###### 附表1卡伦湖地区泉头组砂岩LA⁃ICP-MS 锆石 U⁃Pb 同位素组成

Table 1 Sandstone LA ⁃ ICP-MS zircon U⁃Pb isotope composition in the spring head group in the Karen Lake area

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样品号 | 含量(10-6) | | | | |  | 同位素比值 | | | | | |  | 年龄(Ma) | | | |
| Pb | | | Th | U | Th/U | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ | 206Pb/238U | 1σ | 207Pb/235U | 1σ |
| KLHZK2-G1 | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 16 | | | 327 | 499 | 0.66 | 0.032 3 | 0.000 6 | 0.243 4 | 0.017 5 | 0.0546 | 0.0037 |  | 205 | 4 | 221 | 16 |
| 2 | 6 | | | 180 | 210 | 0.86 | 0.025 9 | 0.000 5 | 0.192 2 | 0.009 5 | 0.0539 | 0.0030 |  | 165 | 3 | 179 | 9 |
| 3 | 19 | | | 330 | 691 | 0.48 | 0.028 1 | 0.000 4 | 0.201 7 | 0.009 3 | 0.0520 | 0.0023 |  | 179 | 3 | 187 | 9 |
| 4 | 11 | | | 174 | 335 | 0.52 | 0.031 6 | 0.000 5 | 0.221 3 | 0.011 4 | 0.0507 | 0.0027 |  | 201 | 3 | 203 | 10 |
| 5 | 14 | | | 171 | 531 | 0.32 | 0.026 8 | 0.000 5 | 0.198 6 | 0.009 2 | 0.0537 | 0.0027 |  | 171 | 3 | 184 | 8 |
| 6 | 15 | | | 217 | 584 | 0.37 | 0.026 9 | 0.000 4 | 0.208 4 | 0.008 2 | 0.0562 | 0.0023 |  | 171 | 2 | 192 | 8 |
| 7 | 28 | | | 335 | 915 | 0.37 | 0.031 7 | 0.000 5 | 0.241 8 | 0.014 1 | 0.0553 | 0.0034 |  | 201 | 3 | 220 | 13 |
| 8 | 8 | | | 128 | 249 | 0.52 | 0.032 7 | 0.001 8 | 0.249 6 | 0.042 6 | 0.0553 | 0.0103 |  | 208 | 11 | 226 | 39 |
| 9 | 4 | | | 61 | 136 | 0.45 | 0.030 7 | 0.000 6 | 0.213 9 | 0.012 4 | 0.0506 | 0.0031 |  | 195 | 4 | 197 | 11 |
| 10 | 20 | | | 317 | 764 | 0.41 | 0.027 2 | 0.000 4 | 0.195 9 | 0.007 8 | 0.0523 | 0.0021 |  | 173 | 3 | 182 | 7 |
| 11 | 3 | | | 39 | 107 | 0.37 | 0.025 6 | 0.000 7 | 0.194 9 | 0.014 2 | 0.0552 | 0.0041 |  | 163 | 4 | 181 | 13 |
| 12 | 13 | | | 204 | 488 | 0.42 | 0.027 6 | 0.000 5 | 0.200 0 | 0.009 5 | 0.0525 | 0.0025 |  | 176 | 3 | 185 | 9 |
| 13 | 36 | | | 591 | 1154 | 0.51 | 0.031 7 | 0.000 4 | 0.217 8 | 0.006 5 | 0.0499 | 0.0015 |  | 201 | 3 | 200 | 6 |
| 14 | 20 | | | 453 | 718 | 0.63 | 0.027 5 | 0.000 4 | 0.195 6 | 0.006 9 | 0.0515 | 0.0019 |  | 175 | 3 | 181 | 6 |
| 15 | 10 | | | 143 | 380 | 0.38 | 0.027 7 | 0.000 7 | 0.203 8 | 0.015 8 | 0.0533 | 0.0040 |  | 176 | 5 | 188 | 15 |
| 16 | 37 | | | 479 | 1487 | 0.32 | 0.025 6 | 0.000 7 | 0.187 6 | 0.020 1 | 0.0532 | 0.0058 |  | 163 | 4 | 175 | 19 |
| 17 | 20 | | | 299 | 727 | 0.41 | 0.027 6 | 0.000 4 | 0.2073 | 0.010 0 | 0.0545 | 0.0026 |  | 176 | 3 | 191 | 9 |
| 18 | 11 | | | 75 | 369 | 0.20 | 0.030 9 | 0.000 5 | 0.249 0 | 0.010 7 | 0.0585 | 0.0025 |  | 196 | 3 | 226 | 10 |
| 19 | 7 | | | 116 | 282 | 0.41 | 0.026 7 | 0.000 5 | 0.204 7 | 0.009 5 | 0.0555 | 0.0027 |  | 170 | 3 | 189 | 9 |
| 20 | 8 | | | 192 | 273 | 0.70 | 0.026 8 | 0.000 5 | 0.185 5 | 0.008 7 | 0.0503 | 0.0024 |  | 170 | 3 | 173 | 8 |
| 21 | 11 | | | 280 | 401 | 0.70 | 0.026 8 | 0.000 4 | 0.211 4 | 0.009 2 | 0.0572 | 0.0025 |  | 171 | 3 | 195 | 8 |
| 22 | 19 | | | 305 | 719 | 0.42 | 0.027 3 | 0.000 4 | 0.202 8 | 0.007 2 | 0.0538 | 0.0019 |  | 174 | 2 | 188 | 7 |
| 23 | 28 | | | 345 | 1078 | 0.32 | 0.027 0 | 0.000 4 | 0.201 5 | 0.006 7 | 0.0541 | 0.0018 |  | 172 | 2 | 186 | 6 |
| 24 | 16 | | | 234 | 594 | 0.39 | 0.026 3 | 0.000 4 | 0.206 2 | 0.008 2 | 0.0569 | 0.0023 |  | 167 | 3 | 190 | 8 |
| 25 | 5 | | | 130 | 189 | 0.69 | 0.027 6 | 0.000 7 | 0.192 0 | 0.015 7 | 0.0505 | 0.0046 |  | 175 | 5 | 178 | 15 |
| 26 | 14 | | | 206 | 505 | 0.41 | 0.026 3 | 0.000 4 | 0.180 9 | 0.007 3 | 0.0498 | 0.0020 |  | 168 | 3 | 169 | 7 |
| 27 | 7 | | | 119 | 262 | 0.45 | 0.0270 | 0.000 5 | 0.184 0 | 0.009 3 | 0.0494 | 0.0026 |  | 172 | 3 | 171 | 9 |
| 28 | 8 | | | 94 | 246 | 0.38 | 0.0325 | 0.000 9 | 0.245 7 | 0.0211 | 0.0549 | 0.0048 |  | 206 | 5 | 223 | 19 |
| 29 | 12 | | | 170 | 471 | 0.36 | 0.0264 | 0.000 4 | 0.2034 | 0.0093 | 0.0558 | 0.0025 |  | 168 | 3 | 188 | 9 |
| 30 | 36 | | | 477 | 1266 | 0.38 | 0.0289 | 0.000 4 | 0.2039 | 0.0071 | 0.0511 | 0.0016 |  | 184 | 3 | 188 | 7 |
| 31 | 20 | | | 383 | 702 | 0.55 | 0.0282 | 0.000 5 | 0.1953 | 0.0116 | 0.0503 | 0.0030 |  | 179 | 3 | 181 | 11 |
| 32 | 17 | | | 333 | 306 | 1.09 | 0.0493 | 0.000 8 | 0.3856 | 0.0152 | 0.0567 | 0.0024 |  | 310 | 5 | 331 | 13 |
| 33 | 41 | | | 853 | 1471 | 0.58 | 0.0274 | 0.000 5 | 0.1937 | 0.0174 | 0.0513 | 0.0044 |  | 174 | 3 | 180 | 16 |
| 34 | 17 | | | 390 | 620 | 0.63 | 0.0272 | 0.000 4 | 0.2097 | 0.0077 | 0.0560 | 0.0020 |  | 173 | 3 | 193 | 7 |
| 35 | 25 | | | 276 | 913 | 0.30 | 0.0279 | 0.000 7 | 0.2040 | 0.0127 | 0.0531 | 0.0034 |  | 177 | 4 | 189 | 12 |
