Supplementary Material

**Solvent, Substituents and pH Effects towards the Spectral Shifts of some highly colored Indicators**

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The Chemical structures and the corresponding abbreviations of the six studied indicators are given below:

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Fig. S-1. Structure of the investigated indicators and their abbreviations

*The pH effect on the absorption spectra:*

A representative example for the effect of pH on the absorption spectra of AYGG is given below

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Fig. S-2. Effect of pH on the electronic absorption spectra of 1 × 10-4 M of AYGG

*The solvent parameters*:

TABLE S-I. The Physical parameters for the solvents

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Solvent | Dioxane | Ethanol | DMF | DMSO | Acetone | Acetonitrile | H2O |
| n | 1.422 | 1.361 | 1.427 | 1.478 | 1.359 | 1.344 | 1.333 |
| D | 2.2 | 24.3 | 36.7 | 48.9 | 20.7 | 37.5 | 78.5 |
| K | 0.223 | 0.470 | 0.480 | 0.485 | 0.465 | 0.48 | 0.491 |
| M | 0.203 | 0.181 | 0.204 | 0.221 | 0.180 | 0.175 | 0.171 |
| N | 0.031 | 0.665 | 0.666 | 0.658 | 0.648 | 0.712 | 0.757 |
| E | 36.0 | 51.9 | 43.8 | 45.0 | 42.2 | 46.0 | 63.1 |
| J | 0.286 | 0.886 | 0.922 | 0.941 | 0.868 | 0.924 | 0.963 |
| H | 0.254 | 0.221 | 0.257 | 0.283 | 0.220 | 0.212 | 0.206 |
| β | 0.37 | 0.77 | 0.69 | 0.76 | 0.48 | 0.31 | 0.47 |
| α | 0.00 | 0.83 | 0.00 | 0.00 | 0.08 | 0.19 | 1.17 |
| π\* | 0.55 | 0.54 | 0.87 | 1.00 | 0.71 | 0.75 | 1.09 |

*The regression data for the indicators:*

TABLE S-II. Regression analysis data for Y1 and Y2 bands for SO indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | a4 | | | MCC | | P |
| *K* | | 314.092 | | -10.037 | |  | |  |  | | | 0.281 | | 0.358 |
| *M* | | 292.304 | | 89.085 | |  | |  |  | | | 0.585 | | 0.132 |
| *N* | | 312.171 | | -4.339 | |  | |  |  | | | 0.334 | | 0.307 |
| *E* | | 323.149 | | -0.300 | |  | |  |  | | | 0.621 | | 0.113 |
| *K,M* | | 297.235 | | -7.851 | | 81.069 | |  |  | | | 0.752 | | 0.248 |
| *K,N* | | 287.678 | | 115.606 | | -49.984 | |  |  | | | 0.614 | | 0.386 |
| *K,E* | | 325.008 | | 6.196 | | -0.401 | |  |  | | | 0.657 | | 0.343 |
| *M,N* | | 296.353 | | 77.102 | | -3.104 | |  |  | | | 0.745 | | 0.255 |
| *M,E* | | 307.574 | | 58.557 | | -0.208 | |  |  | | | 0.816 | | 0.184 |
| *N,E* | | 325.651 | | 1.880 | | -0.379 | |  |  | | | 0.640 | | 0.360 |
| *K,M,N* | | 338.248 | | -411.615 | | 297.965 | | 162.954 |  | | | 0.925 | | 0.345 |
| *K,M,E* | | 307.498 | | -9.85E-02 | | 58.732 | | -0.206 |  | | | 0.816 | | 0.529 |
| *K,N,E* | | 304.406 | | 85.937 | | -33.453 | | -0.294 |  | | | 0.780 | | 0.575 |
| *M,N,E* | | 307.699 | | 58.381 | | 5.84E-02 | | -0.211 |  | | | 0.816 | | 0.529 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 416.508 | | -9.860 | |  | |  | | |  | 0.009 | | 0.844 | | |
| *M* | 317.234 | | 498.397 | |  | |  | | |  | 0.787 | | 0.008 | | |
| *N* | 416.989 | | -8.196 | |  | |  | | |  | 0.039 | | 0.672 | | |
| *E* | 451.818 | | -0.847 | |  | |  | | |  | 0.490 | | 0.080 | | |
| *K,M* | 303.480 | | 18.850 | | 526.797 | |  | | |  | 0.816 | | 0.034 | | |
| *K,N* | 227.867 | | 882.599 | | -349.177 | |  | | |  | 0.896 | | 0.011 | | |
| *K,E* | 444.992 | | 52.666 | | -1.199 | |  | | |  | 0.649 | | 0.123 | | |
| *M,N* | 306.622 | | 533.118 | | 6.765 | |  | | |  | 0.810 | | 0.036 | | |
| *M,E* | 351.369 | | 405.771 | | -0.352 | |  | | |  | 0.845 | | 0.024 | | |
| *N,E* | 457.490 | | 18.886 | | -1.206 | |  | | |  | 0.609 | | 0.153 | | |
| *K,M,N* | 243.283 | | 639.102 | | 177.567 | | -250.122 | | |  | 0.916 | | 0.040 | | |
| *K,M,E* | 349.573 | | 47.246 | | 388.287 | | -0.689 | | |  | 0.943 | | 0.008 | | |
| *K,N,E* | 269.565 | | 741.252 | | -286.940 | | -0.340 | | |  | 0.919 | | 0.038 | | |
| *M,N,E* | 356.298 | | 409.369 | | 19.379 | | -0.716 | | |  | 0.969 | | 0.009 | | |
| *K,M,N,E* | 329.412 | | 187.900 | | 325.422 | | -58.246 | | | -0.597 | 0.974 | | 0.051 | | |

