**Table S1.** LA-ICP-MS zircon U-Pb data for the Permian granites in the Chifeng area.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | *w*B/ppm | | | Th/U | Isotope ratio | | | | *T* (Ma) | | | |
| Pb | Th | U | 207Pb/235U±1σ | | 206Pb/238U±1σ | | 207Pb/235U±1σ | | 206Pb/238U±1σ | |
| PM210-12-1-01 | 18 | 479 | 306 | 1.57 | 0.30120 | 0.01548 | 0.04258 | 0.00071 | 267 | 12 | 269 | 4 |
| PM210-12-1-02 | 43 | 847 | 798 | 1.06 | 0.30296 | 0.00754 | 0.04262 | 0.00056 | 269 | 6 | 269 | 3 |
| PM210-12-1-03 | 22 | 372 | 416 | 0.89 | 0.31363 | 0.00938 | 0.04399 | 0.00060 | 277 | 7 | 278 | 4 |
| PM210-12-1-04 | 17 | 321 | 340 | 0.94 | 0.31135 | 0.00988 | 0.04404 | 0.00062 | 275 | 8 | 278 | 4 |
| PM210-12-1-05 | 14 | 309 | 239 | 1.30 | 0.31456 | 0.01159 | 0.04321 | 0.00062 | 278 | 9 | 273 | 4 |
| PM210-12-1-06 | 21 | 194 | 461 | 0.42 | 0.30855 | 0.00980 | 0.04323 | 0.00060 | 273 | 8 | 273 | 4 |
| PM210-12-1-07 | 19 | 365 | 361 | 1.01 | 0.30706 | 0.00932 | 0.04290 | 0.00058 | 272 | 7 | 271 | 4 |
| PM210-12-1-08 | 22 | 382 | 444 | 0.86 | 0.29926 | 0.00875 | 0.04198 | 0.00057 | 266 | 7 | 265 | 4 |
| PM210-12-1-09 | 19 | 282 | 384 | 0.73 | 0.29478 | 0.00893 | 0.04230 | 0.00059 | 262 | 7 | 267 | 4 |
| PM210-12-1-10 | 19 | 286 | 373 | 0.77 | 0.30602 | 0.00961 | 0.04306 | 0.00060 | 271 | 7 | 272 | 4 |
| PM210-12-1-11 | 17 | 241 | 348 | 0.69 | 0.30275 | 0.01157 | 0.04236 | 0.00062 | 269 | 9 | 267 | 4 |
| PM210-12-1-12 | 19 | 325 | 356 | 0.91 | 0.31134 | 0.01202 | 0.04358 | 0.00063 | 275 | 9 | 275 | 4 |
| PM210-12-1-13 | 14 | 159 | 289 | 0.55 | 0.33868 | 0.01064 | 0.04183 | 0.00059 | 296 | 8 | 264 | 4 |
| PM210-12-1-14 | 18 | 311 | 359 | 0.87 | 0.30850 | 0.01079 | 0.04329 | 0.00062 | 273 | 8 | 273 | 4 |
| PM210-12-1-15 | 17 | 294 | 349 | 0.84 | 0.30095 | 0.01365 | 0.04176 | 0.00062 | 267 | 11 | 264 | 4 |
| PM210-12-1-16 | 27 | 505 | 525 | 0.96 | 0.30742 | 0.00881 | 0.04298 | 0.00058 | 272 | 7 | 271 | 4 |
| PM210-12-1-17 | 17 | 259 | 343 | 0.76 | 0.29843 | 0.00972 | 0.04209 | 0.00058 | 265 | 8 | 266 | 4 |
| PM210-12-1-18 | 18 | 289 | 359 | 0.80 | 0.30452 | 0.00879 | 0.04270 | 0.00059 | 270 | 7 | 270 | 4 |
| PM210-12-1-19 | 30 | 560 | 580 | 0.97 | 0.30524 | 0.00784 | 0.04273 | 0.00057 | 270 | 6 | 270 | 4 |
| PM210-12-1-20 | 21 | 365 | 406 | 0.90 | 0.30491 | 0.00922 | 0.04271 | 0.00058 | 270 | 7 | 270 | 4 |
| PM210-12-1-21 | 22 | 365 | 435 | 0.84 | 0.29347 | 0.00886 | 0.04275 | 0.00059 | 261 | 7 | 270 | 4 |
| PM210-12-1-22 | 22 | 401 | 414 | 0.97 | 0.35615 | 0.01069 | 0.04241 | 0.00059 | 309 | 8 | 268 | 4 |
| PM210-12-1-23 | 21 | 417 | 413 | 1.01 | 0.30165 | 0.00927 | 0.04251 | 0.00058 | 268 | 7 | 268 | 4 |
| PM210-12-1-24 | 36 | 577 | 733 | 0.79 | 0.30270 | 0.00744 | 0.04261 | 0.00056 | 269 | 6 | 269 | 3 |
| PM105-2-2-1 | 145 | 720 | 1235 | 0.56 | 0.29673 | 0.00963 | 0.04136 | 0.00037 | 264 | 8 | 261 | 2 |
| PM105-2-2-2\* | 43 | 190 | 370 | 0.50 | 0.35780 | 0.01890 | 0.04256 | 0.00061 | 311 | 14 | 269 | 4 |
| PM105-2-2-3 | 61 | 255 | 518 | 0.46 | 0.30865 | 0.01715 | 0.04247 | 0.00065 | 273 | 13 | 268 | 4 |
| PM105-2-2-4 | 67 | 305 | 584 | 0.51 | 0.33610 | 0.01523 | 0.04320 | 0.00062 | 294 | 12 | 273 | 4 |
| PM105-2-2-5 | 168 | 773 | 1312 | 0.56 | 0.32872 | 0.01151 | 0.04205 | 0.00046 | 289 | 9 | 266 | 3 |
| PM105-2-2-6\* | 123 | 737 | 785 | 0.88 | 0.48000 | 0.02201 | 0.04305 | 0.00056 | 398 | 15 | 272 | 3 |
| PM105-2-2-7\* | 104 | 432 | 760 | 0.54 | 0.38759 | 0.01611 | 0.04244 | 0.00050 | 333 | 12 | 268 | 3 |
| PM105-2-2-8 | 111 | 460 | 962 | 0.47 | 0.31749 | 0.01283 | 0.04270 | 0.00052 | 280 | 10 | 270 | 3 |
| PM105-2-2-9 | 52 | 206 | 447 | 0.45 | 0.32860 | 0.01658 | 0.04448 | 0.00066 | 288 | 13 | 281 | 4 |
| PM105-2-2-10 | 94 | 432 | 885 | 0.47 | 0.30209 | 0.01287 | 0.04219 | 0.00046 | 268 | 10 | 266 | 3 |
| PM105-2-2-11 | 75 | 328 | 692 | 0.46 | 0.29782 | 0.01290 | 0.04294 | 0.00054 | 265 | 10 | 271 | 3 |
| PM105-2-2-12 | 60 | 256 | 545 | 0.45 | 0.31203 | 0.01775 | 0.04269 | 0.00055 | 276 | 14 | 269 | 3 |
| PM105-2-2-13 | 83 | 338 | 765 | 0.43 | 0.29531 | 0.01326 | 0.04180 | 0.00056 | 263 | 10 | 264 | 3 |
| PM105-2-2-14 | 109 | 479 | 838 | 0.55 | 0.31363 | 0.01319 | 0.04442 | 0.00055 | 277 | 10 | 280 | 3 |
| PM105-2-2-15 | 83 | 339 | 776 | 0.43 | 0.29269 | 0.01256 | 0.04339 | 0.00048 | 261 | 10 | 274 | 3 |
| PM105-2-2-16 | 50 | 208 | 455 | 0.44 | 0.31713 | 0.01681 | 0.04275 | 0.00067 | 280 | 13 | 270 | 4 |
| PM105-2-2-17 | 58 | 239 | 528 | 0.44 | 0.31952 | 0.01517 | 0.04240 | 0.00056 | 282 | 12 | 268 | 3 |
| PM105-2-2-18 | 49 | 210 | 471 | 0.43 | 0.30498 | 0.01446 | 0.04178 | 0.00056 | 270 | 11 | 264 | 3 |
| P3038-1 | 218 | 1044 | 1442 | 0.72 | 0.27712 | 0.00925 | 0.03976 | 0.00034 | 248 | 7 | 251 | 2 |
| P3038-2 | 214 | 1138 | 878 | 1.31 | 0.29200 | 0.01304 | 0.04070 | 0.00043 | 260 | 10 | 257 | 3 |
| P3038-3 | 204 | 968 | 1270 | 0.76 | 0.29048 | 0.00960 | 0.04115 | 0.00040 | 259 | 8 | 260 | 2 |
| P3038-4 | 246 | 1175 | 1845 | 0.63 | 0.27289 | 0.00841 | 0.03942 | 0.00033 | 245 | 7 | 249 | 2 |
| P3038-5 | 275 | 1062 | 2047 | 0.52 | 0.32302 | 0.00949 | 0.04199 | 0.00046 | 284 | 7 | 265 | 3 |
| P3038-6\* | 202 | 935 | 1192 | 0.78 | 0.35606 | 0.01276 | 0.04117 | 0.00039 | 309 | 10 | 260 | 2 |
| P3038-7 | 221 | 1048 | 1227 | 0.83 | 0.28741 | 0.00940 | 0.04197 | 0.00043 | 257 | 7 | 265 | 3 |
| P3038-8 | 213 | 1029 | 1380 | 0.73 | 0.28757 | 0.00889 | 0.04059 | 0.00035 | 257 | 7 | 256 | 2 |
| P3038-9 | 178 | 833 | 1162 | 0.70 | 0.28793 | 0.00990 | 0.04081 | 0.00037 | 257 | 8 | 258 | 2 |
| P3038-10 | 124 | 596 | 759 | 0.77 | 0.29174 | 0.01253 | 0.04232 | 0.00055 | 260 | 10 | 267 | 3 |
| P3038-11 | 183 | 879 | 1277 | 0.67 | 0.29111 | 0.00975 | 0.04228 | 0.00038 | 259 | 8 | 267 | 2 |
| P3038-12 | 189 | 857 | 1250 | 0.67 | 0.30543 | 0.00999 | 0.04270 | 0.00041 | 271 | 8 | 270 | 3 |