| 36 | 19 | | | 273 | 716 | 0.38 | 0.0264 | 0.000 4 | 0.1906 | 0.0069 | 0.0523 | 0.0019 |  | 168 | 2 | 177 | 6 |
| 37 | 16 | | | 222 | 598 | 0.37 | 0.0267 | 0.0004 | 0.1987 | 0.0080 | 0.0541 | 0.0021 |  | 170 | 3 | 184 | 7 |
| 38 | 34 | | | 575 | 1192 | 0.48 | 0.0288 | 0.0004 | 0.1977 | 0.0063 | 0.0498 | 0.0015 |  | 183 | 3 | 183 | 6 |
| 39 | 13 | | | 288 | 468 | 0.62 | 0.0270 | 0.0004 | 0.2013 | 0.0090 | 0.0541 | 0.0024 |  | 172 | 3 | 186 | 8 |
| 40 | 8 | | | 159 | 303 | 0.52 | 0.0262 | 0.0005 | 0.1951 | 0.0100 | 0.0541 | 0.0028 |  | 167 | 3 | 181 | 9 |
| 41 | 1 | | | 31 | 66 | 0.46 | 0.0201 | 0.0010 | 0.1454 | 0.0109 | 0.0526 | 0.0051 |  | 128 | 6 | 138 | 10 |
| 42 | 12 | | | 142 | 167 | 0.85 | 0.0673 | 0.0013 | 0.5465 | 0.0338 | 0.0589 | 0.0039 |  | 420 | 8 | 443 | 27 |
| 43 | 13 | | | 279 | 425 | 0.66 | 0.0292 | 0.0005 | 0.2130 | 0.0091 | 0.0529 | 0.0022 |  | 186 | 3 | 196 | 8 |
| 44 | 10 | | | 158 | 381 | 0.42 | 0.0265 | 0.0004 | 0.2186 | 0.0106 | 0.0598 | 0.0028 |  | 169 | 3 | 201 | 10 |
| 45 | 21 | | | 269 | 882 | 0.31 | 0.0242 | 0.0005 | 0.1984 | 0.0133 | 0.0595 | 0.0041 |  | 154 | 3 | 184 | 12 |
| 46 | 12 | | | 291 | 373 | 0.78 | 0.0315 | 0.0005 | 0.2534 | 0.0113 | 0.0583 | 0.0027 |  | 200 | 3 | 229 | 10 |
| 47 | 8 | | | 236 | 291 | 0.81 | 0.0249 | 0.0005 | 0.2044 | 0.0152 | 0.0596 | 0.0045 |  | 158 | 4 | 189 | 14 |
| 48 | 30 | | | 9 | 328 | 0.03 | 0.0975 | 0.0014 | 0.8169 | 0.0261 | 0.0608 | 0.0019 |  | 600 | 9 | 606 | 19 |
| 49 | 20 | | | 465 | 597 | 0.78 | 0.0330 | 0.0005 | 0.2457 | 0.0096 | 0.0540 | 0.0022 |  | 209 | 3 | 223 | 9 |
| 50 | 22 | | | 393 | 810 | 0.48 | 0.0270 | 0.0004 | 0.1996 | 0.0071 | 0.0536 | 0.0019 |  | 172 | 3 | 185 | 7 |
| 51 | 19 | | | 313 | 560 | 0.56 | 0.0344 | 0.0005 | 0.2664 | 0.0110 | 0.0561 | 0.0022 |  | 218 | 3 | 240 | 10 |
| 52 | 18 | | | 299 | 558 | 0.54 | 0.0332 | 0.0005 | 0.2279 | 0.0124 | 0.0498 | 0.0027 |  | 210 | 3 | 208 | 11 |
| 53 | 11 | | | 239 | 379 | 0.63 | 0.0272 | 0.0004 | 0.2118 | 0.0095 | 0.0565 | 0.0028 |  | 173 | 3 | 195 | 9 |
| 54 | 22 | | | 336 | 812 | 0.41 | 0.0277 | 0.0005 | 0.1913 | 0.0113 | 0.0500 | 0.0033 |  | 176 | 3 | 178 | 11 |
| 55 | 19 | | | 486 | 631 | 0.77 | 0.0292 | 0.0005 | 0.2118 | 0.0104 | 0.0527 | 0.0026 |  | 185 | 3 | 195 | 10 |
| 56 | 30 | | | 7 | 330 | 0.02 | 0.0991 | 0.0014 | 0.8489 | 0.0267 | 0.0621 | 0.0019 |  | 609 | 9 | 624 | 20 |
| 57 | 51 | | | 1553 | 1525 | 1.02 | 0.0311 | 0.0004 | 0.2378 | 0.0092 | 0.0555 | 0.0023 |  | 197 | 3 | 217 | 8 |
| 58 | 33 | | | 396 | 1241 | 0.32 | 0.0277 | 0.0004 | 0.2056 | 0.0063 | 0.0538 | 0.0016 |  | 176 | 2 | 190 | 6 |
| 59 | 12 | | | 114 | 402 | 0.28 | 0.0281 | 0.0007 | 0.1894 | 0.0124 | 0.0490 | 0.0033 |  | 178 | 5 | 176 | 12 |
| 60 | 17 | | | 355 | 620 | 0.57 | 0.0278 | 0.0004 | 0.1983 | 0.0073 | 0.0518 | 0.0019 |  | 176 | 2 | 184 | 7 |
| 61 | 35 | | | 718 | 1306 | 0.55 | 0.0265 | 0.0004 | 0.1932 | 0.0061 | 0.0529 | 0.0017 |  | 168 | 2 | 179 | 6 |
| 62 | 17 | | | 358 | 582 | 0.61 | 0.0287 | 0.0005 | 0.2247 | 0.0085 | 0.0568 | 0.0021 |  | 182 | 3 | 206 | 8 |
| 63 | 14 | | | 273 | 443 | 0.62 | 0.0323 | 0.0006 | 0.2156 | 0.0142 | 0.0484 | 0.0033 |  | 205 | 4 | 198 | 13 |
| 64 | 13 | | | 227 | 396 | 0.57 | 0.0323 | 0.0008 | 0.2347 | 0.0195 | 0.0527 | 0.0045 |  | 205 | 5 | 214 | 18 |
| 65 | 26 | | | 412 | 795 | 0.52 | 0.0326 | 0.0006 | 0.2569 | 0.0168 | 0.0572 | 0.0041 |  | 207 | 4 | 232 | 15 |
| 66 | 12 | | | 265 | 457 | 0.58 | 0.0279 | 0.0004 | 0.2237 | 0.0089 | 0.0581 | 0.0024 |  | 178 | 3 | 205 | 8 |
| 67 | 14 | | | 471 | 521 | 0.91 | 0.0266 | 0.0004 | 0.2128 | 0.0089 | 0.0581 | 0.0024 |  | 169 | 3 | 196 | 8 |
| 68 | 33 | | | 1190 | 1063 | 1.12 | 0.0318 | 0.0006 | 0.2480 | 0.0217 | 0.0566 | 0.0044 |  | 202 | 4 | 225 | 20 |
| 69 | 15 | | | 910 | 581 | 1.57 | 0.0262 | 0.0004 | 0.2083 | 0.0085 | 0.0577 | 0.0023 |  | 167 | 2 | 192 | 8 |
| 70 | 22 | | | 2223 | 773 | 2.88 | 0.0277 | 0.0004 | 0.2066 | 0.0071 | 0.0542 | 0.0019 |  | 176 | 3 | 191 | 7 |
| 71 | 22 | | | 9910 | 676 | 14.67 | 0.0268 | 0.0004 | 0.1991 | 0.0075 | 0.0538 | 0.0021 |  | 171 | 2 | 184 | 7 |
| 72 | 37 | | | 17422 | 1188 | 14.67 | 0.0321 | 0.0006 | 0.2113 | 0.0109 | 0.0477 | 0.0025 |  | 204 | 4 | 195 | 10 |
| 73 | 48 | | | 15704 | 1564 | 10.04 | 0.0269 | 0.0004 | 0.2072 | 0.0083 | 0.0560 | 0.0023 |  | 171 | 3 | 191 | 8 |
| 74 | 27 | | | 2382 | 842 | 2.83 | 0.0319 | 0.0005 | 0.2320 | 0.0151 | 0.0527 | 0.0037 |  | 203 | 3 | 212 | 14 |
