附表1 查孜中新世正长岩的锆石U-Pb年龄数据

Table 1 U-Pb age data of zircons from the Miocene syenite in Chazi area

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 测点 | 含量(10-6) | | | Th/U | 同位素比值 | | | | | | 年龄(Ma) | | | | | |
| Pb | Th | U | 207Pb/206Pb | ±1σ | 207Pb/235U | ±1σ | 206Pb/238U | ±1σ | 207Pb/235U | ±1σ | 206Pb/238U | ±1σ | | |
| SS01-N（石英角闪正长岩） | | | | | | | | | | | | | | | |
| 1 | 28.3 | 3 552 | 2 083 | 1.71 | 0.048 5 | 0.005 5 | 0.010 9 | 0.001 0 | 0.001 7 | 0.000 1 | 11.0 | 1.0 | 10.7 | 0.3 | | |
| 2 | 41.2 | 5 269 | 2 211 | 2.38 | 0.049 1 | 0.005 6 | 0.010 4 | 0.001 0 | 0.001 6 | 0.000 0 | 10.5 | 1.0 | 10.3 | 0.3 | | |
| 3 | 36.9 | 4 638 | 2 003 | 2.32 | 0.051 1 | 0.005 9 | 0.010 9 | 0.001 1 | 0.001 6 | 0.000 0 | 11.0 | 1.1 | 10.5 | 0.3 | | |
| 4 | 5.25 | 598 | 552 | 1.08 | 0.054 7 | 0.016 9 | 0.010 4 | 0.004 0 | 0.001 7 | 0.000 1 | 10.5 | 4.0 | 10.8 | 0.5 | | |
| 5 | 15.1 | 1 947 | 1 018 | 1.91 | 0.055 5 | 0.032 2 | 0.008 5 | 0.003 6 | 0.001 7 | 0.000 1 | 8.6 | 3.6 | 11.0 | 0.7 | | |
| 6 | 77 | 9 187 | 3 023 | 3.04 | 0.043 1 | 0.004 3 | 0.009 9 | 0.000 9 | 0.001 7 | 0.000 0 | 10.0 | 0.9 | 10.9 | 0.3 | | |
| 7 | 21.3 | 2 502 | 1 309 | 1.91 | 0.048 2 | 0.007 5 | 0.010 4 | 0.001 4 | 0.001 7 | 0.000 1 | 10.5 | 1.4 | 11.1 | 0.5 | | |
| 8 | 30.9 | 3 999 | 1 708 | 2.34 | 0.046 6 | 0.006 7 | 0.010 9 | 0.001 9 | 0.001 7 | 0.000 1 | 11.0 | 1.9 | 10.8 | 0.4 | | |
| 9 | 36.2 | 4 398 | 2 528 | 1.74 | 0.052 1 | 0.008 2 | 0.010 2 | 0.001 4 | 0.001 5 | 0.000 1 | 10.3 | 1.4 | 9.7 | 0.4 | | |
| 10 | 32.6 | 4 490 | 1 992 | 2.25 | 0.049 9 | 0.006 4 | 0.010 5 | 0.001 2 | 0.001 6 | 0.000 0 | 10.6 | 1.2 | 10.3 | 0.3 | | |
| 11 | 46.6 | 5 710 | 2 751 | 2.08 | 0.049 8 | 0.005 0 | 0.010 9 | 0.000 9 | 0.001 6 | 0.000 0 | 11.0 | 0.9 | 10.3 | 0.3 | | |
| ~~12~~ | ~~55.9~~ | ~~2 816~~ | ~~1 624~~ | ~~1.73~~ | ~~0.273 2~~ | ~~0.019 8~~ | ~~0.090 1~~ | ~~0.007 9~~ | ~~0.0023~~ | ~~0.000 1~~ | ~~87.6~~ | ~~7.3~~ | ~~14.7~~ | ~~0.6~~ | | |