| P3038-13 | 213 | 1046 | 1325 | 0.77 | 0.28770 | 0.00987 | 0.04172 | 0.00035 | 257 | 8 | 263 | 2 |
| P3038-14 | 194 | 842 | 1110 | 0.74 | 0.31759 | 0.01065 | 0.04295 | 0.00039 | 280 | 8 | 271 | 2 |
| P3038-15\* | 262 | 1240 | 1397 | 0.87 | 0.32884 | 0.01166 | 0.04035 | 0.00039 | 289 | 9 | 255 | 2 |
| PM302-7-1-1\* | 143 | 560 | 1107 | 0.51 | 0.36743 | 0.01128 | 0.04452 | 0.00079 | 318 | 8 | 281 | 5 |
| PM302-7-1-2\* | 78 | 210 | 306 | 0.69 | 0.30319 | 0.00681 | 0.03668 | 0.00063 | 269 | 5 | 232 | 4 |
| PM302-7-1-3 | 63 | 245 | 397 | 0.62 | 0.29056 | 0.01314 | 0.04062 | 0.00073 | 259 | 10 | 257 | 5 |
| PM302-7-1-4 | 112 | 308 | 714 | 0.43 | 0.28800 | 0.00822 | 0.04014 | 0.00090 | 257 | 6 | 254 | 6 |
| PM302-7-1-5\* | 125 | 681 | 738 | 0.92 | 0.56001 | 0.01652 | 0.02889 | 0.00080 | 452 | 11 | 184 | 5 |
| PM302-7-1-6 | 97 | 538 | 891 | 0.60 | 0.29314 | 0.00803 | 0.04008 | 0.00080 | 261 | 6 | 253 | 5 |
| PM302-7-1-7 | 146 | 342 | 607 | 0.56 | 0.29222 | 0.00872 | 0.04251 | 0.00105 | 260 | 7 | 268 | 6 |
| PM302-7-1-8\* | 87 | 469 | 714 | 0.66 | 0.29663 | 0.00978 | 0.03929 | 0.00093 | 264 | 8 | 248 | 6 |
| PM302-7-1-9\* | 182 | 208 | 181 | 1.15 | 0.34545 | 0.00989 | 0.04161 | 0.00090 | 301 | 7 | 263 | 6 |
| PM302-7-1-10 | 60 | 381 | 578 | 0.66 | 0.31256 | 0.00848 | 0.04335 | 0.00094 | 276 | 7 | 274 | 6 |
| PM302-7-1-11\* | 89 | 283 | 562 | 0.50 | 0.34706 | 0.01299 | 0.04777 | 0.00100 | 303 | 10 | 301 | 6 |
| PM302-7-1-14 | 92 | 526 | 761 | 0.69 | 0.28641 | 0.01539 | 0.04069 | 0.00101 | 256 | 12 | 257 | 6 |
| PM302-7-1-15\* | 118 | 447 | 783 | 0.57 | 0.32985 | 0.00927 | 0.04464 | 0.00085 | 289 | 7 | 282 | 5 |
| PM302-7-1-16\* | 152 | 398 | 562 | 0.71 | 0.46225 | 0.02595 | 0.04254 | 0.00091 | 386 | 18 | 269 | 6 |
| PM302-7-1-17 | 201 | 329 | 589 | 0.56 | 0.29836 | 0.00896 | 0.04293 | 0.00078 | 265 | 7 | 271 | 5 |
| PM302-7-1-18\* | 84 | 218 | 158 | 1.38 | 0.32349 | 0.01263 | 0.04054 | 0.00087 | 285 | 10 | 256 | 5 |
| PM302-7-1-19 | 128 | 318 | 649 | 0.49 | 0.28353 | 0.00887 | 0.03900 | 0.00079 | 253 | 7 | 247 | 5 |
| PM302-7-1-20\* | 137 | 230 | 430 | 0.54 | 0.39362 | 0.01650 | 0.04532 | 0.00099 | 337 | 12 | 286 | 6 |
| PM302-7-1-21 | 124 | 468 | 730 | 0.64 | 0.30164 | 0.01239 | 0.04220 | 0.00097 | 268 | 10 | 266 | 6 |
| PM302-7-1-22 | 142 | 416 | 789 | 0.53 | 0.29491 | 0.00815 | 0.04178 | 0.00072 | 262 | 6 | 264 | 4 |
| PM302-7-1-23 | 163 | 259 | 551 | 0.47 | 0.30226 | 0.01088 | 0.04193 | 0.00119 | 268 | 8 | 265 | 7 |
| PM302-7-1-24 | 92 | 271 | 490 | 0.55 | 0.28809 | 0.00954 | 0.04038 | 0.00129 | 257 | 8 | 255 | 8 |
| PM302-7-1-25 | 74 | 521 | 823 | 0.63 | 0.28540 | 0.01095 | 0.04068 | 0.00128 | 255 | 9 | 257 | 8 |
| D5695-01 | 5 | 45 | 95 | 0.48 | 0.29646 | 0.01537 | 0.04171 | 0.00078 | 264 | 12 | 263 | 5 |
| D5695-02\* | 94 | 167 | 226 | 0.74 | 5.11548 | 0.16795 | 0.31990 | 0.00521 | 1839 | 28 | 1789 | 25 |
| D5695-03 | 6 | 74 | 125 | 0.60 | 0.29109 | 0.01448 | 0.04103 | 0.00075 | 259 | 11 | 259 | 5 |
| D5695-04 | 19 | 374 | 337 | 1.11 | 0.30132 | 0.01029 | 0.04136 | 0.00067 | 267 | 8 | 261 | 4 |
| D5695-05\* | 124 | 95 | 329 | 0.29 | 5.18704 | 0.10556 | 0.32701 | 0.00498 | 1850 | 17 | 1824 | 24 |
| D5695-06 | 8 | 83 | 157 | 0.53 | 0.29554 | 0.01493 | 0.04160 | 0.00074 | 263 | 12 | 263 | 5 |
| D5695-07 | 8 | 106 | 162 | 0.65 | 0.29460 | 0.01153 | 0.04149 | 0.00071 | 262 | 9 | 262 | 4 |
| D5695-08 | 13 | 212 | 263 | 0.81 | 0.29402 | 0.01197 | 0.04075 | 0.00069 | 262 | 9 | 257 | 4 |
| D5695-09 | 17 | 248 | 345 | 0.72 | 0.29333 | 0.01053 | 0.04136 | 0.00070 | 261 | 8 | 261 | 4 |
| D5695-10 | 18 | 314 | 343 | 0.92 | 0.27931 | 0.00807 | 0.04037 | 0.00066 | 250 | 6 | 255 | 4 |
| D5695-11 | 27 | 629 | 465 | 1.35 | 0.29009 | 0.00776 | 0.04092 | 0.00065 | 259 | 6 | 259 | 4 |
| D5695-12 | 11 | 149 | 218 | 0.68 | 0.29509 | 0.01233 | 0.04154 | 0.00071 | 263 | 10 | 262 | 4 |
| D5695-13\* | 6 | 77 | 103 | 0.75 | 0.26525 | 0.01890 | 0.04178 | 0.00077 | 239 | 15 | 264 | 5 |
| D5695-14 | 15 | 268 | 294 | 0.91 | 0.29038 | 0.01240 | 0.04101 | 0.00073 | 259 | 10 | 259 | 5 |
| D5695-15 | 16 | 210 | 323 | 0.65 | 0.29369 | 0.00891 | 0.04136 | 0.00068 | 261 | 7 | 261 | 4 |
| D5695-16 | 14 | 258 | 275 | 0.94 | 0.29097 | 0.00946 | 0.04097 | 0.00069 | 259 | 7 | 259 | 4 |
| D5695-17 | 10 | 115 | 209 | 0.55 | 0.29103 | 0.01044 | 0.04097 | 0.00071 | 259 | 8 | 259 | 4 |
| D5695-18 | 10 | 163 | 202 | 0.81 | 0.29562 | 0.01069 | 0.04171 | 0.00073 | 263 | 8 | 263 | 5 |
| D5695-19 | 10 | 128 | 218 | 0.59 | 0.28881 | 0.01059 | 0.04079 | 0.00072 | 258 | 8 | 258 | 4 |
| D5695-20 | 8 | 145 | 158 | 0.91 | 0.29332 | 0.01320 | 0.04134 | 0.00076 | 261 | 10 | 261 | 5 |
| D5695-21 | 5 | 51 | 106 | 0.48 | 0.30420 | 0.01401 | 0.04172 | 0.00079 | 270 | 11 | 263 | 5 |
| D5695-22 | 22 | 457 | 406 | 1.13 | 0.29273 | 0.00804 | 0.04123 | 0.00068 | 261 | 6 | 260 | 4 |
| D5695-23 | 15 | 247 | 293 | 0.84 | 0.29101 | 0.00930 | 0.04109 | 0.00070 | 259 | 7 | 260 | 4 |
| D5695-24 | 9 | 97 | 196 | 0.50 | 0.29350 | 0.01446 | 0.04133 | 0.00076 | 261 | 11 | 261 | 5 |
| D5695-25 | 19 | 304 | 374 | 0.81 | 0.29439 | 0.00918 | 0.04154 | 0.00070 | 262 | 7 | 262 | 4 |
| T310-01 | 536.76 | 1692.88 | 3923.57 | 0.43 | 0.30160 | 0.00673 | 0.04047 | 0.00051 | 268 | 5 | 256 | 3 |
| T310-02 | 281.09 | 1252.29 | 1331.13 | 0.94 | 0.29487 | 0.00837 | 0.03955 | 0.00050 | 262 | 7 | 250 | 3 |
| T310-03 | 416.87 | 1847.32 | 1939.62 | 0.95 | 0.28007 | 0.00672 | 0.03957 | 0.00049 | 251 | 5 | 250 | 3 |
| T310-04 | 115.32 | 492.23 | 375.97 | 1.31 | 0.29540 | 0.01767 | 0.04120 | 0.00068 | 263 | 14 | 260 | 4 |
| T310-05 | 408.73 | 1756.70 | 2111.76 | 0.83 | 0.28636 | 0.00677 | 0.03985 | 0.00042 | 256 | 5 | 252 | 3 |
| T310-06 | 428.20 | 1822.41 | 2314.77 | 0.79 | 0.28534 | 0.01248 | 0.03952 | 0.00059 | 255 | 10 | 250 | 4 |
| T310-07 | 323.22 | 1566.83 | 873.27 | 1.79 | 0.31435 | 0.00993 | 0.04004 | 0.00050 | 278 | 8 | 253 | 3 |