TABLE S-III. Regression analysis data for Y1 and Y2 bands for AYR indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | a4 | | | MCC | | P |
| *K* | | 278.210 | | 52.012 | |  | |  |  | | | 0.640 | | 0.056 |
| *M* | | 291.506 | | 49.406 | |  | |  |  | | | 0.020 | | 0.790 |
| *N* | | 289.814 | | 19.237 | |  | |  |  | | | 0.582 | | 0.078 |
| *E* | | 294.136 | | 0.144 | |  | |  |  | | | 0.037 | | 0.716 |
| *K,M* | | 249.686 | | 58.602 | | 133.406 | |  |  | | | 0.774 | | 0.107 |
| *K,N* | | 242.474 | | 221.207 | | -66.036 | |  |  | | | 0.724 | | 0.145 |
| *K,E* | | 287.856 | | 75.086 | | -0.415 | |  |  | | | 0.818 | | 0.078 |
| *M,N* | | 254.429 | | 170.495 | | 23.745 | |  |  | | | 0.786 | | 0.099 |
| *M,E* | | 250.198 | | 168.840 | | 0.385 | |  |  | | | 0.166 | | 0.761 |
| *N,E* | | 307.157 | | 31.277 | | -0.511 | |  |  | | | 0.815 | | 0.079 |
| *K,M,N* | | 288.769 | | -397.975 | | 415.403 | | 183.635 |  | | | 0.825 | | 0.251 |
| *K,M,E* | | 273.621 | | 72.229 | | 55.620 | | -0.314 |  | | | 0.831 | | 0.243 |
| *K,N,E* | | 294.849 | | 48.010 | | 11.358 | | -0.451 |  | | | 0.819 | | 0.259 |
| *M,N,E* | | 282.135 | | 94.008 | | 29.937 | | -0.349 |  | | | 0.854 | | 0.211 |
| *K,M,N,E* | | 370.372 | | -802.391 | | 535.333 | | 356.551 | -0.588 | | | 0.977 | | 0.225 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 379.351 | | 28.895 | |  | |  | | |  | 0.398 | | 0.129 | | |
| *M* | 415.873 | | -124.617 | |  | |  | | |  | 0.268 | | 0.234 | | |
| *N* | 384.916 | | 12.222 | |  | |  | | |  | 0.471 | | 0.089 | | |
| *E* | 379.131 | | 0.278 | |  | |  | | |  | 0.287 | | 0.215 | | |
| *K,M* | 398.304 | | 24.081 | | -88.336 | |  | | |  | 0.522 | | 0.229 | | |
| *K,N* | 424.896 | | -186.579 | | 84.305 | |  | | |  | 0.680 | | 0.103 | | |
| *K,E* | 376.264 | | 22.118 | | 0.130 | |  | | |  | 0.158 | | 0.315 | | |
| *M,N* | 399.884 | | -72.301 | | 10.193 | |  | | |  | 0.548 | | 0.204 | | |
| *M,E* | 397.919 | | -75.898 | | 0.185 | |  | | |  | 0.354 | | 0.417 | | |
| *N,E* | 382.270 | | 10.453 | | 7.880 | |  | | |  | 0.484 | | 0.266 | | |
| *K,M,N* | 436.429 | | -368.745 | | 132.843 | | 158.411 | | |  | 0.741 | | 0.205 | | |
| *K,M,E* | 397.034 | | 23.298 | | -84.520 | | 1.899 | | |  | 0.044 | | 0.472 | | |
| *K,N,E* | 458.156 | | -299.326 | | 133.949 | | -0.271 | | |  | 0.760 | | 0.184 | | |
| *M,N,E* | 400.555 | | -73.974 | | 10.364 | | -9.684E-03 | | |  | 0.548 | | 0.438 | | |
| *K,M,N,E* | 503.883 | | -722.116 | | 248.640 | | 308.684 | | | -0.468 | 0.934 | | 0.128 | | |