| 13 | 13.5 | 1 713 | 1 273 | 1.35 | 0.046 5 | 0.007 5 | 0.010 9 | 0.001 7 | 0.0017 | 0.000 1 | 11.0 | 1.7 | 11.0 | 0.5 | | |
| ~~14~~ | ~~36.4~~ | ~~3 857~~ | ~~1 843~~ | ~~2.09~~ | ~~0.127 1~~ | ~~0.021 9~~ | ~~0.032 9~~ | ~~0.006 8~~ | ~~0.0017~~ | ~~0.000 1~~ | ~~32.8~~ | ~~6.7~~ | ~~11.1~~ | ~~0.5~~ | | |
| 15 | 51.6 | 6 266 | 3 304 | 1.90 | 0.053 2 | 0.012 2 | 0.010 7 | 0.001 8 | 0.0015 | 0.000 1 | 10.8 | 1.8 | 9.4 | 0.6 | | |
| 16 | 27.5 | 3 257 | 1 524 | 2.14 | 0.054 2 | 0.008 3 | 0.011 6 | 0.001 3 | 0.0016 | 0.000 1 | 11.7 | 1.3 | 10.6 | 0.4 | | |
| 17 | 26.1 | 3 151 | 1 433 | 2.20 | 0.054 5 | 0.008 4 | 0.012 4 | 0.001 5 | 0.0018 | 0.000 1 | 12.5 | 1.5 | 11.4 | 0.4 | | |
| 18 | 45.8 | 6 239 | 2 398 | 2.60 | 0.056 7 | 0.009 7 | 0.010 3 | 0.001 4 | 0.0015 | 0.000 1 | 10.5 | 1.4 | 9.7 | 0.4 | | |
| 19 | 40.1 | 5 042 | 2 168 | 2.33 | 0.047 8 | 0.005 4 | 0.010 1 | 0.000 8 | 0.0015 | 0.000 0 | 10.2 | 0.8 | 10.0 | 0.3 | | |
| 20 | 9.5 | 1 254 | 926 | 1.35 | 0.044 5 | 0.015 4 | 0.010 8 | 0.005 8 | 0.0018 | 0.000 1 | 10.9 | 5.9 | 11.3 | 0.7 | | |
| 21 | 13.8 | 1 687 | 1 368 | 1.23 | 0.059 6 | 0.009 5 | 0.011 9 | 0.001 8 | 0.0016 | 0.000 1 | 12.0 | 1.8 | 10.2 | 0.4 | | |
| 22 | 16.8 | 1 932 | 1951 | 0.99 | 0.048 1 | 0.007 6 | 0.009 8 | 0.001 4 | 0.0015 | 0.000 1 | 10.0 | 1.4 | 9.6 | 0.4 | | |
| 23 | 39.0 | 4 852 | 2 088 | 2.32 | 0.054 1 | 0.007 7 | 0.010 8 | 0.001 4 | 0.0015 | 0.000 1 | 10.9 | 1.4 | 9.5 | 0.3 | | |
| 24 | 16.7 | 2 155 | 1 209 | 1.78 | 0.047 3 | 0.008 6 | 0.010 4 | 0.001 8 | 0.0016 | 0.000 1 | 10.5 | 1.8 | 10.3 | 0.4 | | |
| AMX02-N（斑状石英正长岩） | | | | | | | | | | | | | | |
| 1 | 3.04 | 449 | 437 | 1.03 | 0.045 6 | 0.022 1 | 0.012 1 | 0.004 0 | 0.001 8 | 0.000 2 | 12.2 | 4.1 | 11.4 | 1.2 | | |
| 2 | 2.62 | 305 | 288 | 1.06 | 0.009 2 | 0.009 2 | 0.011 0 | 0.003 3 | 0.001 6 | 0.000 2 | 11.1 | 3.3 | 10.6 | 1.4 | | |
| 3 | ~~4.19~~ | ~~449~~ | ~~316~~ | ~~1.42~~ | ~~0.037 4~~ | ~~0.022 4~~ | ~~0.026 8~~ | ~~0.006 0~~ | ~~0.001 9~~ | ~~0.000 3~~ | ~~26.9~~ | ~~6.0~~ | ~~12.4~~ | ~~2.0~~ | | |