| T310-08 | 297.57 | 1337.49 | 1285.46 | 1.04 | 0.28482 | 0.00749 | 0.03991 | 0.00048 | 254 | 6 | 252 | 3 |
| T310-09 | 229.28 | 1005.60 | 852.70 | 1.18 | 0.30318 | 0.02609 | 0.04024 | 0.00087 | 269 | 20 | 254 | 5 |
| T310-10 | 471.42 | 1958.81 | 1878.41 | 1.04 | 0.30301 | 0.00679 | 0.03994 | 0.00049 | 269 | 5 | 252 | 3 |
| T310-11 | 257.83 | 1085.44 | 914.55 | 1.19 | 0.30877 | 0.01186 | 0.04029 | 0.00057 | 273 | 9 | 255 | 4 |
| T310-12 | 285.22 | 1138.60 | 1496.03 | 0.76 | 0.28694 | 0.00678 | 0.04034 | 0.00056 | 256 | 5 | 255 | 3 |
| T310-13 | 121.55 | 521.33 | 502.17 | 1.04 | 0.31047 | 0.01252 | 0.04101 | 0.00060 | 275 | 10 | 259 | 4 |
| T310-14 | 81.67 | 325.90 | 249.62 | 1.31 | 0.29230 | 0.01372 | 0.04041 | 0.00058 | 260 | 11 | 255 | 4 |
| T310-15 | 50.51 | 228.11 | 214.42 | 1.06 | 0.28330 | 0.02668 | 0.03942 | 0.00166 | 253 | 21 | 249 | 10 |
| PM401-17-1-01 | 27.64 | 588.05 | 527.25 | 1.12 | 0.28126 | 0.01150 | 0.03981 | 0.00060 | 252 | 9 | 252 | 4 |
| PM401-17-1-02 | 18.00 | 288.25 | 367.11 | 0.79 | 0.28591 | 0.01406 | 0.04035 | 0.00061 | 255 | 11 | 255 | 4 |
| PM401-17-1-03\* | 35.92 | 628.21 | 546.82 | 1.15 | 0.60911 | 0.05187 | 0.04635 | 0.00133 | 483 | 33 | 292 | 8 |
| PM401-17-1-04 | 10.78 | 238.88 | 198.34 | 1.20 | 0.29578 | 0.02128 | 0.04100 | 0.00091 | 263 | 17 | 259 | 6 |
| PM401-17-1-05 | 22.17 | 445.98 | 440.88 | 1.01 | 0.29486 | 0.01734 | 0.03991 | 0.00070 | 262 | 14 | 252 | 4 |
| PM401-17-1-06 | 8.36 | 351.50 | 124.18 | 2.83 | 0.29650 | 0.04611 | 0.03975 | 0.00184 | 264 | 36 | 251 | 11 |
| PM401-17-1-07 | 19.30 | 324.16 | 379.72 | 0.85 | 0.25659 | 0.04024 | 0.04148 | 0.00122 | 232 | 33 | 262 | 8 |
| PM401-17-1-08 | 41.13 | 967.02 | 857.05 | 1.13 | 0.28874 | 0.01432 | 0.04007 | 0.00070 | 258 | 11 | 253 | 4 |
| PM401-17-1-09\* | 69.64 | 115.89 | 267.10 | 0.43 | 3.16082 | 0.12152 | 0.23906 | 0.00659 | 1448 | 30 | 1382 | 34 |
| PM401-17-1-10\* | 17.08 | 267.36 | 290.77 | 0.92 | 0.42117 | 0.03195 | 0.04507 | 0.00087 | 357 | 23 | 284 | 5 |
| PM401-17-1-11 | 40.91 | 690.36 | 869.49 | 0.79 | 0.28048 | 0.01286 | 0.03960 | 0.00080 | 251 | 10 | 250 | 5 |
| PM401-17-1-12 | 20.64 | 452.68 | 386.05 | 1.17 | 0.27924 | 0.01681 | 0.04186 | 0.00078 | 250 | 13 | 264 | 5 |
| PM401-17-1-13 | 8.66 | 344.00 | 121.57 | 2.83 | 0.28707 | 0.09547 | 0.04024 | 0.00254 | 256 | 75 | 254 | 16 |
| PM401-17-1-14 | 25.74 | 553.53 | 510.92 | 1.08 | 0.30917 | 0.04021 | 0.04042 | 0.00196 | 274 | 31 | 255 | 12 |
| PM401-17-1-15 | 55.41 | 640.08 | 1248.37 | 0.51 | 0.28769 | 0.01816 | 0.03971 | 0.00103 | 257 | 14 | 251 | 6 |
| PM401-17-1-16 | 17.74 | 370.66 | 337.93 | 1.10 | 0.29893 | 0.01192 | 0.04090 | 0.00072 | 266 | 9 | 258 | 4 |
| PM401-17-1-17 | 30.53 | 482.90 | 601.61 | 0.80 | 0.30815 | 0.01351 | 0.04191 | 0.00065 | 273 | 10 | 265 | 4 |
| PM401-17-1-18 | 59.48 | 1276.75 | 1155.71 | 1.10 | 0.28042 | 0.00827 | 0.03964 | 0.00053 | 251 | 7 | 251 | 3 |
| PM401-17-1-19 | 52.15 | 968.22 | 1014.04 | 0.95 | 0.31734 | 0.07809 | 0.04129 | 0.00082 | 280 | 60 | 261 | 5 |
| PM401-17-1-20 | 6.54 | 142.11 | 121.20 | 1.17 | 0.32067 | 0.04890 | 0.04176 | 0.00295 | 282 | 38 | 264 | 18 |
| PM305-21-1-01 | 39.65 | 787.04 | 862.99 | 0.91 | 0.28533 | 0.00806 | 0.03995 | 0.00054 | 255 | 6 | 253 | 3 |
| PM305-21-1-02\* | 43.50 | 891.61 | 1059.24 | 0.84 | 0.24311 | 0.00652 | 0.03579 | 0.00048 | 221 | 5 | 227 | 3 |
| PM305-21-1-03 | 60.28 | 1415.29 | 1193.15 | 1.19 | 0.28390 | 0.00716 | 0.04115 | 0.00055 | 254 | 6 | 260 | 3 |
| PM305-21-1-04 | 108.96 | 3199.17 | 1972.83 | 1.62 | 0.28742 | 0.00717 | 0.04100 | 0.00055 | 257 | 6 | 259 | 3 |
| PM305-21-1-05 | 36.89 | 716.16 | 794.71 | 0.90 | 0.28101 | 0.00762 | 0.04059 | 0.00055 | 251 | 6 | 256 | 3 |
| PM305-21-1-06 | 107.72 | 3451.06 | 1883.18 | 1.83 | 0.28833 | 0.00749 | 0.04110 | 0.00055 | 257 | 6 | 260 | 3 |
| PM305-21-1-07 | 37.06 | 834.76 | 775.81 | 1.08 | 0.28279 | 0.00783 | 0.04027 | 0.00055 | 253 | 6 | 255 | 3 |
| PM305-21-1-08\* | 14.45 | 479.70 | 487.87 | 0.98 | 0.17455 | 0.00548 | 0.02565 | 0.00036 | 163 | 5 | 163 | 2 |
| PM305-21-1-09 | 90.33 | 2357.00 | 1717.96 | 1.37 | 0.28515 | 0.00736 | 0.04120 | 0.00055 | 255 | 6 | 260 | 3 |
| PM305-21-1-10 | 109.93 | 3669.51 | 1908.99 | 1.92 | 0.28683 | 0.00731 | 0.04057 | 0.00054 | 256 | 6 | 256 | 3 |
| PM305-21-1-11 | 109.85 | 115.15 | 352.22 | 0.33 | 4.58226 | 0.12273 | 0.30546 | 0.00410 | 1746 | 22 | 1718 | 20 |
| PM305-21-1-12 | 17.29 | 309.25 | 386.06 | 0.80 | 0.29523 | 0.00994 | 0.04012 | 0.00056 | 263 | 8 | 254 | 3 |
| PM305-21-1-13 | 83.19 | 2491.27 | 1582.27 | 1.57 | 0.28095 | 0.00731 | 0.04008 | 0.00054 | 251 | 6 | 253 | 3 |
| PM305-21-1-14 | 11.45 | 268.12 | 169.24 | 1.58 | 0.38291 | 0.01365 | 0.05207 | 0.00073 | 329 | 10 | 327 | 4 |
| PM305-21-1-15 | 17.10 | 112.88 | 340.36 | 0.33 | 0.37062 | 0.01225 | 0.05139 | 0.00072 | 320 | 9 | 323 | 4 |
| PM305-21-1-16 | 283.95 | 627.09 | 599.23 | 1.05 | 7.18168 | 0.18675 | 0.39052 | 0.00523 | 2134 | 23 | 2125 | 24 |
| PM305-21-1-17 | 74.74 | 2170.05 | 1384.81 | 1.57 | 0.28795 | 0.00765 | 0.04126 | 0.00056 | 257 | 6 | 261 | 3 |
| PM305-21-1-18 | 228.59 | 198.16 | 716.33 | 0.28 | 4.80778 | 0.12645 | 0.31784 | 0.00426 | 1786 | 22 | 1779 | 21 |
| PM305-21-1-19 | 30.72 | 738.47 | 620.23 | 1.19 | 0.29821 | 0.00960 | 0.04123 | 0.00058 | 265 | 8 | 260 | 4 |
| PM305-21-1-20 | 281.37 | 276.01 | 860.74 | 0.32 | 4.88528 | 0.12780 | 0.32237 | 0.00432 | 1800 | 22 | 1801 | 21 |
| PM305-21-1-21 | 46.35 | 1013.23 | 985.23 | 1.03 | 0.29087 | 0.00846 | 0.04021 | 0.00055 | 259 | 7 | 254 | 3 |
| PM305-21-1-22 | 74.98 | 2261.18 | 1439.28 | 1.57 | 0.28381 | 0.00793 | 0.04022 | 0.00055 | 254 | 6 | 254 | 3 |
| PM305-21-1-23 | 46.34 | 1260.91 | 942.93 | 1.34 | 0.28683 | 0.00824 | 0.03971 | 0.00054 | 256 | 7 | 251 | 3 |

\*Representing the abandoned points when calculating weighted average age because of discordance.