| 75 | 7 | | | 586 | 241 | 2.43 | 0.0267 | 0.0008 | 0.1965 | 0.0182 | 0.0535 | 0.0053 |  | 170 | 5 | 182 | 17 |
| 76 | 19 | | | 817 | 702 | 1.16 | 0.0271 | 0.0004 | 0.1915 | 0.0070 | 0.0512 | 0.0019 |  | 172 | 2 | 178 | 6 |
| 77 | 15 | | | 548 | 561 | 0.98 | 0.0269 | 0.0007 | 0.1930 | 0.0158 | 0.0520 | 0.0045 |  | 171 | 4 | 179 | 15 |
| 78 | 24 | | | 575 | 942 | 0.61 | 0.0266 | 0.0005 | 0.2149 | 0.0086 | 0.0586 | 0.0025 |  | 169 | 3 | 198 | 8 |
| 79 | 32 | | | 498 | 1219 | 0.41 | 0.0275 | 0.0004 | 0.1976 | 0.0063 | 0.0520 | 0.0017 |  | 175 | 2 | 183 | 6 |
| 80 | 5 | | | 177 | 196 | 0.90 | 0.0256 | 0.0006 | 0.2259 | 0.0163 | 0.0641 | 0.0049 |  | 163 | 4 | 207 | 15 |
| 样品号 | 含量(×10-6) | | | | |  | 同位素比值 | | | | | |  | 年龄(Ma) | | | |
| Pb | Th | | | U | Th/U | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ |  | 206Pb/238U | 1σ | 207Pb/235U | 1σ |
| KLHZK2-G2 | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 59 | | | 7573 | 1834 | 4.13 | 0.0320 | 0.0007 | 0.2426 | 0.0170 | 0.0549 | 0.0045 |  | 203 | 5 | 221 | 15 |
| 2 | 45 | | | 2445 | 1748 | 1.40 | 0.0266 | 0.0004 | 0.1926 | 0.0068 | 0.0524 | 0.0017 |  | 169 | 2 | 179 | 6 |
| 3 | 58 | | | 2470 | 2189 | 1.13 | 0.0268 | 0.0004 | 0.2095 | 0.0062 | 0.0567 | 0.0016 |  | 171 | 3 | 193 | 6 |
| 4 | 48 | | | 2044 | 1674 | 1.22 | 0.0287 | 0.0004 | 0.1951 | 0.0063 | 0.0493 | 0.0016 |  | 182 | 2 | 181 | 6 |
| 5 | 25 | | | 1392 | 898 | 1.55 | 0.0262 | 0.0004 | 0.1945 | 0.0074 | 0.0539 | 0.0022 |  | 167 | 2 | 180 | 7 |
| 6 | 47 | | | 1021 | 1686 | 0.61 | 0.0289 | 0.0004 | 0.1987 | 0.0066 | 0.0499 | 0.0016 |  | 183 | 3 | 184 | 6 |
| 7 | 30 | | | 461 | 1097 | 0.42 | 0.0284 | 0.0004 | 0.2044 | 0.0068 | 0.0522 | 0.0017 |  | 180 | 3 | 189 | 6 |
| 8 | 14 | | | 219 | 500 | 0.44 | 0.0274 | 0.0005 | 0.2226 | 0.0106 | 0.0588 | 0.0029 |  | 175 | 3 | 204 | 10 |
| 9 | 17 | | | 302 | 560 | 0.54 | 0.0310 | 0.0008 | 0.2501 | 0.0257 | 0.0584 | 0.0069 |  | 197 | 5 | 227 | 23 |
| 10 | 23 | | | 346 | 895 | 0.39 | 0.0265 | 0.0004 | 0.2186 | 0.0088 | 0.0599 | 0.0024 |  | 168 | 3 | 201 | 8 |
| 11 | 49 | | | 736 | 2651 | 0.28 | 0.0188 | 0.0003 | 0.1318 | 0.0044 | 0.0508 | 0.0017 |  | 120 | 2 | 126 | 4 |
| 12 | 31 | | | 310 | 1123 | 0.28 | 0.0286 | 0.0005 | 0.1897 | 0.0096 | 0.0480 | 0.0026 |  | 182 | 3 | 176 | 9 |
| 13 | 20 | | | 361 | 712 | 0.51 | 0.0288 | 0.0005 | 0.2103 | 0.0095 | 0.0529 | 0.0025 |  | 183 | 3 | 194 | 9 |
| 14 | 6 | | | 108 | 142 | 0.76 | 0.0427 | 0.0010 | 0.3142 | 0.0180 | 0.0534 | 0.0034 |  | 269 | 7 | 277 | 16 |
| 15 | 24 | | | 388 | 838 | 0.46 | 0.0290 | 0.0007 | 0.2233 | 0.0161 | 0.0558 | 0.0040 |  | 184 | 4 | 205 | 15 |
| 16 | 27 | | | 475 | 940 | 0.51 | 0.0294 | 0.0008 | 0.1955 | 0.0182 | 0.0482 | 0.0049 |  | 187 | 5 | 181 | 17 |
| 17 | 52 | | | 507 | 2127 | 0.24 | 0.0251 | 0.0004 | 0.1985 | 0.0075 | 0.0574 | 0.0022 |  | 160 | 2 | 184 | 7 |
| 18 | 41 | | | 607 | 1508 | 0.40 | 0.0267 | 0.0005 | 0.2135 | 0.0074 | 0.0579 | 0.0021 |  | 170 | 3 | 196 | 7 |
| 19 | 27 | | | 459 | 928 | 0.49 | 0.0286 | 0.0004 | 0.1922 | 0.0100 | 0.0487 | 0.0025 |  | 182 | 3 | 178 | 9 |
| 20 | 30 | | | 626 | 1075 | 0.58 | 0.0260 | 0.0005 | 0.1866 | 0.0110 | 0.0520 | 0.0030 |  | 166 | 3 | 174 | 10 |
| 21 | 21 | | | 194 | 711 | 0.27 | 0.0295 | 0.0005 | 0.2187 | 0.0087 | 0.0537 | 0.0022 |  | 188 | 3 | 201 | 8 |
| 22 | 13 | | | 208 | 437 | 0.48 | 0.0283 | 0.0007 | 0.1973 | 0.0150 | 0.0505 | 0.0046 |  | 180 | 4 | 183 | 14 |
| 23 | 16 | | | 304 | 510 | 0.60 | 0.0283 | 0.0005 | 0.2408 | 0.0112 | 0.0618 | 0.0030 |  | 180 | 3 | 219 | 10 |
| 24 | 33 | | | 687 | 968 | 0.71 | 0.0292 | 0.0005 | 0.2143 | 0.0121 | 0.0532 | 0.0030 |  | 186 | 3 | 197 | 11 |
| 25 | 32 | | | 289 | 1111 | 0.26 | 0.0291 | 0.0005 | 0.2104 | 0.0106 | 0.0525 | 0.0027 |  | 185 | 3 | 194 | 10 |
| 26 | 12 | | | 124 | 453 | 0.27 | 0.0258 | 0.0004 | 0.1764 | 0.0086 | 0.0496 | 0.0024 |  | 164 | 3 | 165 | 8 |
| 27 | 29 | | | 513 | 1217 | 0.42 | 0.0225 | 0.0005 | 0.1791 | 0.0103 | 0.0578 | 0.0034 |  | 143 | 3 | 167 | 10 |
| 28 | 29 | | | 310 | 1098 | 0.28 | 0.0269 | 0.0004 | 0.2031 | 0.0076 | 0.0548 | 0.0020 |  | 171 | 2 | 188 | 7 |
| 29 | 12 | | | 173 | 451 | 0.38 | 0.0252 | 0.0005 | 0.1739 | 0.0094 | 0.0500 | 0.0026 |  | 161 | 3 | 163 | 9 |
| 30 | 22 | | | 368 | 804 | 0.46 | 0.0267 | 0.0004 | 0.2022 | 0.0087 | 0.0550 | 0.0024 |  | 170 | 3 | 187 | 8 |
| 31 | 35 | | | 347 | 1372 | 0.25 | 0.0259 | 0.0007 | 0.1787 | 0.0147 | 0.0501 | 0.0052 |  | 165 | 5 | 167 | 14 |
| 32 | 23 | | | 490 | 743 | 0.66 | 0.0298 | 0.0005 | 0.1971 | 0.0124 | 0.0480 | 0.0031 |  | 189 | 3 | 183 | 11 |