| 4 | 6.02 | 567 | 1 871 | 0.30 | 0.052 9 | 0.012 1 | 0.011 5 | 0.003 2 | 0.001 8 | 0.000 1 | 11.6 | 3.2 | 11.4 | 0.7 | | |
| 5 | 2.84 | 358 | 293 | 1.22 | 0.007 5 | 0.007 5 | 0.011 7 | 0.007 7 | 0.001 9 | 0.000 2 | 11.8 | 7.8 | 12.0 | 1.4 | | |
| ~~6~~ | ~~2.13~~ | ~~302~~ | ~~301~~ | ~~1.00~~ | ~~0.063 2~~ | ~~0.038 2~~ | ~~0.014 2~~ | ~~0.011 8~~ | ~~0.001 6~~ | ~~0.000 1~~ | ~~14.4~~ | ~~11.8~~ | ~~10.2~~ | ~~0.9~~ | | |
| 7 | 6.66 | 931 | 1 228 | 0.76 | 0.070 2 | 0.021 0 | 0.011 1 | 0.002 4 | 0.001 7 | 0.000 1 | 11.3 | 2.4 | 10.7 | 0.6 | | |
| 8 | 4.80 | 698 | 582 | 1.20 | 0.023 9 | 0.011 1 | 0.012 4 | 0.008 0 | 0.001 8 | 0.000 1 | 12.5 | 8.0 | 11.5 | 1.0 | | |
| ~~9~~ | ~~5.54~~ | ~~346~~ | ~~322~~ | ~~1.08~~ | ~~4.769 3~~ | ~~4.707 6~~ | ~~0.785 3~~ | ~~2.224 5~~ | ~~0.001 7~~ | ~~0.000 2~~ | ~~588.5~~ | ~~1 265.2~~ | ~~11.0~~ | ~~1.0~~ | | |
| 10 | 1.49 | 277 | 229 | 1.21 | 0.041 9 | 0.029 3 | 0.010 1 | 0.001 6 | 0.001 7 | 0.000 2 | 10.2 | 1.6 | 10.9 | 1.6 | | |
| 11 | 4.44 | 771 | 758 | 1.02 | 0.038 0 | 0.013 8 | 0.010 1 | 0.001 3 | 0.001 6 | 0.000 1 | 10.2 | 1.3 | 10.3 | 0.7 | | |
| 12 | 4.34 | 601 | 374 | 1.61 | 0.035 9 | 0.017 5 | 0.010 3 | 0.002 6 | 0.001 8 | 0.000 1 | 10.4 | 2.6 | 11.3 | 1.0 | | |
| ~~13~~ | ~~3.81~~ | ~~536~~ | ~~396~~ | ~~1.35~~ | ~~0.060 7~~ | ~~0.024 1~~ | ~~0.016 9~~ | ~~0.006 8~~ | ~~0.001 8~~ | ~~0.000 2~~ | ~~17.0~~ | ~~6.8~~ | ~~11.8~~ | ~~1.1~~ | | |
| ~~14~~ | ~~3.43~~ | ~~441~~ | ~~348~~ | ~~1.27~~ | ~~0.047 4~~ | ~~0.029 2~~ | ~~0.013 9~~ | ~~0.019 0~~ | ~~0.002 2~~ | ~~0.000 2~~ | ~~14.0~~ | ~~19.1~~ | ~~14.1~~ | ~~1.2~~ | | |
| 15 | 3.63 | 646 | 695 | 0.93 | 0.061 0 | 0.022 4 | 0.010 9 | 0.002 9 | 0.001 7 | 0.000 1 | 11.0 | 2.9 | 10.6 | 0.7 | | |
| 16 | 2.41 | 427 | 311 | 1.37 | 0.020 4 | 0.015 1 | 0.013 0 | 0.002 8 | 0.001 7 | 0.000 1 | 13.1 | 2.8 | 11.1 | 0.9 | | |
| 17 | 8.1 | 1243 | 652 | 1.91 | 0.077 3 | 0.025 6 | 0.013 8 | 0.003 2 | 0.001 8 | 0.000 1 | 14.0 | 3.2 | 11.5 | 0.8 | | |