**Table S2.** Major (wt%) and trace (ppm) elements data of Permian granites in the Chifeng area.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | | PM105-2-1 | | | | | PM105-2-2 | | | | | | PM105-2-3 | | | | | | PM105-2-4 | | | | | | PM105-2-5 | | | | | | PM105-4-1 | | | | |
| Lithology | | Monzogranite | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pluton | | Aohan Banner | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SiO2 | | 72.00 | | | | | 72.34 | | | | | | 72.10 | | | | | | 73.37 | | | | | | 72.45 | | | | | | 72.02 | | | | |
| TiO2 | | 0.20 | | | | | 0.12 | | | | | | 0.13 | | | | | | 0.12 | | | | | | 0.18 | | | | | | 0.18 | | | | |
| Al2O3 | | 14.57 | | | | | 14.17 | | | | | | 14.41 | | | | | | 14.43 | | | | | | 14.53 | | | | | | 14.62 | | | | |
| TFe2O3 | | 2.73 | | | | | 2.68 | | | | | | 2.87 | | | | | | 2.56 | | | | | | 2.38 | | | | | | 2.87 | | | | |
| FeO | | 0.81 | | | | | 0.70 | | | | | | 0.76 | | | | | | 0.67 | | | | | | 0.40 | | | | | | 0.76 | | | | |
| MnO | | 0.02 | | | | | 0.02 | | | | | | 0.02 | | | | | | 0.02 | | | | | | 0.02 | | | | | | 0.03 | | | | |
| MgO | | 0.09 | | | | | 0.06 | | | | | | 0.02 | | | | | | 0.04 | | | | | | 0.16 | | | | | | 0.15 | | | | |
| CaO | | 0.34 | | | | | 0.34 | | | | | | 0.34 | | | | | | 0.31 | | | | | | 0.36 | | | | | | 0.32 | | | | |
| Na2O | | 4.38 | | | | | 4.46 | | | | | | 4.67 | | | | | | 3.94 | | | | | | 4.22 | | | | | | 4.13 | | | | |
| K2O | | 4.53 | | | | | 4.70 | | | | | | 4.63 | | | | | | 4.32 | | | | | | 4.49 | | | | | | 4.69 | | | | |
| P2O5 | | 0.07 | | | | | 0.05 | | | | | | 0.05 | | | | | | 0.04 | | | | | | 0.06 | | | | | | 0.07 | | | | |
| LOI | | 0.88 | | | | | 0.64 | | | | | | 0.56 | | | | | | 0.63 | | | | | | 0.95 | | | | | | 0.73 | | | | |
| Total | | 100.6 | | | | | 100.2 | | | | | | 100.5 | | | | | | 100.4 | | | | | | 100.1 | | | | | | 100.5 | | | | |
| Na2O+K2O | | 8.91 | | | | | 9.17 | | | | | | 9.30 | | | | | | 8.26 | | | | | | 8.71 | | | | | | 8.82 | | | | |
| Na2O/K2O | | 0.97 | | | | | 0.95 | | | | | | 1.01 | | | | | | 0.91 | | | | | | 0.94 | | | | | | 0.88 | | | | |
| A/NK | | 1.20 | | | | | 1.14 | | | | | | 1.14 | | | | | | 1.29 | | | | | | 1.23 | | | | | | 1.23 | | | | |
| A/CNK | | 1.14 | | | | | 1.09 | | | | | | 1.08 | | | | | | 1.23 | | | | | | 1.17 | | | | | | 1.17 | | | | |
| SI | | 0.69 | | | | | 0.45 | | | | | | 0.13 | | | | | | 0.38 | | | | | | 1.35 | | | | | | 1.18 | | | | |
| AR | | 3.85 | | | | | 4.20 | | | | | | 4.41 | | | | | | 3.30 | | | | | | 3.62 | | | | | | 3.47 | | | | |
| σ43 | | 2.73 | | | | | 2.86 | | | | | | 2.97 | | | | | | 2.24 | | | | | | 2.56 | | | | | | 2.68 | | | | |
| R1 | | 2093 | | | | | 2054 | | | | | | 1968 | | | | | | 2398 | | | | | | 2222 | | | | | | 2144 | | | | |
| R2 | | 328 | | | | | 319 | | | | | | 321 | | | | | | 320 | | | | | | 334 | | | | | | 330 | | | | |
| Mg# | | 0.07 | | | | | 0.05 | | | | | | 0.01 | | | | | | 0.04 | | | | | | 0.21 | | | | | | 0.11 | | | | |
| La | | 33.01 | | | | | 34.66 | | | | | | 34.50 | | | | | | 34.20 | | | | | | 30.46 | | | | | | 11.16 | | | | |
| Ce | | 65.06 | | | | | 70.53 | | | | | | 69.45 | | | | | | 69.18 | | | | | | 61.78 | | | | | | 30.19 | | | | |
| Pr | | 7.00 | | | | | 7.07 | | | | | | 6.93 | | | | | | 6.91 | | | | | | 6.65 | | | | | | 2.49 | | | | |
| Nd | | 25.43 | | | | | 24.49 | | | | | | 24.38 | | | | | | 24.07 | | | | | | 24.00 | | | | | | 9.53 | | | | |
| Sm | | 5.08 | | | | | 4.60 | | | | | | 4.55 | | | | | | 4.48 | | | | | | 4.88 | | | | | | 2.12 | | | | |
| Eu | | 0.67 | | | | | 0.61 | | | | | | 1.03 | | | | | | 0.57 | | | | | | 0.62 | | | | | | 0.39 | | | | |
| Gd | | 4.18 | | | | | 3.62 | | | | | | 3.64 | | | | | | 3.62 | | | | | | 4.06 | | | | | | 2.01 | | | | |
| Tb | | 0.75 | | | | | 0.63 | | | | | | 0.62 | | | | | | 0.61 | | | | | | 0.73 | | | | | | 0.43 | | | | |
| Dy | | 4.53 | | | | | 3.75 | | | | | | 3.71 | | | | | | 3.69 | | | | | | 4.30 | | | | | | 2.91 | | | | |
| Ho | | 0.89 | | | | | 0.75 | | | | | | 0.73 | | | | | | 0.74 | | | | | | 0.83 | | | | | | 0.60 | | | | |
| Er | | 2.31 | | | | | 2.18 | | | | | | 2.14 | | | | | | 1.99 | | | | | | 2.25 | | | | | | 1.71 | | | | |
| Tm | | 0.42 | | | | | 0.37 | | | | | | 0.36 | | | | | | 0.35 | | | | | | 0.37 | | | | | | 0.32 | | | | |
| Yb | | | 2.84 | | | | | | | 2.65 | | | | | | 2.57 | | | | | | 2.49 | | | | | | 2.63 | | | | | | 2.26 | |
| Lu | | | 0.41 | | | | | | | 0.39 | | | | | | 0.39 | | | | | | 0.37 | | | | | | 0.39 | | | | | | 0.34 | |
| Y | | | 25.20 | | | | | | | 21.83 | | | | | | 20.92 | | | | | | 21.06 | | | | | | 23.61 | | | | | | 17.31 | |
| ΣREE | | | 152.5 | | | | | | | 156.2 | | | | | | 154.9 | | | | | | 153.2 | | | | | | 143.9 | | | | | | 66.45 | |
| LREE | | | 136.2 | | | | | | | 141.9 | | | | | | 140.8 | | | | | | 139.4 | | | | | | 128.3 | | | | | | 55.88 | |
| HREE | | | 16.33 | | | | | | | 14.34 | | | | | | 14.16 | | | | | | 13.86 | | | | | | 15.56 | | | | | | 10.56 | |
| LREE/HREE | | | 8.35 | | | | | | | 9.90 | | | | | | 9.95 | | | | | | 10.06 | | | | | | 8.25 | | | | | | 5.29 | |
| LaN/YbN | | | 8.34 | | | | | | | 9.39 | | | | | | 9.62 | | | | | | 9.84 | | | | | | 8.30 | | | | | | 3.54 | |
| δEu | | | 0.43 | | | | | | | 0.44 | | | | | | 0.75 | | | | | | 0.42 | | | | | | 0.42 | | | | | | 0.57 | |
| δCe | | | 1.00 | | | | | | | 1.04 | | | | | | 1.04 | | | | | | 1.04 | | | | | | 1.02 | | | | | | 1.35 | |
| Sc | | | 2.87 | | | | | | | 2.39 | | | | | | 3.13 | | | | | | 2.52 | | | | | | 3.85 | | | | | | 3.56 | |
| V | | | 22.02 | | | | | | | 15.04 | | | | | | 18.04 | | | | | | 16.52 | | | | | | 20.21 | | | | | | 19.27 | |
| Cr | | | 23.69 | | | | | | | 37.52 | | | | | | 29.17 | | | | | | 29.64 | | | | | | 44.66 | | | | | | 28.67 | |
| Co | | | 4.42 | | | | | | | 2.21 | | | | | | 3.30 | | | | | | 1.62 | | | | | | 4.55 | | | | | | 3.11 | |
| Ni | | | 1.31 | | | | | | | 0.35 | | | | | | 2.83 | | | | | | 1.65 | | | | | | 2.28 | | | | | | 1.40 | |
| Be | | | 4.07 | | | | | | | 4.05 | | | | | | 4.12 | | | | | | 4.09 | | | | | | 3.92 | | | | | | 4.55 | |
| Rb | | | 216 | | | | | | | 212 | | | | | | 210 | | | | | | 212 | | | | | | 215 | | | | | | 238 | |
| Sr | | | 69.73 | | | | | | | 66.09 | | | | | | 66.71 | | | | | | 65.21 | | | | | | 66.24 | | | | | | 67.09 | |
