -2 | -5 | 214 | 215 | 3 | 2 | -1 | 521 | 473 |
| 2 | 9 | 0 | 54 | 47 | 2 | 9 | -2 | 135 | 136 | 2 | -4 | 4 | 469 | 500 | 2 | -3 | -5 | 408 | 401 | 3 | 3 | -1 | 350 | 308 |
| 2 | 10 | 0 | 158 | 151 | 2 | 10 | -2 | 105 | 112 | 2 | -5 | 4 | 230 | 213 | 2 | -4 | -5 | 258 | 252 | 3 | 4 | -1 | -67 | 64 |
| 2 | 11 | 0 | 192 | 196 | 2 | 11 | -2 | 96 | 108 | 2 | -6 | 4 | 78 | 68 | 2 | -5 | -5 | 92 | -73 | 3 | 5 | -1 | -73 | -23 |
| 2 | 12 | 0 | 88 | 105 | 2 | 12 | -2 | 107 | 122 | 2 | -7 | 4 | 148 | 145 | 2 | -6 | -5 | -90 | 34 | 3 | 6 | -1 | 334 | 357 |
| 2 | 0 | 1 | 955 | 939 | 2 | 0 | -3 | 708 | 697 | 2 | -8 | 4 | 157 | 159 | 2 | -7 | -5 | 211 | 189 | 3 | 7 | -1 | 269 | 260 |
| 2 | 1 | 1 | 160 | 184 | 2 | 1 | -3 | 549 | 553 | 2 | -9 | 4 | 73 | 73 | 2 | -8 | -5 | 170 | 139 | 3 | 8 | -1 | 89 | 100 |
| 2 | 2 | 1 | 289 | 246 | 2 | 2 | -3 | 74 | 46 | 2 | -10 | 4 | -87 | 56 | 2 | -9 | -5 | -81 | 62 | 3 | 9 | -1 | -94 | -8 |
| 2 | 3 | 1 | 318 | 325 | 2 | 3 | -3 | 379 | 331 | 2 | -11 | 4 | 95 | 97 | 2 | -10 | -5 | 59 | 72 | 3 | 10 | -1 | -88 | 89 |
| 2 | 4 | 1 | 428 | 429 | 2 | 4 | -3 | 294 | 311 | 2 | -12 | 4 | 75 | 79 | 2 | -2 | -6 | 359 | 357 | 3 | 11 | -1 | 116 | 111 |
| 2 | 5 | 1 | 317 | 329 | 2 | 5 | -3 | 162 | 162 | 2 | -1 | 5 | 287 | 327 | 2 | -3 | -6 | 120 | 118 | 3 | 0 | -2 | 573 | 612 |
| 2 | 6 | 1 | 464 | 484 | 2 | 6 | -3 | 87 | 53 | 2 | -2 | 5 | 415 | 408 | 2 | -4 | -6 | -84 | -28 | 3 | 1 | -2 | 551 | 530 |
| 2 | 7 | 1 | 226 | 250 | 2 | 7 | -3 | 165 | 201 | 2 | -3 | 5 | 413 | 407 | 2 | -5 | -6 | 128 | 117 | 3 | 2 | -2 | 314 | 296 |
| 2 | 8 | 1 | -84 | 47 | 2 | 8 | -3 | -81 | 65 | 2 | -4 | 5 | 315 | 309 | 2 | -6 | -6 | 212 | 186 | 3 | 3 | -2 | 498 | 511 |
| 2 | 9 | 1 | 204 | 209 | 2 | 9 | -3 | 142 | 144 | 2 | -5 | 5 | 345 | 380 | 2 | -7 | -6 | 94 | 99 | 3 | 4 | -2 | 411 | 443 |
| 2 | 10 | 1 | 174 | 180 | 2 | 10 | -3 | 84 | 76 | 2 | -6 | 5 | 277 | 278 | 2 | -8 | -6 | -82 | -13 | 3 | 5 | -2 | 275 | 303 |
| 2 | 11 | 1 | 86 | 84 | 2 | 11 | -3 | -69 | 70 | 2 | -7 | 5 | 159 | 148 | 2 | -9 | -6 | -60 | 68 | 3 | 6 | -2 | -81 | -61 |
| 2 | 0 | 2 | 222 | -147 | 2 | 12 | -3 | 75 | 81 | 2 | -8 | 5 | 125 | 104 | 3 | 0 | 0 | 278 | 252 | 3 | 7 | -2 | 230 | 214 |
| 2 | 1 | 2 | 465 | 467 | 2 | 0 | -4 | 706 | 708 | 2 | -9 | 5 | 179 | 165 | 3 | 1 | 0 | 697 | 716 | 3 | 8 | -2 | 224 | 201 |
| 2 | 2 | 2 | 473 | 465 | 2 | 1 | -4 | 419 | 465 | 2 | -10 | 5 | -83 | 54 | 3 | 2 | 0 | 522 | 536 | 3 | 9 | -2 | -93 | 41 |
| 2 | 3 | 2 | 407 | 460 | 2 | 2 | -4 | 419 | 420 | 2 | -11 | 5 | -67 | 60 | 3 | 3 | 0 | 66 | 75 | 3 | 10 | -2 | -87 | -25 |
| 2 | 4 | 2 | 257 | 268 | 2 | 3 | -4 | 222 | 241 | 2 | -12 | 5 | 62 | 72 | 3 | 4 | 0 | 190 | -166 | 3 | 11 | -2 | 95 | 94 |
| 2 | 5 | 2 | 318 | 299 | 2 | 4 | -4 | 376 | 364 | 2 | -1 | 6 | 191 | 193 | 3 | 5 | 0 | 232 | 220 | 3 | 0 | -3 | 403 | 430 |
| 2 | 6 | 2 | 291 | 279 | 2 | 5 | -4 | 389 | 366 | 2 | -2 | 6 | 291 | 262 | 3 | 6 | 0 | 311 | 345 | 3 | 1 | -3 | 497 | 473 |
| 2 | 7 | 2 | 301 | 315 | 2 | 6 | -4 | 184 | 199 | 2 | -3 | 6 | 284 | 301 | 3 | 7 | 0 | 148 | 141 | 3 | 2 | -3 | 552 | 516 |
| 2 | 8 | 2 | 200 | 207 | 2 | 7 | -4 | 123 | -123 | 2 | -4 | 6 | 329 | 333 | 3 | 8 | 0 | -90 | 5 | 3 | 3 | -3 | 424 | 422 |
| 2 | 9 | 2 | 89 | 104 | 2 | 8 | -4 | 162 | 174 | 2 | -5 | 6 | 166 | 180 | 3 | 9 | 0 | 116 | 97 | 3 | 4 | -3 | 382 | 375 |
| 2 | 10 | 2 | 117 | 105 | 2 | 9 | -4 | 212 | 200 | 2 | -6 | 6 | 157 | 153 | 3 | 10 | 0 | 182 | 183 | 3 | 5 | -3 | 348 | 344 |
| 2 | 11 | 2 | 55 | 60 | 2 | 10 | -4 | -81 | 40 | 2 | -7 | 6 | 197 | 189 | 3 | 11 | 0 | 88 | 92 | 3 | 6 | -3 | 326 | 350 |
| 2 | 0 | 3 | 353 | 339 | 2 | 11 | -4 | -63 | -29 | 2 | -8 | 6 | 333 | 304 | 3 | 0 | 1 | 358 | 368 | 3 | 7 | -3 | 216 | 224 |
| 2 | 1 | 3 | 683 | 686 | 2 | 1 | -5 | 419 | 419 | 2 | -9 | 6 | 135 | 122 | 3 | 1 | 1 | 427 | 394 | 3 | 8 | -3 | 127 | 102 |
| 2 | 2 | 3 | 523 | 516 | 2 | 2 | -5 | 411 | 430 | 2 | -10 | 6 | 71 | 84 | 3 | 2 | 1 | 334 | 326 | 3 | 9 | -3 | 92 | 73 |
| 2 | 3 | 3 | 375 | 363 | 2 | 3 | -5 | 193 | 192 | 2 | -11 | 6 | 77 | 81 | 3 | 3 | 1 | 90 | -59 | 3 | 10 | -3 | -84 | 64 |
| 2 | 4 | 3 | 297 | 316 | 2 | 4 | -5 | 224 | 225 | 2 | -1 | 7 | 311 | 297 | 3 | 4 | 1 | 109 | 100 | 3 | 11 | -3 | 64 | 67 |