| 33 | 40 | | | 1135 | 1982 | 0.57 | 0.0204 | 0.0003 | 0.1489 | 0.0070 | 0.0530 | 0.0025 |  | 130 | 2 | 141 | 7 |
| 34 | 13 | | | 224 | 510 | 0.44 | 0.0263 | 0.0005 | 0.1910 | 0.0136 | 0.0527 | 0.0038 |  | 167 | 3 | 177 | 13 |
| 35 | 14 | | | 307 | 541 | 0.57 | 0.0258 | 0.0004 | 0.1897 | 0.0085 | 0.0533 | 0.0025 |  | 164 | 3 | 176 | 8 |
| 36 | 20 | | | 341 | 738 | 0.46 | 0.0265 | 0.0004 | 0.2042 | 0.0097 | 0.0559 | 0.0027 |  | 169 | 3 | 189 | 9 |
| 37 | 21 | | | 246 | 795 | 0.31 | 0.0264 | 0.0004 | 0.2038 | 0.0083 | 0.0559 | 0.0024 |  | 168 | 2 | 188 | 8 |
| 38 | 18 | | | 308 | 686 | 0.45 | 0.0262 | 0.0004 | 0.2033 | 0.0088 | 0.0563 | 0.0025 |  | 167 | 3 | 188 | 8 |
| 39 | 4 | | | 64 | 148 | 0.43 | 0.0262 | 0.0010 | 0.1937 | 0.0163 | 0.0535 | 0.0050 |  | 167 | 6 | 180 | 15 |
| 40 | 39 | | | 516 | 1253 | 0.41 | 0.0317 | 0.0008 | 0.2281 | 0.0186 | 0.0521 | 0.0043 |  | 201 | 5 | 209 | 17 |
| 41 | 11 | | | 205 | 442 | 0.46 | 0.0233 | 0.0004 | 0.1812 | 0.0093 | 0.0563 | 0.0028 |  | 149 | 3 | 169 | 9 |
| 42 | 17 | | | 230 | 561 | 0.41 | 0.0298 | 0.0005 | 0.2175 | 0.0096 | 0.0530 | 0.0024 |  | 189 | 3 | 200 | 9 |
| 43 | 30 | | | 274 | 945 | 0.29 | 0.0328 | 0.0011 | 0.2585 | 0.0254 | 0.0571 | 0.0052 |  | 208 | 7 | 233 | 23 |
| 44 | 20 | | | 315 | 808 | 0.39 | 0.0255 | 0.0004 | 0.1944 | 0.0075 | 0.0553 | 0.0022 |  | 162 | 2 | 180 | 7 |
| 45 | 76 | | | 1389 | 4860 | 0.29 | 0.0159 | 0.0003 | 0.1129 | 0.0047 | 0.0516 | 0.0022 |  | 102 | 2 | 109 | 5 |
| 46 | 14 | | | 220 | 524 | 0.42 | 0.0278 | 0.0004 | 0.1987 | 0.0090 | 0.0518 | 0.0025 |  | 177 | 3 | 184 | 8 |
| 47 | 22 | | | 495 | 864 | 0.57 | 0.0249 | 0.0007 | 0.1839 | 0.0173 | 0.0536 | 0.0055 |  | 158 | 4 | 171 | 16 |
| 48 | 35 | | | 515 | 1122 | 0.46 | 0.0319 | 0.0006 | 0.2269 | 0.0128 | 0.0516 | 0.0030 |  | 202 | 4 | 208 | 12 |
| 49 | 16 | | | 272 | 639 | 0.43 | 0.0260 | 0.0004 | 0.2003 | 0.0098 | 0.0559 | 0.0029 |  | 165 | 3 | 185 | 9 |
| 50 | 42 | | | 844 | 1679 | 0.50 | 0.0255 | 0.0003 | 0.1960 | 0.0062 | 0.0558 | 0.0018 |  | 162 | 2 | 182 | 6 |
| 51 | 45 | | | 821 | 1608 | 0.51 | 0.0287 | 0.0004 | 0.2029 | 0.0067 | 0.0513 | 0.0017 |  | 182 | 3 | 188 | 6 |
| 52 | 38 | | | 1043 | 1475 | 0.71 | 0.0258 | 0.0004 | 0.1721 | 0.0052 | 0.0485 | 0.0015 |  | 164 | 2 | 161 | 5 |
| 53 | 33 | | | 997 | 1219 | 0.82 | 0.0266 | 0.0004 | 0.2098 | 0.0078 | 0.0572 | 0.0021 |  | 169 | 3 | 193 | 7 |
| 54 | 18 | | | 449 | 729 | 0.61 | 0.0247 | 0.0005 | 0.1877 | 0.0136 | 0.0552 | 0.0039 |  | 157 | 3 | 175 | 13 |
| 55 | 34 | | | 1066 | 1019 | 1.05 | 0.0332 | 0.0007 | 0.2577 | 0.0144 | 0.0562 | 0.0032 |  | 211 | 4 | 233 | 13 |
| 56 | 24 | | | 661 | 860 | 0.77 | 0.0281 | 0.0004 | 0.2220 | 0.0095 | 0.0572 | 0.0024 |  | 179 | 3 | 204 | 9 |
| 57 | 5 | | | 170 | 183 | 0.93 | 0.0261 | 0.0006 | 0.1883 | 0.0096 | 0.0522 | 0.0026 |  | 166 | 4 | 175 | 9 |
| 58 | 13 | | | 292 | 535 | 0.55 | 0.0258 | 0.0004 | 0.2118 | 0.0100 | 0.0594 | 0.0030 |  | 165 | 3 | 195 | 9 |
| 59 | 46 | | | 912 | 1478 | 0.62 | 0.0317 | 0.0006 | 0.2323 | 0.0123 | 0.0532 | 0.0027 |  | 201 | 4 | 212 | 11 |
| 60 | 24 | | | 417 | 758 | 0.55 | 0.0320 | 0.0007 | 0.2535 | 0.0191 | 0.0574 | 0.0044 |  | 203 | 4 | 229 | 17 |
| 61 | 55 | | | 1121 | 2235 | 0.50 | 0.0255 | 0.0004 | 0.1905 | 0.0066 | 0.0541 | 0.0018 |  | 162 | 3 | 177 | 6 |
| 62 | 53 | | | 1813 | 2286 | 0.79 | 0.0230 | 0.0004 | 0.1850 | 0.0075 | 0.0583 | 0.0023 |  | 147 | 2 | 172 | 7 |
| 63 | 33 | | | 950 | 1212 | 0.78 | 0.0273 | 0.0005 | 0.1922 | 0.0113 | 0.0510 | 0.0031 |  | 174 | 3 | 178 | 10 |
| 64 | 28 | | | 528 | 869 | 0.61 | 0.0325 | 0.0005 | 0.2129 | 0.0120 | 0.0475 | 0.0027 |  | 206 | 3 | 196 | 11 |
| 65 | 19 | | | 546 | 682 | 0.80 | 0.0277 | 0.0004 | 0.2130 | 0.0088 | 0.0558 | 0.0023 |  | 176 | 3 | 196 | 8 |
| 66 | 9 | | | 233 | 322 | 0.72 | 0.0285 | 0.0007 | 0.2389 | 0.0196 | 0.0609 | 0.0050 |  | 181 | 4 | 218 | 18 |
| 67 | 17 | | | 590 | 630 | 0.94 | 0.0268 | 0.0004 | 0.1939 | 0.0091 | 0.0526 | 0.0025 |  | 170 | 3 | 180 | 8 |
| 68 | 31 | | | 700 | 1113 | 0.63 | 0.0278 | 0.0004 | 0.2058 | 0.0076 | 0.0537 | 0.0019 |  | 177 | 2 | 190 | 7 |
| 69 | 21 | | | 345 | 827 | 0.42 | 0.0262 | 0.0004 | 0.2076 | 0.0089 | 0.0575 | 0.0025 |  | 167 | 3 | 192 | 8 |
| 70 | 29 | | | 777 | 1063 | 0.73 | 0.0272 | 0.0004 | 0.1968 | 0.0074 | 0.0524 | 0.0020 |  | 173 | 3 | 182 | 7 |
| 71 | 26 | | | 661 | 914 | 0.72 | 0.0279 | 0.0004 | 0.2312 | 0.0089 | 0.0601 | 0.0023 |  | 178 | 3 | 211 | 8 |