| 18 | 3.77 | 454 | 373 | 1.22 | 0.033 9 | 0.020 2 | 0.010 8 | 0.001 9 | 0.001 6 | 0.000 2 | 10.9 | 1.9 | 10.0 | 1.0 | | |
| ~~19~~ | ~~3.54~~ | ~~553~~ | ~~414~~ | ~~1.34~~ | ~~0.093 0~~ | ~~0.033 9~~ | ~~0.022 8~~ | ~~0.006 5~~ | ~~0.001 5~~ | ~~0.000 1~~ | ~~22.9~~ | ~~6.5~~ | ~~9.6~~ | ~~0.8~~ | | |
| 20 | 3.04 | 482 | 420 | 1.15 | 0.072 9 | 0.036 6 | 0.011 0 | 0.002 8 | 0.001 7 | 0.000 2 | 11.1 | 2.8 | 10.8 | 1.3 | | |
| 21 | 3.82 | 628 | 495 | 1.27 | 0.044 1 | 0.020 0 | 0.011 0 | 0.000 8 | 0.001 6 | 0.000 2 | 11.1 | 0.9 | 10.2 | 1.1 | | |
| 22 | 9.6 | 1 766 | 949 | 1.86 | 0.067 9 | 0.030 8 | 0.011 6 | 0.005 6 | 0.001 9 | 0.000 1 | 11.7 | 5.6 | 12.4 | 0.8 | | |
| 23 | 2.93 | 467 | 406 | 1.15 | 0.038 1 | 0.020 8 | 0.011 7 | 0.008 8 | 0.001 8 | 0.000 2 | 11.8 | 8.8 | 11.6 | 1.1 | | |
| 24 | 1.89 | 391 | 316 | 1.24 | 0.053 7 | 0.037 8 | 0.013 0 | 0.016 6 | 0.001 9 | 0.000 2 | 13.1 | 16.7 | 12.0 | 1.0 | | |
| ~~25~~ | ~~1.35~~ | ~~153~~ | ~~150~~ | ~~1.01~~ | ~~0.018 0~~ | ~~0.014 2~~ | ~~0.031 2~~ | ~~0.018 7~~ | ~~0.002 4~~ | ~~0.000 3~~ | ~~31.2~~ | ~~18.4~~ | ~~15.4~~ | ~~2.0~~ | | |
| 26 | 9.1 | 1 334 | 1 422 | 0.94 | 0.058 8 | 0.014 0 | 0.010 3 | 0.001 7 | 0.001 7 | 0.000 1 | 10.4 | 1.7 | 10.8 | 0.6 | | |
| ~~27~~ | ~~6.27~~ | ~~900~~ | ~~612~~ | ~~1.47~~ | ~~0.066 0~~ | ~~0.025 6~~ | ~~0.018 3~~ | ~~0.008 5~~ | ~~0.002 1~~ | ~~0.000 2~~ | ~~18.4~~ | ~~8.4~~ | ~~13.4~~ | ~~1.1~~ | | |
| ~~28~~ | ~~3.58~~ | ~~573~~ | ~~588~~ | ~~0.97~~ | ~~0.118 2~~ | ~~0.038 2~~ | ~~0.017 3~~ | ~~0.007 1~~ | ~~0.001 6~~ | ~~0.000 1~~ | ~~17.5~~ | ~~7.1~~ | ~~10.3~~ | ~~0.9~~ | | |
| 29 | 1.34 | 298 | 263 | 1.14 | 0.028 9 | 0.017 5 | 0.010 0 | 0.002 4 | 0.001 7 | 0.000 2 | 10.1 | 2.4 | 10.8 | 1.4 | | |
| ~~30~~ | ~~12.3~~ | ~~1178~~ | ~~996~~ | ~~1.18~~ | ~~0.150 3~~ | ~~0.036 9~~ | ~~0.033 5~~ | ~~0.007 1~~ | ~~0.001 8~~ | ~~0.000 1~~ | ~~33.4~~ | ~~6.9~~ | ~~11.6~~ | ~~0.8~~ | | |

附表2查孜中新世正长岩的主量(%)、微量和稀土元素(10-6)含量

Table 2 major element, trace and rare earth element concentrations of the Miocene syenite in Chazi area