*Table 4. Continued.*

| H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 0 | -4 | 286 | 296 | 3-10 | 5 | -86 | 41 | 4 | 7 | 0 | 48 | 32 | 4 | 2 | -4 | 136 | 126 | 4 | -7 | 6 | -93 | 37 |
| 3 | 1 | -4 | 446 | 411 | 3-11 | 5 | 76 | 73 | 4 | 8 | 0 | 93 | 105 | 4 | 3 | -4 | 189 | 164 | 4 | -8 | 6 | -89 | -10 |
| 3 | 2 | -4 | 298 | 287 | 3 | -1 | 6 | 397 | 408 | 4 | 9 | 0 | 115 | 119 | 4 | 4 | -4 | 161 | 175 | 4 | -9 | 6 | 122 | 128 |
| 3 | 3 | -4 | 228 | 207 | 3 | -2 | 6 | 194 | 189 | 4 | 10 | 0 | 100 | 106 | 4 | 5 | -4 | 173 | 181 | 4-10 | | 6 | 123 | 126 |
| 3 | 4 | -4 | 423 | 419 | 3 | -3 | 6 | -88 | 37 | 4 | 0 | 1 | 304 | 322 | 4 | 6 | -4 | 162 | 183 | 4 | -1 | 7 | 106 | 86 |
| 3 | 5 | -4 | 278 | 250 | 3 | -4 | 6 | 292 | 291 | 4 | 1 | 1 | 272 | 252 | 4 | 7 | -4 | 177 | 177 | 4 | -2 | 7 | 281 | 263 |
| 3 | 6 | -4 | 176 | 169 | 3 | -5 | 6 | 322 | 302 | 4 | 2 | 1 | 324 | 291 | 4 | 8 | -4 | 201 | 186 | 4 | -3 | 7 | 210 | 220 |
| 3 | 7 | -4 | 235 | 235 | 3 | -6 | 6 | -95 | 78 | 4 | 3 | 1 | 434 | 396 | 4 | 9 | -4 | 161 | 146 | 4 | -4 | 7 | -94 | 70 |
| 3 | 8 | -4 | 305 | 295 | 3 | -7 | 6 | -98 | 2 | 4 | 4 | 1 | 156 | 158 | 4 | 10 | -4 | 78 | 84 | 4 | -5 | 7 | -94 | 23 |
| 3 | 9 | -4 | 112 | 108 | 3 | -8 | 6 | 170 | 157 | 4 | 5 | 1 | 148 | 129 | 4 | 1 | -5 | 89 | 98 | 4 | -6 | 7 | 176 | 156 |
| 3 | 10 | -4 | -79 | 76 | 3 | -9 | 6 | 140 | 137 | 4 | 6 | 1 | 147 | 140 | 4 | 2 | -5 | 85 | 67 | 4 | -7 | 7 | 140 | 129 |
| 3 | 11 | -4 | 63 | 82 | 3-10 | | 6 | -73 | 53 | 4 | 7 | 1 | -86 | 84 | 4 | 3 | -5 | 183 | 180 | 4 | -8 | 7 | -73 | 50 |
| 3 | 1 | -5 | 323 | 307 | 3 | -1 | 7 | 332 | 316 | 4 | 8 | 1 | -90 | 77 | 4 | 4 | -5 | 197 | 179 | 4 | -9 | 7 | -58 | -21 |
| 3 | 2 | -5 | 144 | 139 | 3 | -2 | 7 | 254 | 239 | 4 | 9 | 1 | 92 | 100 | 4 | 5 | -5 | 85 | 78 | 4 | -1 | 8 | 84 | 75 |
| 3 | 3 | -5 | 114 | 115 | 3 | -3 | 7 | 154 | 127 | 4 | 10 | 1 | 77 | 77 | 4 | 6 | -5 | -88 | -16 | 4 | -2 | 8 | 160 | 137 |
| 3 | 4 | -5 | 298 | 302 | 3 | -4 | 7 | 148 | 124 | 4 | 0 | 2 | 366 | 388 | 4 | 7 | -5 | -89 | 61 | 4 | -3 | 8 | 229 | 212 |
| 3 | 5 | -5 | 298 | 291 | 3 | -5 | 7 | 269 | 233 | 4 | 1 | 2 | 448 | 488 | 4 | 8 | -5 | 195 | 174 | 4 | -4 | 8 | 160 | 150 |
| 3 | 6 | -5 | 182 | 162 | 3 | -6 | 7 | 336 | 307 | 4 | 2 | 2 | 259 | 228 | 4 | 9 | -5 | 127 | 120 | 4 | -5 | 8 | 111 | 111 |
| 3 | 7 | -5 | 175 | 152 | 3 | -7 | 7 | 186 | 146 | 4 | 3 | 2 | 66 | -17 | 4 | 10 | -5 | 60 | 72 | 4 | -6 | 8 | -71 | 60 |
| 3 | 8 | -5 | 205 | 195 | 3 | -8 | 7 | -85 | 17 | 4 | 4 | 2 | 258 | 235 | 4 | 2 | -6 | 93 | 110 | 4 | -7 | 8 | 60 | 66 |
| 3 | 9 | -5 | 231 | 219 | 3 | -9 | 7 | 79 | 84 | 4 | 5 | 2 | 260 | 249 | 4 | 3 | -6 | -86 | -6 | 4 | -8 | 8 | 42 | 54 |
| 3 | 10 | -5 | 105 | 101 | 3-10 | | 7 | 114 | 136 | 4 | 6 | 2 | 103 | 117 | 4 | 4 | -6 | 171 | 173 | 4 | -1 | 9 | 82 | 93 |
| 3 | 11 | -5 | 62 | 45 | 3 | -1 | 8 | -98 | 45 | 4 | 7 | 2 | -90 | 30 | 4 | 5 | -6 | 217 | 237 | 4 | -2 | 9 | 100 | 118 |
| 3 | 2 | -6 | 190 | 174 | 3 | -2 | 8 | 191 | 169 | 4 | 8 | 2 | -89 | 42 | 4 | 6 | -6 | -93 | -15 | 4 | -3 | 9 | 120 | 132 |
| 3 | 3 | -6 | -88 | 24 | 3 | -3 | 8 | 226 | 202 | 4 | 9 | 2 | 151 | 142 | 4 | 7 | -6 | -88 | -40 | 4 | -4 | 9 | 118 | 135 |
| 3 | 4 | -6 | -91 | -79 | 3 | -4 | 8 | 107 | 98 | 4 | 10 | 2 | 80 | 90 | 4 | 8 | -6 | -78 | 69 | 4 | -1 | -1 | 290 | 306 |
| 3 | 5 | -6 | 175 | 182 | 3 | -5 | 8 | 138 | 118 | 4 | 0 | 3 | 285 | 272 | 4 | 9 | -6 | 123 | 138 | 4 | -2 | -1 | 230 | 235 |
| 3 | 6 | -6 | 299 | 276 | 3 | -6 | 8 | 203 | 192 | 4 | 1 | 3 | 133 | 117 | 4 | 5 | -7 | -94 | 54 | 4 | -3 | -1 | 275 | 271 |
| 3 | 7 | -6 | 194 | 187 | 3 | -7 | 8 | 201 | 190 | 4 | 2 | 3 | 133 | -109 | 4 | 6 | -7 | 149 | 141 | 4 | -4 | -1 | 235 | 206 |
| 3 | 8 | -6 | 111 | 102 | 3 | -8 | 8 | 91 | 89 | 4 | 3 | 3 | 237 | 219 | 4 | -1 | 0 | 390 | 477 | 4 | -5 | -1 | 176 | 161 |
| 3 | 9 | -6 | 133 | 126 | 3 | -1 | 9 | -73 | 58 | 4 | 4 | 3 | 300 | 280 | 4 | -2 | 0 | 465 | 480 | 4 | -6 | -1 | 179 | 165 |
| 3 | 10 | -6 | 140 | 148 | 3 | -2 | 9 | -75 | 53 | 4 | 5 | 3 | 103 | 81 | 4 | -3 | 0 | 378 | 382 | 4 | -7 | -1 | 287 | 291 |
| 3 | 5 | -7 | -100 | -10 | 3 | -3 | 9 | 117 | 115 | 4 | 6 | 3 | -90 | -39 | 4 | -4 | 0 | 117 | 124 | 4 | -8 | -1 | 86 | 97 |
| 3 | 6 | -7 | 140 | 119 | 3 | -4 | 9 | 116 | 111 | 4 | 7 | 3 | 166 | 157 | 4 | -5 | 0 | 311 | 321 | 4 | -9 | -1 | -91 | 62 |
| 3 | 7 | -7 | 159 | 152 | 3 | -5 | 9 | 115 | 114 | 4 | 8 | 3 | 250 | 241 | 4 | -6 | 0 | 336 | 350 | 4-10 | | -1 | 189 | 146 |