| 72 | 22 | | | 364 | 826 | 0.44 | 0.0276 | 0.0004 | 0.2178 | 0.0086 | 0.0571 | 0.0023 |  | 176 | 3 | 200 | 8 |
| 73 | 19 | | | 553 | 661 | 0.84 | 0.0285 | 0.0005 | 0.2258 | 0.0100 | 0.0574 | 0.0025 |  | 181 | 3 | 207 | 9 |
| 74 | 38 | | | 1907 | 1366 | 1.40 | 0.0261 | 0.0004 | 0.1912 | 0.0080 | 0.0532 | 0.0021 |  | 166 | 3 | 178 | 7 |
| 75 | 13 | | | 205 | 454 | 0.45 | 0.0286 | 0.0005 | 0.2350 | 0.0108 | 0.0596 | 0.0028 |  | 182 | 3 | 214 | 10 |
| 76 | 20 | | | 411 | 673 | 0.61 | 0.0296 | 0.0010 | 0.2056 | 0.0297 | 0.0503 | 0.0072 |  | 188 | 6 | 190 | 27 |
| 77 | 10 | | | 395 | 237 | 1.67 | 0.0398 | 0.0014 | 0.2854 | 0.0343 | 0.0520 | 0.0066 |  | 252 | 9 | 255 | 31 |
| 78 | 35 | | | 939 | 1422 | 0.66 | 0.0249 | 0.0004 | 0.1949 | 0.0079 | 0.0568 | 0.0022 |  | 158 | 2 | 181 | 7 |
| 79 | 30 | | | 1582 | 1247 | 1.27 | 0.0224 | 0.0007 | 0.1926 | 0.0176 | 0.0625 | 0.0056 |  | 143 | 5 | 179 | 16 |
| 80 | 15 | | | 442 | 496 | 0.89 | 0.0293 | 0.0007 | 0.2333 | 0.0184 | 0.0578 | 0.0046 |  | 186 | 5 | 213 | 17 |
| 样品号 | 含量(×10-6) | | | | |  | 同位素比值 | | | | | |  | 年龄(Ma) | | | |
| Pb | Th | | | U | Th/U | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ |  | 206Pb/238U | 1σ | 207Pb/235U | 1σ |
| KLHZK3-G1 | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 9 | | | 172 | 323 | 0.53 | 0.0268 | 0.0007 | 0.2270 | 0.0149 | 0.0615 | 0.0043 |  | 170 | 5 | 208 | 14 |
| 2 | 9 | | | 391 | 498 | 0.78 | 0.0172 | 0.0003 | 0.1287 | 0.0076 | 0.0542 | 0.0036 |  | 110 | 2 | 123 | 7 |
| 3 | 32 | | | 414 | 955 | 0.43 | 0.0341 | 0.0005 | 0.2622 | 0.0098 | 0.0558 | 0.0020 |  | 216 | 3 | 236 | 9 |
| 4 | 29 | | | 456 | 1183 | 0.39 | 0.0253 | 0.0004 | 0.1868 | 0.0086 | 0.0535 | 0.0024 |  | 161 | 2 | 174 | 8 |
| 5 | 8 | | | 112 | 316 | 0.35 | 0.0259 | 0.0006 | 0.1725 | 0.0153 | 0.0483 | 0.0043 |  | 165 | 4 | 162 | 14 |
| 6 | 19 | | | 407 | 699 | 0.58 | 0.0267 | 0.0004 | 0.2083 | 0.0100 | 0.0565 | 0.0028 |  | 170 | 3 | 192 | 9 |
| 7 | 7 | | | 195 | 286 | 0.68 | 0.0259 | 0.0007 | 0.1976 | 0.0144 | 0.0553 | 0.0048 |  | 165 | 4 | 183 | 13 |
| 8 | 9 | | | 298 | 313 | 0.95 | 0.0273 | 0.0013 | 0.2114 | 0.0312 | 0.0562 | 0.0082 |  | 174 | 8 | 195 | 29 |
| 9 | 148 | | | 764 | 2014 | 0.38 | 0.0759 | 0.0010 | 0.6149 | 0.0154 | 0.0588 | 0.0014 |  | 472 | 6 | 487 | 12 |
| 10 | 16 | | | 273 | 483 | 0.56 | 0.0332 | 0.0011 | 0.2706 | 0.0306 | 0.0591 | 0.0069 |  | 211 | 7 | 243 | 27 |
| 11 | 49 | | | 835 | 1444 | 0.58 | 0.0340 | 0.0005 | 0.2461 | 0.0082 | 0.0525 | 0.0017 |  | 215 | 3 | 223 | 7 |
| 12 | 7 | | | 179 | 283 | 0.63 | 0.0259 | 0.0011 | 0.2146 | 0.0245 | 0.0602 | 0.0071 |  | 165 | 7 | 197 | 23 |
| 13 | 42 | | | 484 | 1696 | 0.29 | 0.0263 | 0.0003 | 0.1856 | 0.0059 | 0.0512 | 0.0016 |  | 167 | 2 | 173 | 6 |
| 14 | 20 | | | 451 | 727 | 0.62 | 0.0274 | 0.0004 | 0.2096 | 0.0100 | 0.0555 | 0.0026 |  | 174 | 3 | 193 | 9 |
| 15 | 17 | | | 494 | 629 | 0.78 | 0.0260 | 0.0004 | 0.2202 | 0.0089 | 0.0613 | 0.0025 |  | 166 | 2 | 202 | 8 |
| 16 | 42 | | | 13 | 499 | 0.03 | 0.0902 | 0.0014 | 0.7487 | 0.0310 | 0.0602 | 0.0025 |  | 557 | 8 | 567 | 24 |
| 17 | 44 | | | 505 | 1331 | 0.38 | 0.0343 | 0.0005 | 0.2503 | 0.0088 | 0.0530 | 0.0018 |  | 217 | 3 | 227 | 8 |
| 18 | 17 | | | 383 | 641 | 0.60 | 0.0268 | 0.0005 | 0.2193 | 0.0130 | 0.0594 | 0.0035 |  | 170 | 3 | 201 | 12 |
| 19 | 14 | | | 298 | 558 | 0.53 | 0.0249 | 0.0008 | 0.2257 | 0.0279 | 0.0657 | 0.0083 |  | 159 | 5 | 207 | 26 |
| 20 | 10 | | | 256 | 408 | 0.63 | 0.0251 | 0.0006 | 0.2329 | 0.0228 | 0.0674 | 0.0072 |  | 160 | 4 | 213 | 21 |
| 21 | 44 | | | 847 | 1744 | 0.49 | 0.0257 | 0.0004 | 0.1774 | 0.0077 | 0.0501 | 0.0021 |  | 163 | 2 | 166 | 7 |
| 22 | 34 | | | 431 | 1053 | 0.41 | 0.0335 | 0.0005 | 0.2524 | 0.0089 | 0.0547 | 0.0019 |  | 212 | 3 | 228 | 8 |
| 23 | 11 | | | 173 | 421 | 0.41 | 0.0268 | 0.0005 | 0.2332 | 0.0118 | 0.0631 | 0.0033 |  | 171 | 3 | 213 | 11 |
| 24 | 25 | | | 350 | 1006 | 0.35 | 0.0254 | 0.0004 | 0.1917 | 0.0082 | 0.0548 | 0.0024 |  | 162 | 2 | 178 | 8 |
| 25 | 44 | | | 908 | 1287 | 0.71 | 0.0338 | 0.0005 | 0.2522 | 0.0088 | 0.0542 | 0.0018 |  | 214 | 3 | 228 | 8 |
| 26 | 5 | | | 145 | 211 | 0.69 | 0.0243 | 0.0020 | 0.1859 | 0.0276 | 0.0554 | 0.0084 |  | 155 | 13 | 173 | 26 |
| 27 | 37 | | | 1086 | 1046 | 1.04 | 0.0342 | 0.0005 | 0.2420 | 0.0084 | 0.0513 | 0.0018 |  | 217 | 3 | 220 | 8 |
| 28 | 38 | | | 974 | 1382 | 0.70 | 0.0268 | 0.0004 | 0.2105 | 0.0073 | 0.0570 | 0.0019 |  | 171 | 2 | 194 | 7 |
| 29 | 15 | | | 383 | 567 | 0.68 | 0.0261 | 0.0004 | 0.2268 | 0.0108 | 0.0631 | 0.0030 |  | 166 | 3 | 208 | 10 |