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 石英角闪正长岩, SS01 | | | | | | 斑状石英正长岩, AMX02 | | | | | | |
| -H1 | -H2 | -H3 | -H4 | -H5 | -H6 | -H1 | -H2 | | -H3 | | -H4 | | |
| SiO2 | 58.96 | 58.96 | 58.93 | 58.78 | 59.54 | 59.24 | 66.46 | 66.35 | | 66.08 | | 66.16 | | |
| TiO2 | 0.91 | 0.83 | 0.83 | 0.84 | 0.75 | 0.86 | 0.65 | 0.68 | | 0.70 | | 0.65 | | |
| Al2O3 | 14.55 | 14.97 | 14.71 | 14.26 | 14.20 | 14.62 | 14.45 | 14.26 | | 14.29 | | 14.42 | | |
| Fe2O3 | 2.66 | 2.77 | 2.68 | 2.9 | 2.79 | 2.7 | 2.01 | 1.95 | | 2.03 | | 1.75 | | |
| FeO | 3.12 | 3.19 | 3.05 | 3.29 | 2.74 | 2.99 | 1.14 | 1.32 | | 1.36 | | 1.46 | | |
| MnO | 0.12 | 0.13 | 0.12 | 0.12 | 0.11 | 0.12 | 0.05 | 0.06 | | 0.06 | | 0.06 | | |
| MgO | 2.92 | 2.84 | 2.97 | 2.92 | 2.77 | 2.73 | 1.44 | 1.53 | | 1.51 | | 1.44 | | |
| CaO | 4.69 | 4.17 | 4.58 | 4.71 | 4.94 | 4.5 | 2.20 | 2.39 | | 2.58 | | 2.49 | | |
| Na2O | 3.22 | 3.43 | 3.39 | 3.35 | 3.38 | 3.47 | 3.62 | 3.59 | | 3.57 | | 3.62 | | |
| K2O | 7.39 | 7.34 | 7.25 | 7.26 | 7.2 | 7.23 | 6.93 | 6.86 | | 6.75 | | 6.84 | | |
| P2O5 | 0.62 | 0.57 | 0.63 | 0.65 | 0.63 | 0.61 | 0.33 | 0.34 | | 0.35 | | 0.32 | | |
| LOI | 0.19 | 0.16 | 0.21 | 0.21 | 0.28 | 0.28 | 0.38 | 0.32 | | 0.35 | | 0.37 | | |
| Total | 99.35 | 99.36 | 99.35 | 99.29 | 99.33 | 99.35 | 99.66 | 99.65 | | 99.63 | | 99.58 | | |
| FeOT | 5.51 | 5.68 | 5.46 | 5.90 | 5.25 | 5.42 | 2.95 | 3.07 | | 3.19 | | 3.03 | | |
| K2O+Na2O | 10.61 | 10.77 | 10.64 | 10.61 | 10.58 | 10.70 | 10.55 | 10.45 | | 10.32 | | 10.46 | | |
| K2O/Na2O | 2.30 | 2.14 | 2.14 | 2.17 | 2.13 | 2.08 | 1.91 | 1.91 | | 1.89 | | 1.89 | | |
| Mg# | 48.56 | 47.11 | 49.22 | 46.87 | 48.46 | 47.31 | 46.54 | 47.01 | | 45.79 | | 45.82 | | |
| δ | 7.05 | 7.27 | 7.11 | 7.13 | 6.77 | 7.05 | 4.74 | 4.68 | | 4.61 | | 4.72 | | |
| A/CNK | 0.67 | 0.71 | 0.68 | 0.65 | 0.64 | 0.67 | 0.83 | 0.81 | | 0.80 | | 0.81 | | |
| A/NK | 1.09 | 1.10 | 1.10 | 1.07 | 1.06 | 1.08 | 1.07 | 1.07 | | 1.08 | | 1.08 | | |
| Sc | 10.1 | 8.55 | 10.2 | 10.8 | 10.5 | 9.71 | 3.32 | 3.44 | | 4.61 | | 4.21 | | |