| Ba | | | 313 | | | | | | | 342 | | | | | | 344 | | | | | | 333 | | | | | | 311 | | | | | | 313 | |
| Li | | | 5.71 | | | | | | | 6.13 | | | | | | 6.09 | | | | | | 6.08 | | | | | | 5.73 | | | | | | 7.13 | |
| Zr | | | 181 | | | | | | | 171 | | | | | | 178 | | | | | | 176 | | | | | | 161 | | | | | | 178 | |
| Nb | | | 26.46 | | | | | | | 27.70 | | | | | | 27.39 | | | | | | 28.17 | | | | | | 24.71 | | | | | | 30.63 | |
| Hf | | | 5.26 | | | | | | | 5.20 | | | | | | 5.31 | | | | | | 4.80 | | | | | | 5.59 | | | | | | 5.12 | |
| Ta | | | 1.82 | | | | | | | 1.41 | | | | | | 1.09 | | | | | | 1.46 | | | | | | 1.51 | | | | | | 1.51 | |
| Th | | | 11.02 | | | | | | | 14.81 | | | | | | 20.02 | | | | | | 17.50 | | | | | | 14.80 | | | | | | 17.17 | |
| U | | | 2.01 | | | | | | | 1.18 | | | | | | 1.19 | | | | | | 1.23 | | | | | | 1.88 | | | | | | 1.30 | |
| Ga | | | 19.08 | | | | | | | 18.53 | | | | | | 18.81 | | | | | | 19.77 | | | | | | 18.92 | | | | | | 20.35 | |
| Sr/Y | | | 2.77 | | | | | | | 3.03 | | | | | | 3.19 | | | | | | 3.10 | | | | | | 2.81 | | | | | | 3.88 | |
| Zr+Nb+Ce+Y | | | 298 | | | | | | | 291 | | | | | | 296 | | | | | | 294 | | | | | | 272 | | | | | | 256 | |
| Na2O+K2O/CaO | | | 25.90 | | | | | | | 26.76 | | | | | | 27.03 | | | | | | 26.30 | | | | | | 24.52 | | | | | | 27.22 | |
| TFe2O3/MgO | | | 31.72 | | | | | | | 47.92 | | | | | | 168.82 | | | | | | 59.60 | | | | | | 15.25 | | | | | | 19.50 | |
| YbN | | | 16.71 | | | | | | | 15.57 | | | | | | 15.14 | | | | | | 14.66 | | | | | | 15.48 | | | | | | 13.29 | |
| Y+Nb | | | 51.66 | | | | | | | 49.53 | | | | | | 48.31 | | | | | | 49.23 | | | | | | 48.32 | | | | | | 47.94 | |
| Yb+Ta | | | 4.66 | | | | | | | 4.06 | | | | | | 3.66 | | | | | | 3.96 | | | | | | 4.14 | | | | | | 3.77 | |
| TFe2O3+MgO | | | 2.81 | | | | | | | 2.74 | | | | | | 2.89 | | | | | | 2.61 | | | | | | 2.54 | | | | | | 3.01 | |
| Sample | | | | D3038-1 | | | | | D3038-2 | | | | | | D3038-3 | | | | | | D3047-1 | | | | | | D3048-1 | | | | | | D3049-1 | | |
| Lithology | | | | Monzogranite | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pluton | | | | Daluobogou | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SiO2 | | | | 73.40 | | | | | 73.49 | | | | | | 74.11 | | | | | | 73.47 | | | | | | 73.83 | | | | | | 73.60 | | |
| TiO2 | | | | 0.18 | | | | | 0.17 | | | | | | 0.18 | | | | | | 0.18 | | | | | | 0.18 | | | | | | 0.16 | | |
| Al2O3 | | | | 14.21 | | | | | 13.92 | | | | | | 13.94 | | | | | | 14.23 | | | | | | 13.93 | | | | | | 14.14 | | |
| TFe2O3 | | | | 1.85 | | | | | 1.94 | | | | | | 1.42 | | | | | | 1.57 | | | | | | 1.66 | | | | | | 1.49 | | |
| FeO | | | | 0.85 | | | | | 1.12 | | | | | | 0.58 | | | | | | 0.63 | | | | | | 0.67 | | | | | | 0.49 | | |
| MnO | | | | 0.05 | | | | | 0.04 | | | | | | 0.04 | | | | | | 0.03 | | | | | | 0.03 | | | | | | 0.03 | | |
| MgO | | | | 0.20 | | | | | 0.20 | | | | | | 0.20 | | | | | | 0.20 | | | | | | 0.20 | | | | | | 0.20 | | |
| CaO | | | | 0.29 | | | | | 0.26 | | | | | | 0.21 | | | | | | 0.25 | | | | | | 0.22 | | | | | | 0.24 | | |
| Na2O | | | | 3.60 | | | | | 3.89 | | | | | | 3.83 | | | | | | 3.77 | | | | | | 3.68 | | | | | | 3.96 | | |
| K2O | | | | 5.79 | | | | | 5.62 | | | | | | 5.47 | | | | | | 5.76 | | | | | | 5.64 | | | | | | 5.80 | | |
| P2O5 | | | | 0.03 | | | | | 0.03 | | | | | | 0.03 | | | | | | 0.03 | | | | | | 0.03 | | | | | | 0.03 | | |
| LOI | | | | 0.27 | | | | | 0.17 | | | | | | 0.43 | | | | | | 0.38 | | | | | | 0.39 | | | | | | 0.26 | | |
| Total | | | | 100.7 | | | | | 100.8 | | | | | | 100.4 | | | | | | 100.5 | | | | | | 100.4 | | | | | | 100.4 | | |
| Na2O+K2O | | | | 9.39 | | | | | 9.51 | | | | | | 9.30 | | | | | | 9.53 | | | | | | 9.32 | | | | | | 9.76 | | |
| Na2O/K2O | | | | 0.62 | | | | | 0.69 | | | | | | 0.70 | | | | | | 0.66 | | | | | | 0.65 | | | | | | 0.68 | | |
| A/NK | | | | 1.17 | | | | | 1.12 | | | | | | 1.14 | | | | | | 1.14 | | | | | | 1.15 | | | | | | 1.11 | | |
| A/CNK | | | | 1.12 | | | | | 1.07 | | | | | | 1.11 | | | | | | 1.10 | | | | | | 1.11 | | | | | | 1.07 | | |
| SI | | | | 1.63 | | | | | 1.57 | | | | | | 1.75 | | | | | | 1.68 | | | | | | 1.70 | | | | | | 1.68 | | |
| AR | | | | 2.97 | | | | | 3.43 | | | | | | 3.36 | | | | | | 3.18 | | | | | | 3.17 | | | | | | 3.45 | | |
| σ43 | | | | 2.91 | | | | | 2.97 | | | | | | 2.78 | | | | | | 2.98 | | | | | | 2.82 | | | | | | 3.11 | | |
| R1 | | | | 2174 | | | | | 2102 | | | | | | 2242 | | | | | | 2145 | | | | | | 2226 | | | | | | 2084 | | |
| R2 | | | | 319 | | | | | 309 | | | | | | 306 | | | | | | 316 | | | | | | 307 | | | | | | 312 | | |
| Mg# | | | | 0.14 | | | | | 0.11 | | | | | | 0.19 | | | | | | 0.17 | | | | | | 0.17 | | | | | | 0.21 | | |
| La | | | | 55.58 | | | | | 61.76 | | | | | | 78.39 | | | | | | 79.41 | | | | | | 56.52 | | | | | | 73.00 | | |
| Ce | | | | 163 | | | | | 157 | | | | | | 171 | | | | | | 169 | | | | | | 144 | | | | | | 159 | | |
| Pr | | | | 10.81 | | | | | 12.01 | | | | | | 15.09 | | | | | | 15.28 | | | | | | 11.19 | | | | | | 14.21 | | |
| Nd | | | | 37.64 | | | | | 41.57 | | | | | | 51.50 | | | | | | 52.40 | | | | | | 40.11 | | | | | | 48.38 | | |
| Sm | | | | 5.69 | | | | | 6.17 | | | | | | 7.37 | | | | | | 7.46 | | | | | | 5.56 | | | | | | 6.90 | | |
| Eu | | | | 0.72 | | | | | 0.75 | | | | | | 0.76 | | | | | | 0.76 | | | | | | 0.72 | | | | | | 0.75 | | |
| Gd | | | | 5.05 | | | | | 5.46 | | | | | | 6.20 | | | | | | 6.27 | | | | | | 5.08 | | | | | | 5.91 | | |
| Tb | | | | 0.68 | | | | | 0.72 | | | | | | 0.82 | | | | | | 0.81 | | | | | | 0.69 | | | | | | 0.79 | | |
| Dy | | | | 3.34 | | | | | 3.55 | | | | | | 3.75 | | | | | | 3.80 | | | | | | 3.39 | | | | | | 3.93 | | |
| Ho | | | | 0.64 | | | | | 0.68 | | | | | | 0.69 | | | | | | 0.70 | | | | | | 0.60 | | | | | | 0.74 | | |
| Er | | | | 1.60 | | | | | 1.71 | | | | | | 1.78 | | | | | | 1.80 | | | | | | 1.72 | | | | | | 1.89 | | |
| Tm | | | | 0.29 | | | | | 0.29 | | | | | | 0.30 | | | | | | 0.30 | | | | | | 0.28 | | | | | | 0.32 | | |
| Yb | | | | | 2.04 | | | | | | 2.07 | | | | | | 2.10 | | | | | | 2.12 | | | | | | 1.99 | | | | | | 2.21 |