| 30 | 5 | | | 157 | 230 | 0.68 | 0.0232 | 0.0014 | 0.2173 | 0.0345 | 0.0679 | 0.0112 |  | 148 | 9 | 200 | 32 |
| 31 | 20 | | | 565 | 719 | 0.79 | 0.0269 | 0.0004 | 0.1881 | 0.0082 | 0.0508 | 0.0022 |  | 171 | 3 | 175 | 8 |
| 32 | 24 | | | 318 | 481 | 0.66 | 0.0499 | 0.0008 | 0.3918 | 0.0175 | 0.0569 | 0.0025 |  | 314 | 5 | 336 | 15 |
| 33 | 23 | | | 364 | 687 | 0.53 | 0.0342 | 0.0005 | 0.2657 | 0.0118 | 0.0563 | 0.0025 |  | 217 | 3 | 239 | 11 |
| 34 | 51 | | | 939 | 2159 | 0.43 | 0.0247 | 0.0004 | 0.1832 | 0.0059 | 0.0537 | 0.0018 |  | 158 | 2 | 171 | 5 |
| 35 | 13 | | | 324 | 477 | 0.68 | 0.0260 | 0.0007 | 0.2521 | 0.0189 | 0.0704 | 0.0055 |  | 165 | 4 | 228 | 17 |
| 36 | 11 | | | 185 | 422 | 0.44 | 0.0273 | 0.0025 | 0.1871 | 0.0334 | 0.0498 | 0.0115 |  | 173 | 16 | 174 | 31 |
| 37 | 15 | | | 351 | 557 | 0.63 | 0.0268 | 0.0004 | 0.2227 | 0.0123 | 0.0602 | 0.0031 |  | 171 | 3 | 204 | 11 |
| 38 | 15 | | | 250 | 563 | 0.44 | 0.0268 | 0.0004 | 0.2166 | 0.0101 | 0.0587 | 0.0027 |  | 170 | 3 | 199 | 9 |
| 39 | 24 | | | 1182 | 890 | 1.33 | 0.0248 | 0.0006 | 0.2140 | 0.0176 | 0.0625 | 0.0052 |  | 158 | 4 | 197 | 16 |
| 40 | 34 | | | 531 | 1297 | 0.41 | 0.0270 | 0.0004 | 0.1994 | 0.0078 | 0.0536 | 0.0021 |  | 172 | 3 | 185 | 7 |
| 41 | 14 | | | 307 | 437 | 0.70 | 0.0332 | 0.0006 | 0.2601 | 0.0131 | 0.0568 | 0.0030 |  | 211 | 4 | 235 | 12 |
| 42 | 29 | | | 585 | 1160 | 0.50 | 0.0260 | 0.0004 | 0.1872 | 0.0075 | 0.0521 | 0.0020 |  | 166 | 2 | 174 | 7 |
| 43 | 18 | | | 368 | 520 | 0.71 | 0.0356 | 0.0010 | 0.2768 | 0.0408 | 0.0565 | 0.0092 |  | 225 | 7 | 248 | 37 |
| 44 | 38 | | | 640 | 1422 | 0.45 | 0.0279 | 0.0005 | 0.1839 | 0.0074 | 0.0479 | 0.0019 |  | 177 | 3 | 171 | 7 |
| 45 | 23 | | | 191 | 719 | 0.27 | 0.0326 | 0.0006 | 0.2994 | 0.0196 | 0.0666 | 0.0043 |  | 207 | 4 | 266 | 17 |
| 46 | 10 | | | 365 | 377 | 0.97 | 0.0249 | 0.0006 | 0.2125 | 0.0166 | 0.0620 | 0.0047 |  | 158 | 4 | 196 | 15 |
| 47 | 5 | | | 90 | 166 | 0.54 | 0.0283 | 0.0007 | 0.2058 | 0.0160 | 0.0528 | 0.0047 |  | 180 | 4 | 190 | 15 |
| 48 | 15 | | | 271 | 580 | 0.47 | 0.0262 | 0.0004 | 0.2229 | 0.0106 | 0.0617 | 0.0032 |  | 167 | 3 | 204 | 10 |
| 49 | 22 | | | 335 | 878 | 0.38 | 0.0262 | 0.0004 | 0.2079 | 0.0088 | 0.0575 | 0.0024 |  | 167 | 2 | 192 | 8 |
| 50 | 55 | | | 1646 | 2253 | 0.73 | 0.0244 | 0.0004 | 0.1853 | 0.0057 | 0.0552 | 0.0017 |  | 155 | 2 | 173 | 5 |
| 51 | 41 | | | 525 | 1261 | 0.42 | 0.0340 | 0.0005 | 0.2423 | 0.0085 | 0.0517 | 0.0018 |  | 216 | 3 | 220 | 8 |
| 52 | 23 | | | 338 | 686 | 0.49 | 0.0336 | 0.0010 | 0.2745 | 0.0286 | 0.0593 | 0.0063 |  | 213 | 6 | 246 | 26 |
| 53 | 18 | | | 375 | 679 | 0.55 | 0.0272 | 0.0004 | 0.2129 | 0.0091 | 0.0567 | 0.0023 |  | 173 | 3 | 196 | 8 |
| 54 | 36 | | | 499 | 1111 | 0.45 | 0.0336 | 0.0005 | 0.2392 | 0.0080 | 0.0517 | 0.0017 |  | 213 | 3 | 218 | 7 |
| 55 | 26 | | | 773 | 976 | 0.79 | 0.0267 | 0.0004 | 0.1877 | 0.0079 | 0.0509 | 0.0022 |  | 170 | 2 | 175 | 7 |
| 56 | 21 | | | 559 | 835 | 0.67 | 0.0249 | 0.0004 | 0.1964 | 0.0088 | 0.0571 | 0.0026 |  | 159 | 2 | 182 | 8 |
| 57 | 29 | | | 343 | 853 | 0.40 | 0.0352 | 0.0006 | 0.2389 | 0.0101 | 0.0492 | 0.0020 |  | 223 | 4 | 217 | 9 |
| 58 | 4 | | | 96 | 126 | 0.76 | 0.0283 | 0.0007 | 0.2014 | 0.0103 | 0.0516 | 0.0030 |  | 180 | 5 | 186 | 9 |
| 59 | 11 | | | 425 | 432 | 0.98 | 0.0252 | 0.0011 | 0.1850 | 0.0244 | 0.0532 | 0.0076 |  | 161 | 7 | 172 | 23 |
| 60 | 25 | | | 547 | 925 | 0.59 | 0.0269 | 0.0005 | 0.1882 | 0.0108 | 0.0508 | 0.0029 |  | 171 | 3 | 175 | 10 |
| 61 | 24 | | | 304 | 937 | 0.32 | 0.0264 | 0.0004 | 0.1972 | 0.0085 | 0.0541 | 0.0023 |  | 168 | 3 | 183 | 8 |
| 62 | 21 | | | 380 | 831 | 0.46 | 0.0258 | 0.0004 | 0.1974 | 0.0115 | 0.0554 | 0.0033 |  | 164 | 3 | 183 | 11 |
| 63 | 32 | | | 529 | 1256 | 0.42 | 0.0263 | 0.0004 | 0.1860 | 0.0073 | 0.0513 | 0.0020 |  | 167 | 2 | 173 | 7 |
| 64 | 30 | | | 539 | 1153 | 0.47 | 0.0262 | 0.0004 | 0.2025 | 0.0076 | 0.0561 | 0.0021 |  | 167 | 3 | 187 | 7 |
| 65 | 36 | | | 434 | 1077 | 0.40 | 0.0347 | 0.0005 | 0.2580 | 0.0093 | 0.0539 | 0.0019 |  | 220 | 3 | 233 | 8 |
| 66 | 7 | | | 215 | 284 | 0.76 | 0.0249 | 0.0009 | 0.1711 | 0.0123 | 0.0497 | 0.0043 |  | 159 | 6 | 160 | 12 |
| 67 | 32 | | | 671 | 1231 | 0.55 | 0.0262 | 0.0004 | 0.1875 | 0.0077 | 0.0518 | 0.0021 |  | 167 | 2 | 174 | 7 |
| 68 | 21 | | | 292 | 834 | 0.35 | 0.0267 | 0.0004 | 0.1883 | 0.0075 | 0.0511 | 0.0021 |  | 170 | 3 | 175 | 7 |
| 69 | 45 | | | 812 | 1687 | 0.48 | 0.0272 | 0.0004 | 0.1906 | 0.0070 | 0.0509 | 0.0018 |  | 173 | 3 | 177 | 7 |