| V | 86.4 | 80.2 | 89.9 | 88.4 | 81.8 | 83.8 | 42.8 | 45.7 | | 46.8 | | 43.4 | | |
| Cr | 64.6 | 61.1 | 58.3 | 52.7 | 34.2 | 23.7 | 22.7 | 25.2 | | 25.3 | | 25.4 | | |
| Co | 14.4 | 12.5 | 13.9 | 12.7 | 12.8 | 12.9 | 8.19 | 8.71 | | 8.47 | | 7.68 | | |
| Ni | 46.6 | 40.1 | 43.1 | 38 | 36.2 | 34.2 | 20.3 | 20.8 | | 19.2 | | 18.9 | | |
| Cu | 11.7 | 11 | 15.4 | 18.4 | 20 | 20 | 104 | 87.8 | | 38.2 | | 30.3 | | |
| Zn | 92.3 | 67.1 | 304 | 305 | 85.6 | 80.7 | 99.6 | 123 | | 92.9 | | 88.7 | | |
| Rb | 587 | 495 | 534 | 548 | 544 | 540 | 406 | 412 | | 408 | | 406 | | |
| Sr | 1 240 | 1 170 | 1 290 | 1 180 | 1 150 | 1 140 | 617 | 527 | | 729 | | 733 | | |
| Y | 37.8 | 33.7 | 38.9 | 38.4 | 39.6 | 38.4 | 18.2 | 16.7 | | 22.7 | | 21.6 | | |
| Zr | 77 | 105 | 98 | 104 | 144 | 81.1 | 237 | 215 | | 233 | | 232 | | |
| Nb | 34.9 | 30.3 | 30.4 | 29 | 27.7 | 4.83 | 36.6 | 17 | | 38.1 | | 35.6 | | |
| Ba | 2 570 | 2 240 | 2 570 | 2 660 | 2 540 | 2 250 | 1 360 | 1 340 | | 1 330 | | 1 320 | | |
| La | 169 | 126 | 157 | 163 | 158 | 161 | 96.8 | 92.3 | | 126 | | 124 | | |
| Ce | 326 | 264 | 309 | 308 | 306 | 309 | 199 | 213 | | 234 | | 228 | | |
| Pr | 40.8 | 32.4 | 39.2 | 38.7 | 38.5 | 38.7 | 20.6 | 19.2 | | 25.5 | | 26.2 | | |
| Nd | 154 | 124 | 150 | 147 | 147 | 147 | 80.6 | 74.6 | | 105 | | 103 | | |
| Sm | 25.6 | 21.2 | 25.1 | 24.8 | 24.8 | 24.5 | 12.3 | 11.3 | | 15.9 | | 15.5 | | |
| Eu | 4.28 | 3.71 | 4.3 | 4.39 | 4.28 | 4.13 | 1.82 | 1.64 | | 2.28 | | 2.18 | | |
| Gd | 13.6 | 11.6 | 13.7 | 13.6 | 13.4 | 13.3 | 7.64 | 7.35 | | 9.74 | | 9.08 | | |
| Tb | 1.82 | 1.58 | 1.84 | 1.82 | 1.82 | 1.78 | 1.07 | 0.98 | | 1.36 | | 1.29 | | |
| Dy | 8.22 | 7.33 | 8.47 | 8.32 | 8.48 | 8.3 | 4.29 | 3.88 | | 5.41 | | 5.25 | | |
| Ho | 1.28 | 1.14 | 1.31 | 1.29 | 1.35 | 1.29 | 0.59 | 0.54 | | 0.76 | | 0.72 | | |
| Er | 3.26 | 2.88 | 3.34 | 3.25 | 3.42 | 3.30 | 1.66 | 1.51 | | 2.10 | | 2.00 | | |
| Tm | 0.41 | 0.37 | 0.42 | 0.42 | 0.44 | 0.42 | 0.18 | 0.16 | | 0.22 | | 0.21 | | |