| 3 | 8 | -7 | -78 | 72 | 3 | -6 | 9 | 109 | 125 | 4 | 9 | 3 | 94 | 94 | 4 | -7 | 0 | 120 | 116 | 4-11 | | -1 | 103 | 113 |
| 3 | 9 | -7 | 59 | 64 | 3 | -1 | -1 | 777 | 848 | 4 | 0 | 4 | 116 | 84 | 4 | -8 | 0 | 101 | -68 | 4-12 | | -1 | -60 | 70 |
| 3 | -1 | 0 | 450 | 485 | 3 | -2 | -1 | 826 | 900 | 4 | 1 | 4 | -70 | 43 | 4 | -9 | 0 | 153 | 157 | 4 | -1 | -2 | 456 | 534 |
| 3 | -2 | 0 | 489 | 481 | 3 | -3 | -1 | 664 | 677 | 4 | 2 | 4 | 180 | 169 | 4-10 | | 0 | 180 | 155 | 4 | -2 | -2 | 419 | 446 |
| 3 | -3 | 0 | 365 | 379 | 3 | -4 | -1 | 122 | 114 | 4 | 3 | 4 | 309 | 277 | 4-11 | | 0 | 89 | 81 | 4 | -3 | -2 | 170 | -129 |
| 3 | -4 | 0 | 399 | 376 | 3 | -5 | -1 | 408 | 380 | 4 | 4 | 4 | 180 | 173 | 4-12 | | 0 | 39 | 49 | 4 | -4 | -2 | -58 | 29 |
| 3 | -5 | 0 | 463 | 477 | 3 | -6 | -1 | 472 | 455 | 4 | 5 | 4 | -91 | 40 | 4 | -1 | 1 | 342 | 348 | 4 | -5 | -2 | 302 | 295 |
| 3 | -6 | 0 | 320 | 313 | 3 | -7 | -1 | 296 | 300 | 4 | 6 | 4 | 169 | 146 | 4 | -2 | 1 | 482 | 500 | 4 | -6 | -2 | 353 | 350 |
| 3 | -7 | 0 | 330 | 316 | 3 | -8 | -1 | -89 | -27 | 4 | 7 | 4 | 231 | 229 | 4 | -3 | 1 | 701 | 763 | 4 | -7 | -2 | -84 | -25 |
| 3 | -8 | 0 | 389 | 393 | 3 | -9 | -1 | 148 | 142 | 4 | 8 | 4 | 128 | 131 | 4 | -4 | 1 | 415 | 445 | 4 | -8 | -2 | -89 | 68 |
| 3 | -9 | 0 | 235 | 222 | 3-10 | | -1 | 120 | 130 | 4 | 0 | 5 | 199 | 172 | 4 | -5 | 1 | 242 | 223 | 4 | -9 | -2 | 171 | 162 |
| 3-10 | | 0 | 97 | 99 | 3-11 | | -1 | -91 | 86 | 4 | 1 | 5 | 213 | 202 | 4 | -6 | 1 | 513 | 486 | 4-10 | | -2 | 285 | 245 |
| 3-11 | | 0 | 58 | 61 | 3-12 | | -1 | -68 | 29 | 4 | 2 | 5 | 286 | 271 | 4 | -7 | 1 | 337 | 355 | 4-11 | | -2 | 117 | 124 |
| 3-12 | | 0 | 56 | 60 | 3 | -1 | -2 | 890 | 931 | 4 | 3 | 5 | 191 | 170 | 4 | -8 | 1 | -84 | 12 | 4-12 | | -2 | 71 | 70 |
| 3 | -1 | 1 | 193 | 224 | 3 | -2 | -2 | 524 | 544 | 4 | 4 | 5 | 162 | 139 | 4 | -9 | 1 | 99 | -72 | 4 | -1 | -3 | 296 | 316 |
| 3 | -2 | 1 | 597 | 661 | 3 | -3 | -2 | 57 | 8 | 4 | 5 | 5 | 183 | 154 | 4-10 | | 1 | 179 | 149 | 4 | -2 | -3 | 84 | -58 |
| 3 | -3 | 1 | 303 | 296 | 3 | -4 | -2 | 361 | 373 | 4 | 6 | 5 | 143 | 136 | 4-11 | | 1 | 176 | 179 | 4 | -3 | -3 | -56 | 16 |
| 3 | -4 | 1 | 269 | 258 | 3 | -5 | -2 | 378 | 403 | 4 | 7 | 5 | 92 | 103 | 4-12 | | 1 | 87 | 82 | 4 | -4 | -3 | 196 | 187 |
| 3 | -5 | 1 | 370 | 377 | 3 | -6 | -2 | 99 | 96 | 4 | 0 | 6 | 122 | 107 | 4 | -1 | 2 | 160 | -152 | 4 | -5 | -3 | 380 | 373 |
| 3 | -6 | 1 | 464 | 509 | 3 | -7 | -2 | 158 | -114 | 4 | 1 | 6 | -90 | -84 | 4 | -2 | 2 | 419 | 424 | 4 | -6 | -3 | 128 | 140 |
| 3 | -7 | 1 | 349 | 357 | 3 | -8 | -2 | 245 | 231 | 4 | 2 | 6 | 235 | 224 | 4 | -3 | 2 | 585 | 572 | 4 | -7 | -3 | -87 | 54 |
| 3 | -8 | 1 | 253 | 233 | 3 | -9 | -2 | 189 | 195 | 4 | 3 | 6 | 331 | 267 | 4 | -4 | 2 | 528 | 562 | 4 | -8 | -3 | 199 | 188 |
| 3 | -9 | 1 | 182 | 214 | 3-10 | | -2 | -98 | 81 | 4 | 4 | 6 | 187 | 169 | 4 | -5 | 2 | 268 | 271 | 4 | -9 | -3 | 392 | 337 |
| 3-10 | | 1 | 199 | 204 | 3-11 | | -2 | -85 | 10 | 4 | 5 | 6 | -82 | 36 | 4 | -6 | 2 | 293 | 254 | 4-10 | | -3 | 176 | 160 |
| 3-11 | | 1 | 146 | 131 | 3-12 | | -2 | 112 | 106 | 4 | 6 | 6 | 109 | 101 | 4 | -7 | 2 | 270 | 268 | 4-11 | | -3 | -67 | 56 |
| 3-12 | | 1 | -74 | 68 | 3 | -1 | -3 | 101 | 76 | 4 | 0 | 7 | -95 | -14 | 4 | -8 | 2 | 367 | 336 | 4 | -1 | -4 | 78 | 49 |
| 3 | -1 | 2 | 156 | -117 | 3 | -2 | -3 | 102 | 112 | 4 | 1 | 7 | 223 | 219 | 4 | -9 | 2 | 182 | 164 | 4 | -2 | -4 | 61 | 76 |
| 3 | -2 | 2 | 345 | 350 | 3 | -3 | -3 | 338 | 350 | 4 | 2 | 7 | 330 | 288 | 4-10 | | 2 | -90 | 45 | 4 | -3 | -4 | 329 | 319 |
| 3 | -3 | 2 | 273 | 308 | 3 | -4 | -3 | 409 | 394 | 4 | 3 | 7 | 172 | 151 | 4-11 | | 2 | 155 | 154 | 4 | -4 | -4 | 488 | 494 |
| 3 | -4 | 2 | 268 | 273 | 3 | -5 | -3 | 100 | 93 | 4 | 4 | 7 | -73 | 8 | 4-12 | | 2 | 131 | 131 | 4 | -5 | -4 | 207 | 192 |
| 3 | -5 | 2 | 171 | 130 | 3 | -6 | -3 | -85 | 27 | 4 | 5 | 7 | 117 | 132 | 4 | -1 | 3 | 455 | 472 | 4 | -6 | -4 | 114 | 129 |
| 3 | -6 | 2 | 466 | 461 | 3 | -7 | -3 | 183 | 184 | 4 | 0 | 8 | 184 | 163 | 4 | -2 | 3 | 156 | 161 | 4 | -7 | -4 | 252 | 243 |
| 3 | -7 | 2 | 542 | 581 | 3 | -8 | -3 | 248 | 245 | 4 | 1 | 8 | 199 | 190 | 4 | -3 | 3 | 334 | 302 | 4 | -8 | -4 | 296 | 266 |
| 3 | -8 | 2 | 298 | 292 | 3 | -9 | -3 | 101 | 104 | 4 | 2 | 8 | 83 | 88 | 4 | -4 | 3 | 399 | 382 | 4 | -9 | -4 | 133 | 127 |
| 3 | -9 | 2 | -91 | 22 | 3-10 | | -3 | -95 | -8 | 4 | 0 | -1 | 96 | 75 | 4 | -5 | 3 | 436 | 435 | 4-10 | | -4 | -76 | 46 |
| 3-10 | | 2 | 184 | 179 | 3-11 | | -3 | -74 | 73 | 4 | 1 | -1 | 557 | 566 | 4 | -6 | 3 | 184 | 190 | 4-11 | | -4 | 113 | 120 |