| 70 | 90 | | | 2059 | 3583 | 0.57 | 0.0254 | 0.0005 | 0.1786 | 0.0118 | 0.0509 | 0.0031 |  | 162 | 3 | 167 | 11 |
| 71 | 10 | | | 167 | 290 | 0.57 | 0.0347 | 0.0007 | 0.2562 | 0.0193 | 0.0536 | 0.0039 |  | 220 | 4 | 232 | 17 |
| 72 | 14 | | | 251 | 427 | 0.59 | 0.0336 | 0.0007 | 0.2558 | 0.0150 | 0.0551 | 0.0035 |  | 213 | 4 | 231 | 14 |
| 73 | 22 | | | 456 | 805 | 0.57 | 0.0272 | 0.0005 | 0.2003 | 0.0092 | 0.0533 | 0.0026 |  | 173 | 3 | 185 | 9 |
| 74 | 5 | | | 137 | 191 | 0.72 | 0.0275 | 0.0031 | 0.1898 | 0.0287 | 0.0500 | 0.0028 |  | 175 | 20 | 176 | 27 |
| 75 | 56 | | | 783 | 1667 | 0.47 | 0.0343 | 0.0005 | 0.2385 | 0.0075 | 0.0504 | 0.0016 |  | 217 | 3 | 217 | 7 |
| 76 | 12 | | | 240 | 487 | 0.49 | 0.0254 | 0.0009 | 0.1830 | 0.0209 | 0.0523 | 0.0067 |  | 162 | 6 | 171 | 19 |
| 77 | 25 | | | 427 | 924 | 0.46 | 0.0270 | 0.0004 | 0.1908 | 0.0081 | 0.0513 | 0.0022 |  | 172 | 3 | 177 | 8 |
| 78 | 18 | | | 104 | 768 | 0.14 | 0.0245 | 0.0004 | 0.1738 | 0.0082 | 0.0514 | 0.0025 |  | 156 | 2 | 163 | 8 |
| 79 | 26 | | | 390 | 980 | 0.40 | 0.0271 | 0.0004 | 0.2091 | 0.0090 | 0.0560 | 0.0023 |  | 172 | 3 | 193 | 8 |
| 80 | 57 | | | 765 | 2079 | 0.37 | 0.0280 | 0.0004 | 0.2095 | 0.0079 | 0.0542 | 0.0021 |  | 178 | 3 | 193 | 7 |
| 样品号 | 含量(×10-6) | | | | |  | 同位素比值 | | | | | |  | 年龄(Ma) | | | |
| Pb | | Th | | U | Th/U | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ |  | 206Pb/238U | 1σ | 207Pb/235U | 1σ |
| KLHZK3-G2 | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 52 | | | 955 | 1568 | 0.61 | 0.0330 | 0.0005 | 0.2375 | 0.0074 | 0.0521 | 0.0016 |  | 210 | 3 | 216 | 7 |
| 2 | 37 | | | 785 | 1087 | 0.72 | 0.0336 | 0.0005 | 0.2299 | 0.0084 | 0.0496 | 0.0018 |  | 213 | 3 | 210 | 8 |
| 3 | 22 | | | 574 | 883 | 0.65 | 0.0255 | 0.0004 | 0.2143 | 0.0083 | 0.0609 | 0.0024 |  | 162 | 2 | 197 | 8 |
| 4 | 5 | | | 113 | 174 | 0.65 | 0.0270 | 0.0006 | 0.3405 | 0.0190 | 0.0913 | 0.0060 |  | 172 | 4 | 298 | 17 |
| 5 | 26 | | | 776 | 1011 | 0.77 | 0.0255 | 0.0004 | 0.1781 | 0.0076 | 0.0506 | 0.0021 |  | 162 | 2 | 166 | 7 |
| 6 | 5 | | | 115 | 187 | 0.62 | 0.0265 | 0.0007 | 0.3290 | 0.0185 | 0.0901 | 0.0058 |  | 168 | 4 | 289 | 16 |
| 7 | 15 | | | 297 | 591 | 0.50 | 0.0258 | 0.0005 | 0.2168 | 0.0105 | 0.0609 | 0.0029 |  | 164 | 3 | 199 | 10 |
| 8 | 39 | | | 587 | 1591 | 0.37 | 0.0259 | 0.0004 | 0.1872 | 0.0096 | 0.0524 | 0.0026 |  | 165 | 3 | 174 | 9 |
| 9 | 21 | | | 737 | 794 | 0.93 | 0.0254 | 0.0004 | 0.1911 | 0.0084 | 0.0546 | 0.0024 |  | 161 | 2 | 178 | 8 |
| 10 | 23 | | | 396 | 915 | 0.43 | 0.0257 | 0.0004 | 0.1980 | 0.0108 | 0.0559 | 0.0032 |  | 163 | 3 | 183 | 10 |
| 11 | 20 | | | 454 | 814 | 0.56 | 0.0250 | 0.0004 | 0.1694 | 0.0077 | 0.0492 | 0.0022 |  | 159 | 2 | 159 | 7 |
| 12 | 23 | | | 531 | 675 | 0.79 | 0.0335 | 0.0005 | 0.2519 | 0.0101 | 0.0545 | 0.0023 |  | 213 | 3 | 228 | 9 |
| 13 | 34 | | | 828 | 1374 | 0.60 | 0.0254 | 0.0004 | 0.1758 | 0.0075 | 0.0502 | 0.0021 |  | 162 | 2 | 164 | 7 |
| 14 | 6 | | | 97 | 210 | 0.46 | 0.0264 | 0.0007 | 0.3333 | 0.0261 | 0.0917 | 0.0070 |  | 168 | 4 | 292 | 23 |
| 15 | 8 | | | 244 | 307 | 0.79 | 0.0256 | 0.0008 | 0.2297 | 0.0184 | 0.0651 | 0.0056 |  | 163 | 5 | 210 | 17 |
| 16 | 48 | | | 708 | 2005 | 0.35 | 0.0250 | 0.0004 | 0.1838 | 0.0073 | 0.0532 | 0.0022 |  | 159 | 3 | 171 | 7 |
| 17 | 7 | | | 218 | 262 | 0.83 | 0.0259 | 0.0006 | 0.2776 | 0.0172 | 0.0779 | 0.0045 |  | 165 | 4 | 249 | 15 |
| 18 | 38 | | | 807 | 1549 | 0.52 | 0.0252 | 0.0004 | 0.1761 | 0.0085 | 0.0508 | 0.0024 |  | 160 | 3 | 165 | 8 |
| 19 | 16 | | | 340 | 621 | 0.55 | 0.0256 | 0.0005 | 0.2251 | 0.0118 | 0.0637 | 0.0037 |  | 163 | 3 | 206 | 11 |
| 20 | 13 | | | 366 | 464 | 0.79 | 0.0260 | 0.0004 | 0.2564 | 0.0141 | 0.0715 | 0.0039 |  | 165 | 3 | 232 | 13 |
| 21 | 4 | | | 100 | 145 | 0.69 | 0.0268 | 0.0007 | 0.4034 | 0.0228 | 0.1093 | 0.0066 |  | 170 | 5 | 344 | 19 |
| 22 | 43 | | | 934 | 1731 | 0.54 | 0.0251 | 0.0005 | 0.1887 | 0.0105 | 0.0545 | 0.0029 |  | 160 | 3 | 175 | 10 |
| 23 | 27 | | | 986 | 1022 | 0.96 | 0.0251 | 0.0004 | 0.1881 | 0.0079 | 0.0544 | 0.0024 |  | 160 | 2 | 175 | 7 |
| 24 | 7 | | | 102 | 209 | 0.49 | 0.0312 | 0.0008 | 0.3941 | 0.0248 | 0.0916 | 0.0059 |  | 198 | 5 | 337 | 21 |

误差为1-sigma；小于1000Ma采用206/238U年龄统计，大于1000Ma的采用207Pb/206Pb年龄统计。

###### 表2卡伦湖地区泉头组砂岩全岩地球化学数据

Table 2 whole rock geochemical data of Quantou Formation sandstone in Kalun Lake area