| Yb | 2.37 | 2.07 | 2.45 | 2.42 | 2.58 | 2.43 | 1.23 | 1.14 | | 1.48 | | 1.42 | | |
| Lu | 0.35 | 0.3 | 0.36 | 0.36 | 0.38 | 0.36 | 0.19 | 0.17 | | 0.24 | | 0.23 | | |
| Hf | 3.97 | 4.58 | 4.95 | 4.85 | 6.3 | 3.1 | 7.05 | 6.74 | | 7.42 | | 7.44 | | |
| Ta | 1.75 | 1.52 | 1.39 | 1.17 | 1.38 | 0.39 | 1.99 | 0.33 | | 2.22 | | 2.08 | | |
| Pb | 106 | 78.7 | 250 | 115 | 102 | 83.4 | 80.4 | 94.6 | | 85.6 | | 81.4 | | |
| Th | 180 | 100 | 122 | 151 | 159 | 151 | 132 | 138 | | 212 | | 205 | | |
| U | 30.1 | 15.3 | 21.7 | 23.7 | 26.3 | 25.5 | 23.9 | 32.2 | | 32.9 | | 32.6 | | |
| ΣREE | 750.99 | 598.58 | 716.49 | 717.37 | 710.45 | 715.51 | 427.97 | | 427.77 | | 529.99 | | 519.08 | | |
| LREE/HREE | 33.15 | 29.89 | 30.86 | 31.21 | 30.23 | 31.51 | 37.80 | | 41.69 | | 37.27 | | 38.03 | | |
| (La/Yb)N | 50.16 | 42.82 | 45.07 | 47.38 | 43.08 | 46.60 | 55.36 | | 56.95 | | 59.88 | | 61.42 | | |
| (La/Sm)N | 4.03 | 3.63 | 3.82 | 4.01 | 3.89 | 4.01 | 4.80 | | 4.98 | | 4.84 | | 4.88 | | |
| (Gd/Yb)N | 4.79 | 4.67 | 4.66 | 4.69 | 4.33 | 4.57 | 5.18 | | 5.38 | | 5.49 | | 5.33 | | |
| δEu | 0.71 | 0.73 | 0.72 | 0.74 | 0.73 | 0.71 | 0.58 | | 0.56 | | 0.57 | | 0.57 | | |
| Sr/Y | 32.80 | 34.72 | 33.16 | 30.73 | 29.04 | 29.69 | 33.90 | | 31.56 | | 32.11 | | 33.94 | | |
| Y/Yb | 15.95 | 16.28 | 15.88 | 15.87 | 15.35 | 15.80 | 14.80 | | 14.65 | | 15.34 | | 15.21 | | |
| Dy/Yb | 3.47 | 3.54 | 3.46 | 3.44 | 3.29 | 3.42 | 3.49 | | 3.40 | | 3.66 | | 3.70 | | |
| La/Yb | 71.3 | 60.9 | 64.1 | 67.4 | 61.2 | 66.3 | 78.7 | | 81.0 | | 85.1 | | 87.3 | | |
| Nb/U | 1.16 | 1.98 | 1.40 | 1.22 | 1.05 | 0.19 | 1.53 | | 0.53 | | 1.16 | | 1.09 | | |
| Ta/U | 0.06 | 0.10 | 0.06 | 0.05 | 0.05 | 0.02 | 0.08 | | 0.01 | | 0.07 | | 0.06 | | |
| Ce/Pb | 3.08 | 3.35 | 1.24 | 2.68 | 3.00 | 3.71 | 3.92 | | 2.48 | | 2.25 | | 2.73 | | |

Mg#=100×(MgO/40.304)/(MgO/40.304+2×Fe2O3/159.691+FeO/71.846); 里特曼指数*δ*=(K2O+Na2O)2/(SiO2-43); A/CNK=molar[Al2O3/(CaO+Na2O+K2O) ]; A/NK= molar[Al2O3/(Na2O+K2O) ]; *δ*Eu=EuN/.