| 3-11 | | 2 | 263 | 245 | 3 | -1 | -4 | 164 | 180 | 4 | 2 | -1 | 824 | 850 | 4 | -7 | 3 | 181 | 182 | 4 | -1 | -5 | 319 | 346 |
| 3-12 | | 2 | 119 | 116 | 3 | -2 | -4 | 214 | 213 | 4 | 3 | -1 | 402 | 403 | 4 | -8 | 3 | 279 | 258 | 4 | -2 | -5 | 71 | 64 |
| 3 | -1 | 3 | 274 | 215 | 3 | -3 | -4 | 222 | 196 | 4 | 4 | -1 | 134 | 123 | 4 | -9 | 3 | 250 | 246 | 4 | -3 | -5 | 207 | 208 |
| 3 | -2 | 3 | 469 | -437 | 3 | -4 | -4 | -74 | 55 | 4 | 5 | -1 | 301 | 321 | 4-10 | | 3 | 190 | 181 | 4 | -4 | -5 | 343 | 358 |
| 3 | -3 | 3 | 283 | 304 | 3 | -5 | -4 | 91 | 108 | 4 | 6 | -1 | 340 | 373 | 4-11 | | 3 | 117 | 97 | 4 | -5 | -5 | 310 | 303 |
| 3 | -4 | 3 | 486 | 476 | 3 | -6 | -4 | 181 | 172 | 4 | 7 | -1 | 148 | 148 | 4-12 | | 3 | 119 | 119 | 4 | -6 | -5 | 187 | 185 |
| 3 | -5 | 3 | 145 | 142 | 3 | -7 | -4 | 255 | 238 | 4 | 8 | -1 | -87 | 63 | 4 | -1 | 4 | 169 | 162 | 4 | -7 | -5 | 192 | 183 |
| 3 | -6 | 3 | 128 | -95 | 3 | -8 | -4 | -102 | 104 | 4 | 9 | -1 | 87 | 98 | 4 | -2 | 4 | 176 | 190 | 4 | -8 | -5 | -96 | 95 |
| 3 | -7 | 3 | 310 | 287 | 3 | -9 | -4 | -100 | 46 | 4 | 10 | -1 | 135 | 133 | 4 | -3 | 4 | 181 | 176 | 4 | -9 | -5 | 81 | 97 |
| 3 | -8 | 3 | 321 | 335 | 3-10 | | -4 | 83 | 101 | 4 | 11 | -1 | 51 | 56 | 4 | -4 | 4 | 138 | 142 | 4-10 | | -5 | 124 | 124 |
| 3 | -9 | 3 | 208 | 197 | 3-11 | | -4 | 164 | 158 | 4 | 0 | -2 | 352 | 342 | 4 | -5 | 4 | 269 | 230 | 4 | -2 | -6 | 145 | 125 |
| 3-10 | | 3 | 142 | 111 | 3 | -1 | -5 | -71 | 48 | 4 | 1 | -2 | 141 | 134 | 4 | -6 | 4 | 301 | 284 | 4 | -3 | -6 | 225 | 259 |
| 3-11 | | 3 | 162 | 143 | 3 | -2 | -5 | -73 | 60 | 4 | 2 | -2 | 197 | 186 | 4 | -7 | 4 | 299 | 288 | 4 | -4 | -6 | 319 | 315 |
| 3-12 | | 3 | 210 | 204 | 3 | -3 | -5 | -77 | 64 | 4 | 3 | -2 | 670 | 640 | 4 | -8 | 4 | 231 | 223 | 4 | -5 | -6 | 258 | 225 |
| 3 | -1 | 4 | 239 | 240 | 3 | -4 | -5 | 116 | 127 | 4 | 4 | -2 | 336 | 309 | 4 | -9 | 4 | 193 | 188 | 4 | -6 | -6 | 111 | 104 |
| 3 | -2 | 4 | 222 | 203 | 3 | -5 | -5 | 140 | 135 | 4 | 5 | -2 | -75 | 50 | 4-10 | | 4 | 148 | 139 | 4 | -7 | -6 | 144 | 145 |
| 3 | -3 | 4 | 221 | 174 | 3 | -6 | -5 | 160 | 165 | 4 | 6 | -2 | 191 | 179 | 4-11 | | 4 | 157 | 156 | 4 | -8 | -6 | 213 | 176 |
| 3 | -4 | 4 | 281 | 264 | 3 | -7 | -5 | 220 | 186 | 4 | 7 | -2 | 432 | 460 | 4-12 | | 4 | 114 | 132 | 5 | 0 | 0 | 288 | 298 |
| 3 | -5 | 4 | 171 | 174 | 3 | -8 | -5 | 245 | 209 | 4 | 8 | -2 | 164 | 155 | 4 | -1 | 5 | 153 | 151 | 5 | 1 | 0 | 161 | 141 |
| 3 | -6 | 4 | 112 | 116 | 3 | -9 | -5 | 165 | 158 | 4 | 9 | -2 | 86 | 81 | 4 | -2 | 5 | 103 | 106 | 5 | 2 | 0 | 286 | 279 |
| 3 | -7 | 4 | -89 | 29 | 3-10 | | -5 | 71 | 80 | 4 | 10 | -2 | 108 | 104 | 4 | -3 | 5 | -78 | -13 | 5 | 3 | 0 | 282 | 258 |
| 3 | -8 | 4 | 158 | 160 | 3 | -2 | -6 | 266 | 260 | 4 | 11 | -2 | 100 | 111 | 4 | -4 | 5 | 176 | 163 | 5 | 4 | 0 | 308 | 304 |
| 3 | -9 | 4 | 172 | 165 | 3 | -3 | -6 | 384 | 370 | 4 | 0 | -3 | 396 | 419 | 4 | -5 | 5 | 215 | 214 | 5 | 5 | 0 | 263 | 253 |
| 3-10 | | 4 | -93 | 91 | 3 | -4 | -6 | -90 | 55 | 4 | 1 | -3 | -54 | 22 | 4 | -6 | 5 | 122 | 125 | 5 | 6 | 0 | 323 | 328 |
| 3-11 | | 4 | 132 | 122 | 3 | -5 | -6 | -98 | 41 | 4 | 2 | -3 | 91 | 84 | 4 | -7 | 5 | -90 | 60 | 5 | 7 | 0 | 123 | 113 |
| 3-12 | | 4 | 125 | 130 | 3 | -6 | -6 | 229 | 212 | 4 | 3 | -3 | 393 | 379 | 4 | -8 | 5 | 203 | 182 | 5 | 8 | 0 | 112 | 115 |
| 3 | -1 | 5 | 327 | 337 | 3 | -7 | -6 | 349 | 288 | 4 | 4 | -3 | 419 | 433 | 4 | -9 | 5 | 241 | 221 | 5 | 9 | 0 | 116 | 117 |
| 3 | -2 | 5 | 195 | 193 | 3 | -8 | -6 | 159 | 152 | 4 | 5 | -3 | 194 | 187 | 4-10 | | 5 | 158 | 142 | 5 | 10 | 0 | 71 | 85 |
| 3 | -3 | 5 | 197 | 180 | 4 | 0 | 0 | 519 | 537 | 4 | 6 | -3 | 217 | 214 | 4-11 | | 5 | 87 | 88 | 5 | 0 | 1 | 325 | 313 |
| 3 | -4 | 5 | 181 | 179 | 4 | 1 | 0 | 500 | 521 | 4 | 7 | -3 | 181 | 154 | 4 | -1 | 6 | 195 | 196 | 5 | 1 | 1 | 568 | 592 |
| 3 | -5 | 5 | 143 | 142 | 4 | 2 | 0 | 555 | 563 | 4 | 8 | -3 | 259 | 239 | 4 | -2 | 6 | 221 | 216 | 5 | 2 | 1 | 301 | 269 |
| 3 | -6 | 5 | -89 | 48 | 4 | 3 | 0 | 428 | 422 | 4 | 9 | -3 | 168 | 166 | 4 | -3 | 6 | 86 | 92 | 5 | 3 | 1 | 98 | 112 |
| 3 | -7 | 5 | 167 | 161 | 4 | 4 | 0 | 352 | 356 | 4 | 10 | -3 | 98 | 90 | 4 | -4 | 6 | -88 | 33 | 5 | 4 | 1 | 302 | 300 |
| 3 | -8 | 5 | 194 | 159 | 4 | 5 | 0 | 164 | 148 | 4 | 0 | -4 | 180 | 184 | 4 | -5 | 6 | 205 | 206 | 5 | 5 | 1 | 411 | 417 |
| 3 | -9 | 5 | 117 | 111 | 4 | 6 | 0 | 99 | 79 | 4 | 1 | -4 | -64 | -13 | 4 | -6 | 6 | 198 | 197 | 5 | 6 | 1 | 188 | 202 |