TABLE S-IV. Regression analysis data for Y1 and Y2 bands for ATA indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | a4 | | | MCC | | P |
| *K* | | 277.052 | | 58.079 | |  | |  |  | | | 0.767 | | 0.022 |
| *M* | | 307.047 | | -23.663 | |  | |  |  | | | 0.004 | | 0.901 |
| *N* | | 289.746 | | 21.932 | |  | |  |  | | | 0.727 | | 0.031 |
| *E* | | 290.565 | | 0.251 | |  | |  |  | | | 0.107 | | 0.528 |
| *K,M* | | 263.341 | | 61.247 | | 64.127 | |  |  | | | 0.797 | | 0.092 |
| *K,N* | | 256.988 | | 153.074 | | -37.076 | |  |  | | | 0.792 | | 0.095 |
| *K,E* | | 284.264 | | 75.332 | | -0.310 | |  |  | | | 0.862 | | 0.051 |
| *M,N* | | 268.593 | | 101.924 | | 24.627 | |  |  | | | 0.797 | | 0.091 |
| *M,E* | | 265.345 | | 96.912 | | 0.389 | |  |  | | | 0.148 | | 0.787 |
| *N,E* | | 303.739 | | 31.646 | | -0.412 | |  |  | | | 0.873 | | 0.045 |
| *K,M,N* | | 267.393 | | 13.901 | | 93.369 | | 19.042 |  | | | 0.797 | | 0.288 |
| *K,M,E* | | 290.157 | | 76.514 | | -23.026 | | -0.352 |  | | | 0.864 | | 0.196 |
| *K,N,E* | | 306.314 | | -10.043 | | 35.813 | | 4.000 |  | | | 0.873 | | 0.184 |
| *M,N,E* | | 298.825 | | 18.463 | | 31.383 | | -0.380 |  | | | 0.874 | | 0.182 |
| *K,M,N,E* | | 333.112 | | -311.794 | | 189.954 | | 158.299 | -0.473 | | | 0.892 | | 0.475 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 395.774 | | -2.715 | |  | |  | | |  | 0.004 | | 0.888 | | |
| *M* | 381.445 | | 68.929 | |  | |  | | |  | 0.102 | | 0.486 | | |
| *N* | 395.625 | | -1.782 | |  | |  | | |  | 0.012 | | 0.812 | | |
| *E* | 409.108 | | -0.310 | |  | |  | | |  | 0.445 | | 0.102 | | |
| *K,M* | 380.618 | | 1.135 | | 70.639 | |  | | |  | 0.102 | | 0.806 | | |
| *K,N* | 364.235 | | 146.492 | | -58.378 | |  | | |  | 0.172 | | 0.686 | | |
| *K,E* | 406.428 | | 20.673 | | -0.448 | |  | | |  | 0.610 | | 0.152 | | |
| *M,N* | 381.167 | | 69.841 | | 0.178 | |  | | |  | 0.102 | | 0.807 | | |
| *M,E* | 413.732 | | -18.680 | | -0.333 | |  | | |  | 0.450 | | 0.303 | | |
| *N,E* | 411.825 | | 9.050 | | -0.482 | |  | | |  | 0.628 | | 0.138 | | |
| *K,M,N* | 359.967 | | 213.910 | | -49.164 | | -85.804 | | |  | 0.183 | | 0.875 | | |
| *K,M,E* | 412.932 | | 21.042 | | -26.467 | | -0.483 | | |  | 0.620 | | 0.349 | | |
| *K,N,E* | 438.568 | | -105.482 | | 52.570 | | -0.606 | | |  | 0.671 | | 0.287 | | |
| *M,N,E* | 416.029 | | -17.003 | | 9.030 | | -0.503 | | |  | 0.633 | | 0.333 | | |
| *K,M,N,E* | 461.618 | | -318.611 | | 125.339 | | 140.654 | | | -0.705 | 0.726 | | 0.473 | | |