| Lu | | | | | 0.30 | | | | | | 0.31 | | | | | | 0.31 | | | | | | 0.32 | | | | | | 0.32 | | | | | | 0.33 |
| Y | | | | | 14.53 | | | | | | 16.23 | | | | | | 17.36 | | | | | | 17.60 | | | | | | 17.87 | | | | | | 15.20 |
| ΣREE | | | | | 288.0 | | | | | | 294.0 | | | | | | 340.6 | | | | | | 341.0 | | | | | | 272.5 | | | | | | 318.9 |
| LREE | | | | | 274.1 | | | | | | 279.2 | | | | | | 324.7 | | | | | | 324.9 | | | | | | 258.4 | | | | | | 302.8 |
| HREE | | | | | 13.93 | | | | | | 14.79 | | | | | | 15.93 | | | | | | 16.12 | | | | | | 14.08 | | | | | | 16.11 |
| LREE/HREE | | | | | 19.68 | | | | | | 18.88 | | | | | | 20.38 | | | | | | 20.16 | | | | | | 18.36 | | | | | | 18.80 |
| LaN/YbN | | | | | 19.58 | | | | | | 21.45 | | | | | | 26.75 | | | | | | 26.88 | | | | | | 20.36 | | | | | | 23.66 |
| δEu | | | | | 0.40 | | | | | | 0.38 | | | | | | 0.34 | | | | | | 0.33 | | | | | | 0.41 | | | | | | 0.35 |
| δCe | | | | | 1.54 | | | | | | 1.33 | | | | | | 1.15 | | | | | | 1.12 | | | | | | 1.32 | | | | | | 1.14 |
| Sc | | | | | 3.08 | | | | | | 3.94 | | | | | | 3.53 | | | | | | 3.70 | | | | | | 3.63 | | | | | | 3.65 |
| V | | | | | 11.65 | | | | | | 10.16 | | | | | | 10.76 | | | | | | 12.78 | | | | | | 10.00 | | | | | | 10.00 |
| Cr | | | | | 15.77 | | | | | | 20.33 | | | | | | 21.14 | | | | | | 17.87 | | | | | | 26.35 | | | | | | 22.03 |
| Co | | | | | 2.76 | | | | | | 2.75 | | | | | | 1.03 | | | | | | 2.12 | | | | | | 1.06 | | | | | | 2.53 |
| Ni | | | | | 2.00 | | | | | | 2.00 | | | | | | 2.00 | | | | | | 2.00 | | | | | | 2.00 | | | | | | 2.00 |
| Be | | | | | 1.79 | | | | | | 1.80 | | | | | | 1.83 | | | | | | 1.85 | | | | | | 1.78 | | | | | | 1.82 |
| Rb | | | | | 142 | | | | | | 141 | | | | | | 136 | | | | | | 142 | | | | | | 139 | | | | | | 140 |
| Sr | | | | | 59.44 | | | | | | 59.27 | | | | | | 56.48 | | | | | | 57.78 | | | | | | 55.85 | | | | | | 59.24 |
| Ba | | | | | 234 | | | | | | 227 | | | | | | 218 | | | | | | 226 | | | | | | 227 | | | | | | 238 |
| Li | | | | | 5.11 | | | | | | 5.31 | | | | | | 6.85 | | | | | | 6.74 | | | | | | 6.51 | | | | | | 5.40 |
| Zr | | | | | 210 | | | | | | 211 | | | | | | 207 | | | | | | 214 | | | | | | 205 | | | | | | 197 |
| Nb | | | | | 18.64 | | | | | | 18.23 | | | | | | 17.33 | | | | | | 18.39 | | | | | | 18.33 | | | | | | 18.10 |
| Hf | | | | | 3.88 | | | | | | 1.13 | | | | | | 1.06 | | | | | | 1.22 | | | | | | 1.08 | | | | | | 1.09 |
| Ta | | | | | 0.97 | | | | | | 0.70 | | | | | | 0.61 | | | | | | 0.80 | | | | | | 0.92 | | | | | | 0.90 |
| Th | | | | | 13.46 | | | | | | 13.48 | | | | | | 14.10 | | | | | | 14.59 | | | | | | 13.07 | | | | | | 14.33 |
| U | | | | | 0.90 | | | | | | 0.82 | | | | | | 0.94 | | | | | | 0.97 | | | | | | 1.07 | | | | | | 0.86 |
| Sr/Y | | | | | 4.09 | | | | | | 3.65 | | | | | | 3.25 | | | | | | 3.28 | | | | | | 3.13 | | | | | | 3.90 |
| Zr+Nb+Ce+Y | | | | | 407 | | | | | | 402 | | | | | | 413 | | | | | | 419 | | | | | | 385 | | | | | | 390 |
| Na2O+K2O/CaO | | | | | 32.27 | | | | | | 36.16 | | | | | | 44.07 | | | | | | 37.66 | | | | | | 42.37 | | | | | | 41.00 |
| TFe2O3/MgO | | | | | 9.24 | | | | | | 9.70 | | | | | | 7.12 | | | | | | 7.85 | | | | | | 8.29 | | | | | | 7.45 |
| YbN | | | | | 11.98 | | | | | | 12.15 | | | | | | 12.36 | | | | | | 12.46 | | | | | | 11.71 | | | | | | 13.02 |
| Y+Nb | | | | | 33.17 | | | | | | 34.46 | | | | | | 34.69 | | | | | | 35.99 | | | | | | 36.19 | | | | | | 33.30 |
| Yb+Ta | | | | | 3.01 | | | | | | 2.77 | | | | | | 2.71 | | | | | | 2.92 | | | | | | 2.91 | | | | | | 3.11 |
| TFe2O3+MgO | | | | | 2.05 | | | | | | 2.14 | | | | | | 1.62 | | | | | | 1.77 | | | | | | 1.86 | | | | | | 1.69 |
| Sample | PM103-2-1 | | | | | PM103-2-3 | | | | | | PM103-4-2 | | | | | | PM103-6-1 | | | | | | PM103-6-2 | | | | | | PM103-6-4 | | | | | |
| Lithology | Monzogranite | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pluton | Erdaogou | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SiO2 | 76.91 | | | | | 76.32 | | | | | | 77.20 | | | | | | 76.36 | | | | | | 77.16 | | | | | | 76.29 | | | | | |
| TiO2 | 0.07 | | | | | 0.07 | | | | | | 0.07 | | | | | | 0.06 | | | | | | 0.06 | | | | | | 0.06 | | | | | |
| Al2O3 | 12.93 | | | | | 12.87 | | | | | | 12.77 | | | | | | 12.99 | | | | | | 12.75 | | | | | | 12.81 | | | | | |
| TFe2O3 | 0.85 | | | | | 1.26 | | | | | | 0.83 | | | | | | 1.23 | | | | | | 0.97 | | | | | | 1.57 | | | | | |
| FeO | 0.36 | | | | | 0.81 | | | | | | 0.49 | | | | | | 0.63 | | | | | | 0.58 | | | | | | 0.97 | | | | | |
| MnO | 0.01 | | | | | 0.08 | | | | | | 0.01 | | | | | | 0.02 | | | | | | 0.01 | | | | | | 0.03 | | | | | |
| MgO | 0.00 | | | | | 0.05 | | | | | | 0.07 | | | | | | 0.08 | | | | | | 0.08 | | | | | | 0.11 | | | | | |
| CaO | 0.16 | | | | | 0.18 | | | | | | 0.14 | | | | | | 0.14 | | | | | | 0.09 | | | | | | 0.11 | | | | | |
| Na2O | 4.25 | | | | | 4.56 | | | | | | 4.32 | | | | | | 4.63 | | | | | | 4.32 | | | | | | 4.25 | | | | | |
| K2O | 4.15 | | | | | 4.24 | | | | | | 4.34 | | | | | | 4.24 | | | | | | 4.35 | | | | | | 4.47 | | | | | |
| P2O5 | 0.01 | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | | |
| LOI | 0.38 | | | | | 0.27 | | | | | | 0.18 | | | | | | 0.22 | | | | | | 0.17 | | | | | | 0.22 | | | | | |
| Total | 100.0 | | | | | 100.7 | | | | | | 100.4 | | | | | | 100.5 | | | | | | 100.5 | | | | | | 100.9 | | | | | |
| Na2O+K2O | 8.40 | | | | | 8.79 | | | | | | 8.67 | | | | | | 8.86 | | | | | | 8.67 | | | | | | 8.73 | | | | | |
| Na2O/K2O | 1.02 | | | | | 1.08 | | | | | | 1.00 | | | | | | 1.09 | | | | | | 0.99 | | | | | | 0.95 | | | | | |
| A/NK | 1.13 | | | | | 1.07 | | | | | | 1.08 | | | | | | 1.07 | | | | | | 1.08 | | | | | | 1.08 | | | | | |
| A/CNK | 1.10 | | | | | 1.04 | | | | | | 1.06 | | | | | | 1.04 | | | | | | 1.07 | | | | | | 1.06 | | | | | |
| SI | 0.01 | | | | | 0.45 | | | | | | 0.72 | | | | | | 0.73 | | | | | | 0.74 | | | | | | 0.93 | | | | | |
| AR | 4.58 | | | | | 5.13 | | | | | | 5.06 | | | | | | 5.16 | | | | | | 5.10 | | | | | | 4.85 | | | | | |
| σ43 | 2.08 | | | | | 2.32 | | | | | | 2.20 | | | | | | 2.36 | | | | | | 2.20 | | | | | | 2.29 | | | | | |
| σ25 | 1.36 | | | | | 1.50 | | | | | | 1.44 | | | | | | 1.53 | | | | | | 1.44 | | | | | | 1.48 | | | | | |