*Table 4. Continued.*

| H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) | H | K | L | F(O) | F(C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 7 | 1 | 82 | 85 | 5 | 4 | -4 | 237 | 250 | 5 | -3 | 5 | 110 | 100 | 6 | 0 | 0 | 72 | 71 | 6 | 0 | -9 | -67 | 30 |
| 5 | 8 | 1 | 100 | 90 | 5 | 5 | -4 | 108 | 106 | 5 | -4 | 5 | 168 | 176 | 7 | 0 | 0 | 330 | 347 | 1 | 0 | -10 | -67 | 52 |
| 5 | 9 | 1 | 93 | 83 | 5 | 6 | -4 | -64 | 51 | 5 | -5 | 5 | 302 | 295 | 8 | 0 | 0 | 220 | 233 | 2 | 0 | -10 | 143 | 165 |
| 5 | 0 | 2 | 692 | 704 | 5 | 7 | -4 | 108 | 97 | 5 | -6 | 5 | 308 | 293 | 9 | 0 | 0 | 70 | 73 | 3 | 0 | -10 | 117 | 152 |
| 5 | 1 | 2 | 357 | 353 | 5 | 8 | -4 | 76 | 70 | 5 | -7 | 5 | 92 | 86 | 10 | 0 | 0 | -92 | 23 | 6 | 1 | 0 | 246 | 228 |
| 5 | 2 | 2 | 72 | 74 | 5 | 9 | -4 | 57 | 57 | 5 | -8 | 5 | 123 | 113 | 6 | 0 | 1 | 444 | 471 | 6 | 2 | 0 | 222 | 201 |
| 5 | 3 | 2 | 204 | 179 | 5 | 0 | -5 | 130 | 128 | 5 | -9 | 5 | 208 | 202 | 7 | 0 | 1 | 209 | 239 | 6 | 3 | 0 | -46 | 31 |
| 5 | 4 | 2 | 377 | 393 | 5 | 1 | -5 | 230 | 221 | 5 | -10 | 5 | 176 | 188 | 8 | 0 | 1 | 109 | 97 | 6 | 4 | 0 | 48 | 55 |
| 5 | 5 | 2 | 181 | 190 | 5 | 2 | -5 | 238 | 210 | 5 | -11 | 5 | 79 | 88 | 9 | 0 | 1 | 154 | 138 | 6 | 5 | 0 | 169 | 172 |
| 5 | 6 | 2 | -67 | -13 | 5 | 3 | -5 | 224 | 237 | 5 | -1 | 6 | 103 | 106 | 10 | 0 | 1 | -95 | 56 | 6 | 6 | 0 | 208 | 217 |
| 5 | 7 | 2 | -67 | 64 | 5 | 4 | -5 | 106 | 76 | 5 | -2 | 6 | 242 | 236 | 6 | 0 | 2 | 236 | 236 | 6 | 7 | 0 | 140 | 145 |
| 5 | 8 | 2 | 135 | 142 | 5 | 5 | -5 | 104 | 104 | 5 | -3 | 6 | 154 | 160 | 7 | 0 | 2 | -105 | -65 | 6 | 8 | 0 | 145 | 148 |
| 5 | 9 | 2 | 87 | 96 | 5 | 6 | -5 | 112 | 115 | 5 | -4 | 6 | -69 | 35 | 8 | 0 | 2 | 176 | 165 | 6 | 9 | 0 | 97 | 103 |
| 5 | 0 | 3 | 271 | 259 | 5 | 7 | -5 | 112 | 113 | 5 | -5 | 6 | 121 | 106 | 9 | 0 | 2 | 195 | 197 | 7 | 1 | 0 | 220 | 231 |
| 5 | 1 | 3 | -49 | 8 | 5 | 8 | -5 | 70 | 71 | 5 | -6 | 6 | 246 | 208 | 10 | 0 | 2 | -75 | 66 | 7 | 2 | 0 | -47 | 71 |
| 5 | 2 | 3 | 239 | 226 | 5 | 9 | -5 | -45 | 1 | 5 | -7 | 6 | 234 | 216 | 6 | 0 | 3 | 150 | 141 | 7 | 3 | 0 | 127 | 147 |
| 5 | 3 | 3 | 293 | 294 | 5 | 2 | -6 | 107 | 122 | 5 | -8 | 6 | 113 | 97 | 7 | 0 | 3 | 122 | 126 | 7 | 4 | 0 | 141 | 144 |
| 5 | 4 | 3 | 125 | 115 | 5 | 3 | -6 | 241 | 228 | 5 | -9 | 6 | 101 | 103 | 8 | 0 | 3 | -112 | 83 | 7 | 5 | 0 | 155 | 161 |
| 5 | 5 | 3 | -67 | 44 | 5 | 4 | -6 | 321 | 314 | 5 | -10 | 6 | 145 | 165 | 9 | 0 | 3 | -93 | 66 | 7 | 6 | 0 | -50 | 0 |
| 5 | 6 | 3 | 68 | 56 | 5 | 5 | -6 | 175 | 150 | 5 | -1 | 7 | -68 | 33 | 10 | 0 | 3 | 89 | 113 | 7 | 7 | 0 | -41 | 1 |
| 5 | 7 | 3 | 147 | 151 | 5 | 6 | -6 | -67 | 50 | 5 | -2 | 7 | 91 | 86 | 6 | 0 | 4 | 249 | 240 | 7 | 8 | 0 | 73 | 83 |
| 5 | 8 | 3 | 93 | 107 | 5 | 7 | -6 | 79 | 79 | 5 | -3 | 7 | 150 | 148 | 7 | 0 | 4 | -114 | 84 | 8 | 1 | 0 | 137 | 152 |
| 5 | 0 | 4 | 224 | 223 | 5 | 8 | -6 | 65 | 65 | 5 | -4 | 7 | 112 | 110 | 8 | 0 | 4 | -105 | 40 | 8 | 2 | 0 | 142 | 133 |
| 5 | 1 | 4 | 219 | 191 | 5 | 9 | -6 | 39 | 42 | 5 | -5 | 7 | -65 | 4 | 9 | 0 | 4 | 136 | 141 | 8 | 3 | 0 | 217 | 223 |
| 5 | 2 | 4 | 128 | 145 | 5 | 4 | -7 | 216 | 205 | 5 | -6 | 7 | -61 | 43 | 6 | 0 | 5 | -118 | 54 | 8 | 4 | 0 | 186 | 174 |
| 5 | 3 | 4 | 146 | 164 | 5 | 5 | -7 | 255 | 252 | 5 | -7 | 7 | 123 | 127 | 7 | 0 | 5 | 136 | 124 | 8 | 5 | 0 | 110 | 113 |
| 5 | 4 | 4 | 76 | 65 | 5 | 6 | -7 | 134 | 135 | 5 | -8 | 7 | 124 | 134 | 8 | 0 | 5 | 133 | 140 | 8 | 6 | 0 | -38 | 35 |
| 5 | 5 | 4 | 104 | 97 | 5 | 7 | -7 | -49 | 41 | 5 | -1 | 8 | 131 | 138 | 6 | 0 | 6 | 156 | 139 | 8 | 7 | 0 | 79 | 88 |
| 5 | 6 | 4 | 133 | 139 | 5 | -1 | 0 | 220 | 255 | 5 | -2 | 8 | -54 | 57 | 7 | 0 | 6 | 202 | 205 | 9 | 1 | 0 | 79 | 77 |
| 5 | 7 | 4 | 59 | 45 | 5 | -2 | 0 | 262 | 306 | 5 | -3 | 8 | 108 | 94 | 6 | 0 | 7 | 156 | 161 | 9 | 2 | 0 | 170 | 157 |