TABLE S-V. Regression analysis data for Y1 and Y2 bands for AYGG indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | a4 | | | MCC | | P |
| *K* | | 262.225 | | -0.893 | |  | |  |  | | | 0.000 | | 0.969 |
| *M* | | 232.235 | | 154.026 | |  | |  |  | | | 0.444 | | 0.149 |
| *N* | | 262.764 | | -1.600 | |  | |  |  | | | 0.009 | | 0.856 |
| *E* | | 270.978 | | -0.192 | |  | |  |  | | | 0.149 | | 0.449 |
| *K,M* | | 227.077 | | 7.227 | | 164.386 | |  |  | | | 0.470 | | 0.386 |
| *K,N* | | 207.004 | | 260.556 | | -102.042 | |  |  | | | 0.463 | | 0.394 |
| *K,E* | | 269.581 | | 16.704 | | -0.316 | |  |  | | | 0.238 | | 0.665 |
| *M,N* | | 227.773 | | 168.598 | | 2.857 | |  |  | | | 0.469 | | 0.387 |
| *M,E* | | 226.827 | | 169.662 | | 5.045 | |  |  | | | 0.449 | | 0.409 |
| *N,E* | | 273.380 | | 5.769 | | -0.313 | |  |  | | | 0.210 | | 0.702 |
| *K,M,N* | | 218.124 | | 111.824 | | 99.783 | | -42.069 |  | | | 0.476 | | 0.672 |
| *K,M,E* | | 229.644 | | 8.689 | | 156.042 | | -3.368 |  | | | 0.471 | | 0.676 |
| *K,N,E* | | 204.243 | | 269.686 | | -106.121 | | 2.378 |  | | | 0.463 | | 0.685 |
| *M,N,E* | | 230.533 | | 160.977 | | 3.474 | | -3.474 |  | | | 0.471 | | 0.677 |
| *K,M,N,E* | | 218.371 | | 110.600 | | 100.146 | | -41.545 | -1.780 | | | 0.476 | | 0.896 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 374.040 | | -39.781 | |  | |  | | |  | 0.159 | | 0.376 | | |
| *M* | 388.693 | | -169.431 | |  | |  | | |  | 0.104 | | 0.481 | | |
| *N* | 364.214 | | -13.167 | |  | |  | | |  | 0.115 | | 0.457 | | |
| *E* | 360.080 | | -7.793 | |  | |  | | |  | 0.005 | | 0.883 | | |
| *K,M* | 427.655 | | -53.400 | | -249.885 | |  | | |  | 0.366 | | 0.402 | | |
| *K,N* | 468.745 | | -487.830 | | 175.300 | |  | | |  | 0.414 | | 0.343 | | |
| *K,E* | 367.186 | | -54.827 | | 0.288 | |  | | |  | 0.201 | | 0.639 | | |
| *M,N* | 421.536 | | -276.889 | | -20.937 | |  | | |  | 0.353 | | 0.419 | | |
| *M,E* | 429.300 | | -279.617 | | -0.419 | |  | | |  | 0.197 | | 0.645 | | |
| *N,E* | 354.093 | | -19.934 | | 0.301 | |  | | |  | 0.156 | | 0.713 | | |
| *K,M,N* | 466.733 | | -456.053 | | -23.173 | | 162.373 | | |  | 0.415 | | 0.608 | | |
| *K,M,E* | 431.245 | | -260.674 | | -51.188 | | -5.367 | | |  | 0.367 | | 0.667 | | |
| *K,N,E* | 532.935 | | -705.420 | | 271.109 | | -0.523 | | |  | 0.477 | | 0.529 | | |
| *M,N,E* | 424.142 | | -283.381 | | -20.275 | | -3.759 | | |  | 0.353 | | 0.684 | | |
| *K,M,N,E* | 557.250 | | -930.240 | | 132.215 | | 364.024 | | | -0.628 | 0.488 | | 0.762 | | |