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 送样号 | KLHZK2-H1 | | KLHZK2-H2 | | | KLHZK2-H3 | KLHZK2-H4 | | KLHZK3-H1 | | KLHZK3-H2 | | KLHZK3-H3 | | KLHZK3-H4 | | |
| 分析号 | A170760001 | | A170760002 | | | A170760003 | A170760004 | | A170760005 | | A170760006 | | A170760007 | | A170760008 | | |
| 主量元素/wt% | | | | | | | | | | | | | | | | | |
| SiO2 | | 77.32 | | 78.59 | 74.64 | | | 78.05 | | 71.5 | | 73.24 | | 73.97 | | 75.7 |
| Al2O3 | | 12.28 | | 11.84 | 10.42 | | | 12.07 | | 14.9 | | 10.61 | | 14.02 | | 13.07 |
| Fe2O3 | | 0.5 | | 0.36 | 0.09 | | | 0.41 | | 1.86 | | 0.012 | | 1 | | 0.69 |
| FeO | | 0.12 | | 0.17 | 0.3 | | | 0.25 | | 0.54 | | 0.29 | | 0.36 | | 0.36 |
| CaO | | 0.64 | | 0.45 | 3.61 | | | 0.47 | | 0.96 | | 4.54 | | 0.81 | | 0.92 |
| MgO | | 0.3 | | 0.27 | 0.35 | | | 0.29 | | 0.6 | | 0.13 | | 0.47 | | 0.35 |
| K2O | | 4.63 | | 4.37 | 4.3 | | | 4.35 | | 3.7 | | 4.25 | | 3.95 | | 3.98 |
| Na2O | | 2.45 | | 2.42 | 2.13 | | | 2.47 | | 3.46 | | 2.55 | | 3.26 | | 3.24 |
| TiO2 | | 0.18 | | 0.16 | 0.11 | | | 0.17 | | 0.48 | | 0.15 | | 0.4 | | 0.3 |
| P2O5 | | 0.053 | | 0.04 | 0.034 | | | 0.045 | | 0.027 | | 0.019 | | 0.015 | | 0.035 |
| MnO | | 0.021 | | 0.011 | 0.18 | | | 0.012 | | 0.028 | | 0.16 | | 0.02 | | 0.02 |
| 灼失 | | 1.2 | | 1.04 | 3.55 | | | 1.18 | | 1.72 | | 3.81 | | 1.5 | | 1.07 |
| 微量元素/10-6 | | | | | | | | | | | | | | | | | |
| Cu | | 5.74 | | 6.73 | 3.79 | | | 6.34 | | 10.5 | | 3.44 | | 21 | | 6.33 | | |
| Pb | | 18 | | 18.9 | 20.6 | | | 17.5 | | 25.9 | | 20.9 | | 18.7 | | 18.6 | | |
| Zn | | 35.3 | | 34.8 | 17 | | | 33.9 | | 58 | | 9.73 | | 35 | | 47.7 | | |
| Cr | | 11 | | 11.8 | 7.13 | | | 10.3 | | 18.6 | | 8.16 | | 15.3 | | 13.6 | | |
| Ni | | 5.53 | | 5.8 | 4.24 | | | 5.49 | | 7.42 | | 3.43 | | 5.92 | | 5.54 | | |
| Co | | 2.93 | | 2.67 | 2.49 | | | 2.64 | | 5.22 | | 2.02 | | 5.49 | | 3.6 | | |
| Li | | 18.4 | | 16.4 | 14.4 | | | 20.5 | | 25.8 | | 11.6 | | 21.5 | | 17.3 | | |
| Rb | | 156 | | 147 | 136 | | | 151 | | 144 | | 132 | | 147 | | 148 | | |
| Cs | | 4.67 | | 4.09 | 3.45 | | | 4.49 | | 8.7 | | 3.27 | | 7.37 | | 6.06 | | |
| Sr | | 119 | | 117 | 150 | | | 119 | | 182 | | 185 | | 167 | | 150 | | |
| Ba | | 420 | | 400 | 367 | | | 389 | | 443 | | 398 | | 439 | | 416 | | |
| V | | 27 | | 32.6 | 27.2 | | | 21 | | 31.8 | | 13.8 | | 104 | | 26.5 | | |
| Sc | | 5.28 | | 3.95 | 2.95 | | | 4.89 | | 6.41 | | 2.24 | | 6.86 | | 5.35 | | |
| Nb | | 8.74 | | 4.73 | 3.46 | | | 6.8 | | 14.4 | | 3.63 | | 11.8 | | 9.31 | | |
| Ta | | 0.65 | | 0.44 | 0.36 | | | 0.58 | | 1.28 | | 0.37 | | 1.04 | | 0.83 | | |
| Zr | | 127 | | 69.5 | 50 | | | 87.3 | | 292 | | 111 | | 234 | | 190 | | |
| Hf | | 3.51 | | 2.35 | 1.69 | | | 2.71 | | 9.04 | | 3.53 | | 7.17 | | 6.12 | | |
| Be | | 1.81 | | 1.7 | 1.38 | | | 1.95 | | 3.01 | | 1.55 | | 2.58 | | 2.47 | | |
| U | | 8.88 | | 21.4 | 11.1 | | | 14.2 | | 4.4 | | 1.77 | | 10.9 | | 3.32 | | |
| Th | | 7.01 | | 6.02 | 4.7 | | | 6.88 | | 14.2 | | 5.1 | | 12.5 | | 9.43 | | |
| La | | 13.9 | | 12.1 | 8.84 | | | 14 | | 36.8 | | 8.29 | | 30.9 | | 20.2 | | |
| Ce | | 25.7 | | 21.9 | 14.7 | | | 24.6 | | 61.8 | | 15.6 | | 53 | | 37 | | |
| Pr | | 3.24 | | 2.65 | 2.02 | | | 3.15 | | 9.37 | | 2.12 | | 7.93 | | 4.95 | | |
| Nd | | 11.6 | | 9.39 | 7.18 | | | 11.1 | | 35.6 | | 7.93 | | 29.6 | | 18.3 | | |
| Sm | | 2.05 | | 1.65 | 1.36 | | | 1.98 | | 6.74 | | 1.69 | | 5.69 | | 3.42 | | |
| Eu | | 0.56 | | 0.47 | 0.44 | | | 0.5 | | 1.04 | | 0.49 | | 0.94 | | 0.69 | | |
| Gd | | 1.84 | | 1.47 | 1.24 | | | 1.7 | | 5.54 | | 1.54 | | 4.55 | | 2.95 | | |
| Tb | | 0.29 | | 0.23 | 0.21 | | | 0.27 | | 0.8 | | 0.26 | | 0.69 | | 0.47 | | |
| Dy | | 1.72 | | 1.33 | 1.28 | | | 1.56 | | 4.2 | | 1.51 | | 3.58 | | 2.59 | | |
| Ho | | 0.35 | | 0.27 | 0.26 | | | 0.32 | | 0.82 | | 0.3 | | 0.68 | | 0.52 | | |
| Er | | 1.02 | | 0.8 | 0.77 | | | 0.94 | | 2.34 | | 0.88 | | 2.02 | | 1.49 | | |
| Tm | | 0.16 | | 0.12 | 0.12 | | | 0.15 | | 0.38 | | 0.14 | | 0.33 | | 0.25 | | |
| Yb | | 1.16 | | 0.89 | 0.86 | | | 1.09 | | 2.76 | | 1.04 | | 2.35 | | 1.81 | | |
| Lu | | 0.19 | | 0.13 | 0.13 | | | 0.17 | | 0.44 | | 0.16 | | 0.36 | | 0.29 | | |
| Y | | 9.45 | | 7.12 | 7.52 | | | 8.62 | | 21 | | 8.76 | | 17.9 | | 13.7 | | |

注: 为消除碳酸钙胶结物的影响，同时考虑到华北地区大部分TTG 岩系及各类中酸性岩浆岩的CaO< 5%，取含量<5%的样品的平均值( 1.97) 作为含量>5%的样品的CaO含量；OIA.洋岛砂岩平均化学组成；CIA.大陆岛弧砂岩平均化学组成;ACM.活动大陆边缘砂岩平均化学组成；PCM.被动大陆边缘砂岩平均化学组成.上述数据源自（Bhatia M R,1983）.UCC.大陆上地壳平均化学组成，数据源自（Rudnik R L et al.,2003）。LOI为烧失量；CIA\* 表示沉积岩物源区化学分异指数；CIA＝[Al2O3/（Al2O3＋CaO\*＋Na2O＋K2O）]×100，式中各氧化物含量均为摩尔质量。