| 5 | 8 | 4 | 33 | 37 | 5 | -3 | 0 | 390 | 406 | 5 | -4 | 8 | 78 | 79 | 6 | 0 | -1 | 248 | 250 | 9 | 3 | 0 | 171 | 158 |
| 5 | 0 | 5 | 135 | 126 | 5 | -4 | 0 | 76 | 76 | 5 | -5 | 8 | -48 | 39 | 7 | 0 | -1 | 253 | 233 | 9 | 4 | 0 | 78 | 76 |
| 5 | 1 | 5 | -63 | -14 | 5 | -5 | 0 | 104 | 104 | 5 | -6 | 8 | 63 | 70 | 8 | 0 | -1 | 319 | 260 | 9 | 5 | 0 | 45 | 57 |
| 5 | 2 | 5 | 81 | 82 | 5 | -6 | 0 | 150 | 146 | 5 | -1 | -1 | 39 | 40 | 9 | 0 | -1 | 159 | 141 | 10 | 1 | 0 | 95 | 114 |
| 5 | 3 | 5 | 169 | 162 | 5 | -7 | 0 | 184 | 206 | 5 | -2 | -1 | 99 | 91 | 10 | 0 | -1 | -95 | 74 | 10 | 2 | 0 | 100 | 100 |
| 5 | 4 | 5 | 135 | 121 | 5 | -8 | 0 | -65 | 16 | 5 | -3 | -1 | 239 | 232 | 6 | 0 | -2 | 354 | 311 | 10 | 3 | 0 | 46 | 56 |
| 5 | 5 | 5 | 64 | 55 | 5 | -9 | 0 | 161 | 145 | 5 | -4 | -1 | 273 | 252 | 7 | 0 | -2 | 333 | 332 | 1 | -1 | 0 | 680 | 707 |
| 5 | 6 | 5 | 74 | 83 | 5 | -10 | 0 | 183 | 179 | 5 | -5 | -1 | 92 | 90 | 8 | 0 | -2 | -110 | 121 | 6 | -1 | 0 | 65 | 53 |
| 5 | 7 | 5 | 92 | 103 | 5 | -11 | 0 | 244 | 225 | 5 | -6 | -1 | 187 | 192 | 9 | 0 | -2 | 140 | 112 | 6 | -2 | 0 | 179 | 190 |
| 5 | 0 | 6 | -59 | -32 | 5 | -12 | 0 | 108 | 102 | 5 | -7 | -1 | 210 | 215 | 10 | 0 | -2 | 172 | 148 | 6 | -3 | 0 | 391 | 408 |
| 5 | 1 | 6 | -70 | 37 | 5 | -1 | 1 | 113 | 109 | 5 | -8 | -1 | 290 | 250 | 11 | 0 | -2 | 102 | 102 | 6 | -4 | 0 | 177 | 192 |
| 5 | 2 | 6 | 200 | 175 | 5 | -2 | 1 | 246 | 245 | 5 | -9 | -1 | 201 | 174 | 6 | 0 | -3 | 117 | 126 | 6 | -5 | 0 | 76 | 93 |
| 5 | 3 | 6 | 135 | 124 | 5 | -3 | 1 | 403 | 406 | 5 | -10 | -1 | 241 | 220 | 7 | 0 | -3 | 254 | 237 | 6 | -6 | 0 | 246 | 238 |
| 5 | 4 | 6 | -60 | 57 | 5 | -4 | 1 | 356 | 367 | 5 | -11 | -1 | 157 | 143 | 8 | 0 | -3 | 205 | 183 | 6 | -7 | 0 | 468 | 450 |
| 5 | 5 | 6 | 84 | 83 | 5 | -5 | 1 | -53 | 53 | 5 | -12 | -1 | 116 | 112 | 9 | 0 | -3 | 162 | 142 | 6 | -8 | 0 | 256 | 263 |
| 5 | 0 | 7 | 128 | 117 | 5 | -6 | 1 | 135 | -103 | 5 | -1 | -2 | 49 | 6 | 10 | 0 | -3 | 130 | 115 | 6 | -9 | 0 | 127 | 133 |
| 5 | 1 | 7 | 224 | 210 | 5 | -7 | 1 | 185 | 163 | 5 | -2 | -2 | 420 | 437 | 1 | 0 | -4 | 314 | 306 | 6 | -10 | 0 | 119 | 111 |
| 5 | 2 | 7 | 99 | 87 | 5 | -8 | 1 | 377 | 362 | 5 | -3 | -2 | 340 | 336 | 6 | 0 | -4 | 349 | 377 | 6 | -11 | 0 | 144 | 147 |
| 5 | 3 | 7 | -51 | -6 | 5 | -9 | 1 | 97 | 82 | 5 | -4 | -2 | 201 | 188 | 7 | 0 | -4 | -113 | -56 | 6 | -12 | 0 | 91 | 126 |
| 5 | 4 | 7 | 77 | 90 | 5 | -10 | 1 | -68 | 14 | 5 | -5 | -2 | 239 | 241 | 8 | 0 | -4 | -118 | 9 | 7 | -1 | 0 | 198 | 217 |
| 5 | 0 | 8 | 146 | 146 | 5 | -11 | 1 | 153 | 144 | 5 | -6 | -2 | 351 | 338 | 9 | 0 | -4 | 210 | 186 | 7 | -2 | 0 | 44 | -12 |
| 5 | 1 | 8 | 72 | 72 | 5 | -12 | 1 | 148 | 156 | 5 | -7 | -2 | 316 | 307 | 10 | 0 | -4 | 132 | 132 | 7 | -3 | 0 | 269 | 261 |
| 5 | 0 | -1 | 102 | 98 | 5 | -1 | 2 | 433 | 469 | 5 | -8 | -2 | 244 | 234 | 1 | 0 | -5 | -88 | -12 | 7 | -4 | 0 | 485 | 492 |
| 5 | 1 | -1 | 451 | 414 | 5 | -2 | 2 | 251 | 250 | 5 | -9 | -2 | 161 | 160 | 2 | 0 | -5 | 265 | 261 | 7 | -5 | 0 | 275 | 270 |
| 5 | 2 | -1 | 202 | 211 | 5 | -3 | 2 | 227 | 210 | 5 | -10 | -2 | 122 | 136 | 3 | 0 | -5 | 301 | 305 | 7 | -6 | 0 | 142 | 153 |
| 5 | 3 | -1 | 141 | 145 | 5 | -4 | 2 | 393 | 419 | 5 | -11 | -2 | 112 | 126 | 4 | 0 | -5 | 257 | 266 | 7 | -7 | 0 | 201 | 188 |
| 5 | 4 | -1 | 278 | 273 | 5 | -5 | 2 | 213 | 194 | 5 | -1 | -3 | 424 | 456 | 6 | 0 | -5 | 201 | 198 | 7 | -8 | 0 | 260 | 251 |
| 5 | 5 | -1 | 455 | 502 | 5 | -6 | 2 | -59 | -1 | 5 | -2 | -3 | 407 | 418 | 7 | 0 | -5 | -122 | 72 | 7 | -9 | 0 | 143 | 130 |
| 5 | 6 | -1 | 194 | 151 | 5 | -7 | 2 | -62 | 56 | 5 | -3 | -3 | 145 | 130 | 8 | 0 | -5 | -120 | 34 | 7 | -10 | 0 | -42 | 52 |
| 5 | 7 | -1 | 79 | 54 | 5 | -8 | 2 | 254 | 220 | 5 | -4 | -3 | 167 | 169 | 9 | 0 | -5 | 152 | 137 | 7 | -11 | 0 | -31 | 31 |