| R1 | 2618 | | | | | 2409 | | | | | | 2549 | | | | | | 2394 | | | | | | 2538 | | | | | | 2441 | | | | | |
| R2 | 272 | | | | | 273 | | | | | | 268 | | | | | | 273 | | | | | | 263 | | | | | | 267 | | | | | |
| Mg# | 0.00 | | | | | 0.04 | | | | | | 0.09 | | | | | | 0.08 | | | | | | 0.08 | | | | | | 0.07 | | | | | |
| La | 25.00 | | | | | 20.68 | | | | | | 22.13 | | | | | | 23.73 | | | | | | 21.30 | | | | | | 23.99 | | | | | |
| Ce | 58.34 | | | | | 46.86 | | | | | | 49.77 | | | | | | 51.61 | | | | | | 45.64 | | | | | | 53.58 | | | | | |
| Pr | 5.48 | | | | | 4.58 | | | | | | 4.66 | | | | | | 5.29 | | | | | | 4.94 | | | | | | 5.62 | | | | | |
| Nd | 17.58 | | | | | 14.38 | | | | | | 14.46 | | | | | | 16.86 | | | | | | 16.07 | | | | | | 18.73 | | | | | |
| Sm | 3.57 | | | | | 2.69 | | | | | | 2.58 | | | | | | 3.26 | | | | | | 3.06 | | | | | | 4.32 | | | | | |
| Eu | 0.14 | | | | | 0.23 | | | | | | 0.21 | | | | | | 0.15 | | | | | | 0.15 | | | | | | 0.18 | | | | | |
| Gd | 3.02 | | | | | 2.29 | | | | | | 2.45 | | | | | | 2.79 | | | | | | 2.66 | | | | | | 3.94 | | | | | |
| Tb | 0.60 | | | | | 0.43 | | | | | | 0.48 | | | | | | 0.53 | | | | | | 0.53 | | | | | | 0.85 | | | | | |
| Dy | 4.32 | | | | | 2.93 | | | | | | 3.40 | | | | | | 3.61 | | | | | | 3.73 | | | | | | 5.82 | | | | | |
| Ho | | | 0.99 | | | | | 0.66 | | | | | | 0.77 | | | | | | 0.79 | | | | | | 0.85 | | | | | | 1.29 | | | |
| Er | | | 2.97 | | | | | 2.04 | | | | | | 2.31 | | | | | | 2.39 | | | | | | 2.61 | | | | | | 3.82 | | | |
| Tm | | | 0.57 | | | | | 0.40 | | | | | | 0.46 | | | | | | 0.46 | | | | | | 0.51 | | | | | | 0.72 | | | |
| Yb | | | 4.28 | | | | | 3.13 | | | | | | 3.46 | | | | | | 3.36 | | | | | | 3.80 | | | | | | 5.25 | | | |
| Lu | | | 0.64 | | | | | 0.47 | | | | | | 0.55 | | | | | | 0.51 | | | | | | 0.58 | | | | | | 0.80 | | | |
| Y | | | 33.60 | | | | | 19.53 | | | | | | 25.10 | | | | | | 24.22 | | | | | | 28.40 | | | | | | 41.31 | | | |
| ΣREE | | | 127.5 | | | | | 101.7 | | | | | | 107.6 | | | | | | 115.3 | | | | | | 106.4 | | | | | | 128.9 | | | |
| LREE | | | 110.1 | | | | | 89.42 | | | | | | 93.81 | | | | | | 100.9 | | | | | | 91.16 | | | | | | 106.4 | | | |
| HREE | | | 17.40 | | | | | 12.34 | | | | | | 13.86 | | | | | | 14.44 | | | | | | 15.27 | | | | | | 22.50 | | | |
| LREE/HREE | | | 6.33 | | | | | 7.25 | | | | | | 6.77 | | | | | | 6.99 | | | | | | 5.97 | | | | | | 4.73 | | | |
| LaN/YbN | | | 4.19 | | | | | 4.75 | | | | | | 4.59 | | | | | | 5.06 | | | | | | 4.02 | | | | | | 3.28 | | | |
| δEu | | | 0.13 | | | | | 0.28 | | | | | | 0.25 | | | | | | 0.15 | | | | | | 0.16 | | | | | | 0.13 | | | |
| δCe | | | 1.17 | | | | | 1.13 | | | | | | 1.14 | | | | | | 1.08 | | | | | | 1.05 | | | | | | 1.09 | | | |
| Sc | | | 2.62 | | | | | 2.86 | | | | | | 2.19 | | | | | | 2.83 | | | | | | 2.70 | | | | | | 3.37 | | | |
| V | | | 9.19 | | | | | 8.88 | | | | | | 7.10 | | | | | | 10.25 | | | | | | 8.56 | | | | | | 9.59 | | | |
| Cr | | | 45.89 | | | | | 47.65 | | | | | | 36.24 | | | | | | 39.53 | | | | | | 44.08 | | | | | | 36.37 | | | |
| Co | | | 0.24 | | | | | 0.69 | | | | | | 0.40 | | | | | | 0.20 | | | | | | 0.97 | | | | | | 1.43 | | | |
| Ni | | | 0.33 | | | | | 0.73 | | | | | | 1.57 | | | | | | 0.21 | | | | | | 0.10 | | | | | | 0.24 | | | |
| Be | | | 3.57 | | | | | 4.72 | | | | | | 3.83 | | | | | | 7.16 | | | | | | 4.97 | | | | | | 5.00 | | | |
| Rb | | | 280 | | | | | 275 | | | | | | 275 | | | | | | 337 | | | | | | 330 | | | | | | 351 | | | |
| Sr | | | 14.65 | | | | | 16.64 | | | | | | 23.98 | | | | | | 14.90 | | | | | | 14.08 | | | | | | 16.41 | | | |
| Ba | | | 15.44 | | | | | 7.72 | | | | | | 22.12 | | | | | | 0.05 | | | | | | 10.31 | | | | | | 20.31 | | | |
| Li | | | 3.44 | | | | | 3.12 | | | | | | 2.66 | | | | | | 3.38 | | | | | | 1.88 | | | | | | 3.25 | | | |
| Zr | | | 201 | | | | | 176 | | | | | | 183 | | | | | | 168 | | | | | | 177 | | | | | | 183 | | | |
| Nb | | | 61.23 | | | | | 46.08 | | | | | | 43.83 | | | | | | 52.12 | | | | | | 45.37 | | | | | | 57.70 | | | |
| Hf | | | 6.72 | | | | | 5.86 | | | | | | 6.97 | | | | | | 5.91 | | | | | | 6.04 | | | | | | 7.24 | | | |
| Ta | | | 2.75 | | | | | 1.86 | | | | | | 1.78 | | | | | | 2.27 | | | | | | 3.02 | | | | | | 2.88 | | | |
| Th | | | 18.30 | | | | | 20.15 | | | | | | 19.75 | | | | | | 23.35 | | | | | | 21.98 | | | | | | 23.67 | | | |
| U | | | 2.89 | | | | | 2.80 | | | | | | 1.77 | | | | | | 1.90 | | | | | | 2.69 | | | | | | 2.86 | | | |
| Ga | | | 24.15 | | | | | 24.06 | | | | | | 23.29 | | | | | | 24.81 | | | | | | 24.42 | | | | | | 24.62 | | | |
| Sr/Y | | | 0.44 | | | | | 0.85 | | | | | | 0.96 | | | | | | 0.62 | | | | | | 0.50 | | | | | | 0.40 | | | |
| Zr+Nb+Ce+Y | | | 354 | | | | | 288 | | | | | | 302 | | | | | | 296 | | | | | | 297 | | | | | | 336 | | | |
| 10000Ga/Al | | | 3.53 | | | | | 3.53 | | | | | | 3.44 | | | | | | 3.61 | | | | | | 3.62 | | | | | | 3.63 | | | |
| Samp;e | | PM403-2-1 | | | | | PM403-2-2 | | | | | | PM403-2-3 | | | | | | PM403-2-4 | | | | | | PM403-2-5 | | | | | | PM403-2-6 | | | | |
| Lithology | | Syenogranite | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pluton | | Qixieyingzi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SiO2 | | 76.25 | | | | | 76.56 | | | | | | 76.22 | | | | | | 76.69 | | | | | | 76.61 | | | | | | 77.58 | | | | |
| TiO2 | | 0.09 | | | | | 0.11 | | | | | | 0.10 | | | | | | 0.10 | | | | | | 0.09 | | | | | | 0.11 | | | | |
| Al2O3 | | 12.62 | | | | | 12.56 | | | | | | 12.63 | | | | | | 12.38 | | | | | | 12.54 | | | | | | 12.05 | | | | |
| TFe2O3 | | 1.06 | | | | | 1.14 | | | | | | 0.81 | | | | | | 1.21 | | | | | | 1.05 | | | | | | 1.28 | | | | |
| FeO | | 0.54 | | | | | 0.49 | | | | | | 0.54 | | | | | | 0.58 | | | | | | 0.54 | | | | | | 0.49 | | | | |
| MnO | | 0.04 | | | | | 0.04 | | | | | | 0.01 | | | | | | 0.02 | | | | | | 0.01 | | | | | | 0.02 | | | | |
| MgO | | 0.48 | | | | | 0.45 | | | | | | 0.56 | | | | | | 0.34 | | | | | | 0.26 | | | | | | 0.24 | | | | |
| CaO | | 0.24 | | | | | 0.24 | | | | | | 0.25 | | | | | | 0.20 | | | | | | 0.17 | | | | | | 0.16 | | | | |
| Na2O | | 3.81 | | | | | 3.74 | | | | | | 3.13 | | | | | | 3.72 | | | | | | 3.27 | | | | | | 3.25 | | | | |