TABLE S-VI. Regression analysis data for Y1 and Y2 bands for EBT indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | a4 | | | MCC | | P |
| *K* | | 292.604 | | -24.960 | |  | |  |  | | | 0.277 | | 0.283 |
| *M* | | 277.336 | | 22.536 | |  | |  |  | | | 0.008 | | 0.868 |
| *N* | | 287.216 | | -9.543 | |  | |  |  | | | 0.269 | | 0.291 |
| *E* | | 293.709 | | -0.253 | |  | |  |  | | | 0.213 | | 0.357 |
| *K,M* | | 295.651 | | -25.664 | | -14.251 | |  |  | | | 0.280 | | 0.611 |
| *K,N* | | 296.073 | | -41.386 | | 6.411 | |  |  | | | 0.279 | | 0.612 |
| *K,E* | | 295.264 | | -18.596 | | -0.114 | |  |  | | | 0.303 | | 0.582 |
| *M,N* | | 293.484 | | -30.201 | | -10.342 | |  |  | | | 0.282 | | 0.609 |
| *M,E* | | 319.778 | | -100.179 | | -0.396 | |  |  | | | 0.298 | | 0.588 |
| *N,E* | | 290.760 | | -7.083 | | -0.104 | |  |  | | | 0.288 | | 0.601 |
| *K,M,N* | | 289.698 | | 43.877 | | -57.202 | | -27.970 |  | | | 0.282 | | 0.850 |
| *K,M,E* | | 315.035 | | -14.628 | | -77.250 | | -0.254 |  | | | 0.350 | | 0.793 |
| *K,N,E* | | 330.868 | | -156.449 | | 57.827 | | -0.300 |  | | | 0.358 | | 0.786 |
| *M,N,E* | | 313.523 | | -85.523 | | -5.863 | | -0.252 |  | | | 0.358 | | 0.795 |
| *K,M,N,E* | | 331.456 | | -163.070 | | 4.168 | | 60.514 | -0.301 | | | 0.358 | | 0.945 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 406.647 | | -16.443 | |  | |  | | |  | 0.254 | | 0.308 | | |
| *M* | 398.778 | | 3.728 | |  | |  | | |  | 0.000 | | 0.970 | | |
| *N* | 403.180 | | -6.528 | |  | |  | | |  | 0.254 | | 0.308 | | |
| *E* | 425.142 | | -0.581 | |  | |  | | |  | 0.789 | | 0.018 | | |
| *K,M* | 410.305 | | -17.088 | | -17.440 | |  | | |  | 0.262 | | 0.634 | | |
| *K,N* | 404.526 | | -6.353 | | -4.017 | |  | | |  | 0.254 | | 0.644 | | |
| *K,E* | 428.191 | | 12.975 | | -0.778 | |  | | |  | 0.857 | | 0.054 | | |
| *M,N* | 408.474 | | -25.851 | | -7.038 | |  | | |  | 0.271 | | 0.622 | | |
| *M,E* | 441.902 | | -67.092 | | -0.666 | |  | | |  | 0.898 | | 0.032 | | |
| *N,E* | 432.249 | | 6.086 | | -0.819 | |  | | |  | 0.877 | | 0.043 | | |
| *K,M,N* | 387.182 | | 181.010 | | -109.178 | | -80.219 | | |  | 0.319 | | 0.820 | | |
| *K,M,E* | 447.011 | | 14.899 | | -73.530 | | -0.900 | | |  | 0.986 | | 0.021 | | |
| *K,N,E* | 458.665 | | -109.310 | | 50.698 | | -0.911 | | |  | 0.951 | | 0.072 | | |
| *M,N,E* | 448.921 | | -66.859 | | 6.059 | | -0.903 | | |  | 0.985 | | 0.022 | | |
| *K,M,N,E* | 444.832 | | 31.449 | | -80.942 | | -6.781 | | | -0.895 | 0.986 | | 0.174 | | |