| 5 | 8 | -1 | 131 | 120 | 5 | -9 | 2 | 170 | 182 | 5 | -5 | -3 | 412 | 397 | 10 | 0 | -5 | 66 | 82 | 8 | -1 | 0 | 328 | 343 |
| 5 | 9 | -1 | 180 | 179 | 5 | -10 | 2 | 75 | 74 | 5 | -6 | -3 | 354 | 332 | 1 | 0 | -6 | 345 | 359 | 8 | -2 | 0 | 214 | 225 |
| 5 | 10 | -1 | 101 | 102 | 5 | -11 | 2 | -57 | 36 | 5 | -7 | -3 | 149 | 164 | 2 | 0 | -6 | 112 | -85 | 8 | -3 | 0 | 72 | 83 |
| 5 | 0 | -2 | 231 | -220 | 5 | -12 | 2 | 77 | 76 | 5 | -8 | -3 | 115 | 110 | 3 | 0 | -6 | -103 | -71 | 8 | -4 | 0 | 193 | 202 |
| 5 | 1 | -2 | 181 | 177 | 5 | -1 | 3 | 599 | 630 | 5 | -9 | -3 | 243 | 204 | 4 | 0 | -6 | 216 | 224 | 8 | -5 | 0 | 224 | 216 |
| 5 | 2 | -2 | 419 | 405 | 5 | -2 | 3 | 341 | 351 | 5 | -10 | -3 | 210 | 204 | 5 | 0 | -6 | 359 | 356 | 8 | -6 | 0 | 66 | 81 |
| 5 | 3 | -2 | 129 | 121 | 5 | -3 | 3 | 109 | 106 | 5 | -11 | -3 | 79 | 80 | 6 | 0 | -6 | 190 | 181 | 8 | -7 | 0 | 61 | -29 |
| 5 | 4 | -2 | -55 | -7 | 5 | -4 | 3 | 368 | 385 | 5 | -1 | -4 | 242 | 235 | 7 | 0 | -6 | -123 | 86 | 8 | -8 | 0 | 84 | 91 |
| 5 | 5 | -2 | 187 | 191 | 5 | -5 | 3 | 393 | 388 | 5 | -2 | -4 | 256 | 265 | 8 | 0 | -6 | 144 | 117 | 8 | -9 | 0 | 128 | 127 |
| 5 | 6 | -2 | 286 | 309 | 5 | -6 | 3 | 248 | 228 | 5 | -3 | -4 | 287 | 259 | 9 | 0 | -6 | 124 | 109 | 8 | -10 | 0 | 114 | 112 |
| 5 | 7 | -2 | 198 | 202 | 5 | -7 | 3 | 185 | 167 | 5 | -4 | -4 | 315 | 345 | 1 | 0 | -7 | 225 | 231 | 9 | -1 | 0 | 199 | 210 |
| 5 | 8 | -2 | -65 | 56 | 5 | -8 | 3 | 159 | 157 | 5 | -5 | -4 | 305 | 298 | 2 | 0 | -7 | 108 | 86 | 9 | -2 | 0 | 175 | 183 |
| 5 | 9 | -2 | 90 | 97 | 5 | -9 | 3 | 102 | 109 | 5 | -6 | -4 | 148 | 150 | 3 | 0 | -7 | 175 | 168 | 9 | -3 | 0 | -53 | 50 |
| 5 | 10 | -2 | 138 | 161 | 5 | -10 | 3 | 102 | 97 | 5 | -7 | -4 | 94 | 86 | 4 | 0 | -7 | 222 | 195 | 9 | -4 | 0 | 54 | -21 |
| 5 | 0 | -3 | 179 | 180 | 5 | -11 | 3 | -53 | 48 | 5 | -8 | -4 | 265 | 228 | 5 | 0 | -7 | 180 | 162 | 9 | -5 | 0 | 93 | 96 |
| 5 | 1 | -3 | 64 | 63 | 5 | -12 | 3 | -35 | 36 | 5 | -9 | -4 | 262 | 223 | 6 | 0 | -7 | 211 | 174 | 9 | -6 | 0 | 173 | 158 |
| 5 | 2 | -3 | 209 | 218 | 5 | -1 | 4 | 244 | 249 | 5 | -10 | -4 | -53 | 29 | 7 | 0 | -7 | -111 | 91 | 9 | -7 | 0 | 94 | 103 |
| 5 | 3 | -3 | 201 | 175 | 5 | -2 | 4 | 97 | 89 | 5 | -2 | -5 | 338 | 350 | 8 | 0 | -7 | 138 | 118 | 9 | -8 | 0 | 41 | 49 |
| 5 | 4 | -3 | 76 | 74 | 5 | -3 | 4 | 334 | 333 | 5 | -3 | -5 | 360 | 370 | 1 | 0 | -8 | 232 | 212 | 9 | -9 | 0 | 85 | 102 |
| 5 | 5 | -3 | -60 | -16 | 5 | -4 | 4 | 284 | 293 | 5 | -4 | -5 | 202 | 202 | 2 | 0 | -8 | -119 | 77 | 10 | -1 | 0 | -48 | 9 |
| 5 | 6 | -3 | 119 | 121 | 5 | -5 | 4 | 313 | 317 | 5 | -5 | -5 | 134 | 143 | 3 | 0 | -8 | 158 | 153 | 10 | -2 | 0 | 87 | 85 |
| 5 | 7 | -3 | 167 | 162 | 5 | -6 | 4 | 209 | 204 | 5 | -6 | -5 | -72 | 64 | 4 | 0 | -8 | 133 | 139 | 10 | -3 | 0 | 173 | 181 |
| 5 | 8 | -3 | 119 | 117 | 5 | -7 | 4 | 226 | 199 | 5 | -7 | -5 | 157 | 133 | 5 | 0 | -8 | -116 | -15 | 10 | -4 | 0 | 98 | 91 |
| 5 | 9 | -3 | -55 | 55 | 5 | -8 | 4 | 216 | 195 | 5 | -8 | -5 | 140 | 127 | 6 | 0 | -8 | -104 | 88 | 10 | -5 | 0 | 85 | 109 |
| 5 | 10 | -3 | 101 | 117 | 5 | -9 | 4 | 259 | 235 | 5 | -9 | -5 | -57 | 42 | 7 | 0 | -8 | 172 | 168 | 10 | -6 | 0 | 151 | 148 |
| 5 | 0 | -4 | 421 | 431 | 5 | -10 | 4 | 118 | 97 | 5 | -3 | -6 | 193 | 179 | 1 | 0 | -9 | 163 | 154 | 10 | -7 | 0 | 152 | 167 |
| 5 | 1 | -4 | 232 | 223 | 5 | -11 | 4 | -46 | 17 | 5 | -4 | -6 | 178 | 174 | 2 | 0 | -9 | -108 | 102 | 11 | -1 | 0 | 85 | 89 |
| 5 | 2 | -4 | -54 | 42 | 5 | -1 | 5 | 212 | 218 | 5 | -5 | -6 | 72 | 91 | 3 | 0 | -9 | 105 | 109 | 11 | -2 | 0 | 80 | 88 |
| 5 | 3 | -4 | 96 | 100 | 5 | -2 | 5 | 282 | 292 | 5 | -6 | -6 | 82 | 67 | 4 | 0 | -9 | -99 | -101 | 11 | -3 | 0 | 132 | 143 |
| | | | | | | | | | | 1 | 0 | 0 | 350 | 391 | 5 | 0 | -9 | -87 | 47 | 11 | -4 | 0 | 128 | 147 |