| K2O | | 4.87 | | | | | 4.35 | | | | | | 5.61 | | | | | | 4.66 | | | | | | 5.34 | | | | | | 4.50 | | | | |
| P2O5 | | 0.01 | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | | | 0.01 | | | | |
| LOI | | 0.34 | | | | | 0.52 | | | | | | 0.48 | | | | | | 0.48 | | | | | | 0.45 | | | | | | 0.59 | | | | |
| Total | | 100.3 | | | | | 100.1 | | | | | | 100.3 | | | | | | 100.3 | | | | | | 100.3 | | | | | | 100.2 | | | | |
| Na2O+K2O | | 8.68 | | | | | 8.09 | | | | | | 8.74 | | | | | | 8.38 | | | | | | 8.61 | | | | | | 7.75 | | | | |
| Na2O/K2O | | 0.78 | | | | | 0.86 | | | | | | 0.56 | | | | | | 0.80 | | | | | | 0.61 | | | | | | 0.72 | | | | |
| A/NK | | 1.09 | | | | | 1.16 | | | | | | 1.13 | | | | | | 1.11 | | | | | | 1.12 | | | | | | 1.18 | | | | |
| A/CNK | | 1.05 | | | | | 1.11 | | | | | | 1.08 | | | | | | 1.08 | | | | | | 1.09 | | | | | | 1.15 | | | | |
| SI | | 4.43 | | | | | 4.46 | | | | | | 5.26 | | | | | | 3.26 | | | | | | 2.45 | | | | | | 2.46 | | | | |
| AR | | 3.91 | | | | | 3.82 | | | | | | 2.89 | | | | | | 3.89 | | | | | | 3.12 | | | | | | 3.28 | | | | |
| σ43 | | 2.26 | | | | | 1.95 | | | | | | 2.30 | | | | | | 2.08 | | | | | | 2.21 | | | | | | 1.74 | | | | |
| σ25 | | 1.47 | | | | | 1.27 | | | | | | 1.49 | | | | | | 1.36 | | | | | | 1.44 | | | | | | 1.15 | | | | |
| R1 | | 2544 | | | | | 2718 | | | | | | 2619 | | | | | | 2652 | | | | | | 2652 | | | | | | 2921 | | | | |
| R2 | | 297 | | | | | 295 | | | | | | 303 | | | | | | 281 | | | | | | 277 | | | | | | 266 | | | | |
| Mg# | | 0.37 | | | | | 0.38 | | | | | | 0.41 | | | | | | 0.28 | | | | | | 0.24 | | | | | | 0.24 | | | | |
| La | | 15.68 | | | | | 24.58 | | | | | | 17.43 | | | | | | 26.06 | | | | | | 28.76 | | | | | | 25.49 | | | | |
| Ce | | 33.81 | | | | | 52.18 | | | | | | 36.51 | | | | | | 55.34 | | | | | | 54.36 | | | | | | 55.35 | | | | |
| Pr | | 3.37 | | | | | 5.33 | | | | | | 3.89 | | | | | | 5.46 | | | | | | 5.96 | | | | | | 5.47 | | | | |
| Nd | | 11.10 | | | | | 17.38 | | | | | | 12.60 | | | | | | 17.50 | | | | | | 18.87 | | | | | | 17.93 | | | | |
| Sm | | 1.65 | | | | | 2.59 | | | | | | 1.93 | | | | | | 2.48 | | | | | | 2.58 | | | | | | 2.53 | | | | |
| Eu | | 0.26 | | | | | 0.33 | | | | | | 0.25 | | | | | | 0.33 | | | | | | 0.31 | | | | | | 0.30 | | | | |
| Gd | | 1.25 | | | | | 1.90 | | | | | | 1.31 | | | | | | 1.84 | | | | | | 1.78 | | | | | | 1.74 | | | | |
| Tb | | 0.17 | | | | | 0.24 | | | | | | 0.16 | | | | | | 0.21 | | | | | | 0.19 | | | | | | 0.20 | | | | |
| Dy | | 0.90 | | | | | 1.28 | | | | | | 0.73 | | | | | | 0.95 | | | | | | 0.85 | | | | | | 0.94 | | | | |
| Ho | | | 0.17 | | | | | 0.27 | | | | | | 0.14 | | | | | | 0.18 | | | | | | 0.21 | | | | | | 0.24 | | | |
| Er | | | 0.63 | | | | | 0.72 | | | | | | 0.55 | | | | | | 0.49 | | | | | | 0.54 | | | | | | 0.60 | | | |
| Tm | | | 0.08 | | | | | 0.12 | | | | | | 0.07 | | | | | | 0.08 | | | | | | 0.09 | | | | | | 0.10 | | | |
| Yb | | | 0.62 | | | | | 0.87 | | | | | | 0.51 | | | | | | 0.63 | | | | | | 0.54 | | | | | | 0.69 | | | |
| Lu | | | 0.11 | | | | | 0.13 | | | | | | 0.08 | | | | | | 0.09 | | | | | | 0.08 | | | | | | 0.11 | | | |
| Y | | | 5.32 | | | | | 8.22 | | | | | | 4.19 | | | | | | 5.42 | | | | | | 16.66 | | | | | | 15.20 | | | |
| ΣREE | | | 69.80 | | | | | 107.9 | | | | | | 76.14 | | | | | | 111.6 | | | | | | 115.1 | | | | | | 111.6 | | | |
| LREE | | | 65.87 | | | | | 102.3 | | | | | | 72.60 | | | | | | 107.1 | | | | | | 110.8 | | | | | | 107.0 | | | |
| HREE | | | 3.93 | | | | | 5.54 | | | | | | 3.55 | | | | | | 4.47 | | | | | | 4.29 | | | | | | 4.62 | | | |
| LREE/HREE | | | 16.77 | | | | | 18.47 | | | | | | 20.48 | | | | | | 23.96 | | | | | | 25.86 | | | | | | 23.18 | | | |
| LaN/YbN | | | 18.05 | | | | | 20.30 | | | | | | 24.32 | | | | | | 29.48 | | | | | | 37.99 | | | | | | 26.46 | | | |
| δEu | | | 0.54 | | | | | 0.44 | | | | | | 0.45 | | | | | | 0.46 | | | | | | 0.42 | | | | | | 0.41 | | | |
| δCe | | | 1.09 | | | | | 1.07 | | | | | | 1.04 | | | | | | 1.08 | | | | | | 0.96 | | | | | | 1.10 | | | |
| Sc | | | 1.29 | | | | | 1.07 | | | | | | 1.06 | | | | | | 1.09 | | | | | | 0.99 | | | | | | 1.11 | | | |
| V | | | 9.59 | | | | | 10.46 | | | | | | 10.26 | | | | | | 12.29 | | | | | | 10.36 | | | | | | 12.64 | | | |
| Cr | | | 45.49 | | | | | 48.86 | | | | | | 41.01 | | | | | | 56.42 | | | | | | 47.94 | | | | | | 48.49 | | | |
| Co | | | 0.76 | | | | | 0.08 | | | | | | 0.05 | | | | | | 1.65 | | | | | | 1.23 | | | | | | 0.31 | | | |
| Ni | | | 0.14 | | | | | 0.43 | | | | | | 1.19 | | | | | | 0.42 | | | | | | 0.96 | | | | | | 1.18 | | | |
| Be | | | 1.25 | | | | | 1.11 | | | | | | 1.13 | | | | | | 1.25 | | | | | | 1.18 | | | | | | 1.15 | | | |
| Rb | | | 167 | | | | | 154 | | | | | | 195 | | | | | | 166 | | | | | | 185 | | | | | | 158 | | | |
| Sr | | | 122 | | | | | 119 | | | | | | 138 | | | | | | 140 | | | | | | 129 | | | | | | 117 | | | |
| Ba | | | 167 | | | | | 142 | | | | | | 182 | | | | | | 162 | | | | | | 161 | | | | | | 140 | | | |
| Li | | | 4.67 | | | | | 4.72 | | | | | | 3.93 | | | | | | 3.92 | | | | | | 5.13 | | | | | | 4.57 | | | |
| Zr | | | 84.68 | | | | | 104.33 | | | | | | 86.04 | | | | | | 82.96 | | | | | | 67.42 | | | | | | 106.93 | | | |
| Nb | | | 8.63 | | | | | 9.80 | | | | | | 7.76 | | | | | | 7.44 | | | | | | 7.15 | | | | | | 8.20 | | | |
| Hf | | | 3.14 | | | | | 3.25 | | | | | | 2.17 | | | | | | 2.83 | | | | | | 5.82 | | | | | | 7.03 | | | |
| Ta | | | 0.38 | | | | | 0.57 | | | | | | 1.10 | | | | | | 1.33 | | | | | | 0.44 | | | | | | 0.89 | | | |
| Th | | | 11.86 | | | | | 14.66 | | | | | | 14.09 | | | | | | 24.17 | | | | | | 19.08 | | | | | | 23.35 | | | |
| U | | | 0.96 | | | | | 2.05 | | | | | | 0.45 | | | | | | 0.73 | | | | | | 0.61 | | | | | | 0.79 | | | |
| Ga | | | 15.27 | | | | | 14.72 | | | | | | 14.20 | | | | | | 13.49 | | | | | | 15.33 | | | | | | 15.56 | | | |
| Sr/Y | | | 23.07 | | | | | 14.57 | | | | | | 33.00 | | | | | | 25.97 | | | | | | 7.75 | | | | | | 7.71 | | | |
| Zr+Nb+Ce+Y | | | 132 | | | | | 174 | | | | | | 134 | | | | | | 151 | | | | | | 145 | | | | | | 185 | | | |
| 10000Ga/Al | | | 2.29 | | | | | 2.21 | | | | | | 2.12 | | | | | | 2.06 | | | | | | 2.31 | | | | | | 2.44 | | | |