TABLE S-VII. Regression analysis data for Y1 and Y2 bands for TY indicator

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y1 | | | | | | | | | | | | | | |
| Parameters | | a0 | | a1 | | a2 | | a3 | | a4 | | MCC | | P |
| *K* | | 441.698 | | -249.581 | |  | |  | |  | | 0.423 | | 0.235 |
| *M* | | 315.416 | | 32.548 | |  | |  | |  | | 0.054 | | 0.708 |
| *N* | | 352.286 | | -44.369 | |  | |  | |  | | 0.402 | | 0.251 |
| *E* | | 322.126 | | -1.052 | |  | |  | |  | | 0.001 | | 0.964 |
| *K,M* | | 437.571 | | -256.181 | | 38.442 | |  | |  | | 0.497 | | 0.503 |
| *K,N* | | 416.697 | | -160.021 | | -26.165 | |  | |  | | 0.508 | | 0.492 |
| *K,E* | | 457.720 | | -293.802 | | 0.105 | |  | |  | | 0.489 | | 0.511 |
| *M,N* | | 385.178 | | -73.920 | | -71.621 | |  | |  | | 0.527 | | 0.473 |
| *M,E* | | 307.423 | | 53.033 | | 8.209 | |  | |  | | 0.081 | | 0.919 |
| *N,E* | | 374.626 | | -108.172 | | 0.436 | |  | |  | | 0.946 | | 0.054 |
| *K,M,N* | | -1108.976 | | 7002.622 | | -3050.621 | | -1965.685 | |  | | 0.920 | | 0.356 |
| *K,M,E* | | 491.609 | | -458.300 | | 151.594 | | 0.435 | |  | | 0.993 | | 0.109 |
| *K,N,E* | | 415.892 | | -105.074 | | -93.282 | | 0.416 | |  | | 0.991 | | 0.120 |
| *M,N,E* | | 393.261 | | -44.800 | | -120.976 | | 0.411 | |  | | 0.991 | | 0.123 |
| Y2 | | | | | | | | | | | | | | |
| *K* | 280.821 | | 266.019 | |  | |  | |  | | 0.094 | | 0.555 | | |
| *M* | 355.899 | | 278.413 | |  | |  | |  | | 0.558 | | 0.088 | | |
| *N* | 437.009 | | -41.882 | |  | |  | |  | | 0.058 | | 0.645 | | |
| *E* | 403.565 | | 9.798 | |  | |  | |  | | 0.011 | | 0.841 | | |
| *K,M* | 280.611 | | 161.641 | | 266.772 | |  | |  | | 0.591 | | 0.261 | | |
| *K,N* | 125.796 | | 811.188 | | -155.246 | |  | |  | | 0.502 | | 0.351 | | |
| *K,E* | 266.602 | | 303.183 | | -7.385 | |  | |  | | 0.098 | | 0.856 | | |
| *M,N* | 311.567 | | 338.076 | | 48.338 | |  | |  | | 0.610 | | 0.244 | | |
| *M,E* | 303.972 | | 399.963 | | 0.597 | |  | |  | | 0.870 | | 0.047 | | |
| *N,E* | 483.512 | | -168.709 | | 0.829 | |  | |  | | 0.331 | | 0.548 | | |
| *K,M,N* | 670.455 | | -1444.981 | | 864.913 | | 390.868 | |  | | 0.679 | | 0.441 | | |
| *K,M,E* | 465.715 | | -415.608 | | 504.412 | | 0.962 | |  | | 0.975 | | 0.038 | | |
| *K,N,E* | 153.963 | | 873.589 | | -306.078 | | 0.929 | |  | | 0.841 | | 0.229 | | |
| *M,N,E* | 355.892 | | 358.552 | | -87.805 | | 0.925 | |  | | 0.947 | | 0.079 | | |
| *K,M,N,E* | 670.285 | | -1269.805 | | 821.065 | | 216.230 | | 0.905 | | 1.000 | | 0.011 | | |