*Table 5.* Bond lengths (Å) and angles (°). Standard deviations are given in parentheses.

$TeS_4$ coordination group

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Te | −S(1) | = 2.691(4) | ∠S(1) | −Te | −S(2) | = | 88.85(9) |
| Te | −S(2) | = 2.668(3) | | | | | |

Benzenethiosulphonate group

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| S(2) | −S(3) | = 2.018(4) | ∠Te | −S(2) | −S(3) | = | 105.73(13) |
| S(3) | −O(1) | = 1.443(9) | ∠S(2) | −S(3) | −O(1) | = | 107.2(4) |
| S(3) | −O(2) | = 1.443(9) | ∠S(2) | −S(3) | −O(2) | = | 111.7(4) |
| S(3) | −C(5) | = 1.777(11) | ∠S(2) | −S(3) | −C(5) | = | 105.7(4) |
| C(5) | −C(6) | = 1.364(16) | ∠O(1) | −S(3) | −O(2) | = | 116.7(6) |
| C(6) | −C(7) | = 1.412(18) | ∠O(1) | −S(3) | −C(5) | = | 108.3(5) |
| C(7) | −C(8) | = 1.386(18) | ∠O(2) | −S(3) | −C(5) | = | 106.7(5) |
| C(8) | −C(9) | = 1.390(18) | ∠S(3) | −C(5) | −C(6) | = | 119.1(8) |
| C(9) | −C(10) | = 1.401(17) | ∠S(3) | −C(5) | −C(10) | = | 117.0(9) |
| C(10) | −C(5) | = 1.402(14) | ∠C(10) | −C(5) | −C(6) | = | 123.9(10) |
| | | | ∠C(5) | −C(6) | −C(7) | = | 117.7(10) |
| | | | ∠C(6) | −C(7) | −C(8) | = | 120.6(13) |
| | | | ∠C(7) | −C(8) | −C(9) | = | 120.0(13) |
| | | | ∠C(8) | −C(9) | −C(10) | = | 120.9(10) |
| | | | ∠C(9) | −C(10) | −C(5) | = | 117.0(10) |

Trimethylenethiourea group

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| S(1) | −C(1) | = 1.716(11) | ∠Te | −S(1) | −C(1) | = | 103.9(4) |
| C(1) | −N(1) | = 1.352(15) | ∠S(1) | −C(1) | −N(1) | = | 117.0(8) |
| C(1) | −N(2) | = 1.313(13) | ∠S(1) | −C(1) | −N(2) | = | 123.0(8) |
| N(1) | −C(4) | = 1.469(17) | ∠N(1) | −C(1) | −N(2) | = | 119.9(10) |
| N(2) | −C(2) | = 1.483(16) | ∠C(1) | −N(1) | −C(4) | = | 122.5(10) |
| C(2) | −C(3) | = 1.532(17) | ∠C(1) | −N(2) | −C(2) | = | 123.8(10) |
| C(4) | −C(3) | = 1.537(19) | ∠N(1) | −C(4) | −C(3) | = | 110.5(11) |
| | | | ∠N(2) | −C(2) | −C(3) | = | 109.0(9) |
| | | | ∠C(2) | −C(3) | −C(4) | = | 106.9(10) |

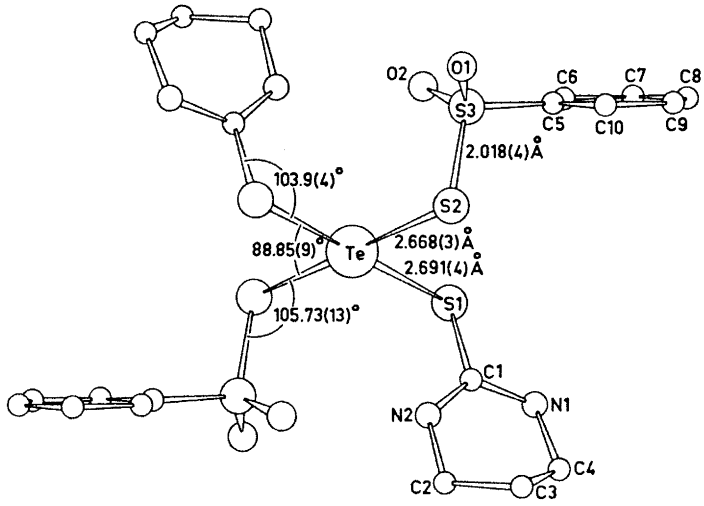


*Fig. 1.* The molecule as seen along the normal to a plane through Te, O(2) and the midpoint between S(1) and S(2).

With tellurium in a centre of symmetry, the $TeS_4$ group is exactly planar. The S—Te—S angle deviates slightly from 90°, presumably because of hydrogen bonding or crystal packing effects.

In uncomplexed tellurium dibenzenethiosulphonate,[8] the Te—S bonds are 2.41(3) Å, and the S—Te—S angle 100(2)°. The bond length, 2.41 Å, agrees with the sum of the single covalent radii for tellurium and sulphur,[9] 1.37 Å and 1.04 Å, respectively. In the complex, the Te—S bonds are longer, 2.691(4) Å and 2.668(3) Å. With single covalent radius for sulphur, the Te—S bond lengths conform to a bonding radius of 1.64 Å for tellurium(II) in centrosymmetric, square-planar complexes, as proposed by Foss.[10,11] The dimensions of the $TeS_4$ group are in accord with a three-centre two-electron-pair bonding scheme, based on tellurium *5p* orbitals.

The S—S bond in the benzenethiosulphonate group, 2.018(4) Å, is to be compared with 2.08(4) Å for the S—S bond in uncomplexed tellurium dibenzenethiosulphonate,[6] and 1.98(1) Å for the S—S bond in ionic sodium methanethiosulphonate monohydrate.[12] The short S—S bond in the complex relative to the covalent compound, indicates a covalency lower than one for the Te—S bond in the complex, and hence is in agreement with the large Te—S distances found.

The S—O bonds of the benzenethiosulphonate group are both equal to 1.443(9) Å, while the S—C bond is 1.777(11) Å. The arrangement of atoms bonded to S(3) is approximately tetrahedral, with greatest deviation in the O—S—O angle, which is 116.7(6)°. The benzene ring has a somewhat large angle at the carbon atom bonded to sulphur. This C(10)—C(5)—C(6) angle is 123.9(10)°. The atoms of a least squares plane through S(3) and the benzene ring do not deviate more than 0.008 Å from this plane.

Bond lengths and angles of the trimethylenethiourea group do not deviate significantly neither from the values found by Dias and Truter [13] for trimethylenethiourea, nor from the values found by Luth and Truter [14] for trimethylenethiourea as a ligand in dichloro-tetrakis(trimethylenethiourea)nickel(II). Excluding C(3), a least squares plane through the trimethylenethiourea group shows an approximately planar group with maximum deviation for C(1), which is 0.023 Å from the plane. C(3) is 0.683 Å from this plane, at the same side as C(1). The plane makes an angle of 89.7° with the $TeS_4$ plane.

Each of the hydrogen atoms bonded to the trimethylenethiourea nitrogen atoms appear to be engaged in hydrogen bonding to the benzenethiosulphonate oxygen atoms. The N(1)···O(1′) distance, where O(1′) is at $x-1$, $y$, $z$ relative to O(1), is 2.942(13) Å. The C(1)—N(1)···O(1′) angle is 139.1(8)°, and the C(4)—N(1)···O(1′) angle is 97.8(7)°. This bond occurs between neighbouring molecules. The N(2)···O(2′) distance, where O(2′) is at $-x$, $-y$, $-z$ relative to O(2), is 2.864(12) Å. The C(1)—N(2)···O(2′) angle is 132.0(8)°, and the C(2)—N(2)···O(2′) angle is 101.0(7)°. This bond occurs within the molecule. O(1′) and O(2′) are 0.459 Å and 0.829 Å, respectively, out of the least squares plane referred to above, through the trimethylenethiourea group, and they are both on the opposite side of C(3). These dimensions are in the range found for N—H···O hydrogen bonds in other compounds.[15]

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