附表

表1 公婆泉岩浆弧早期俯冲侵入岩主量元素（%）、微量元素（×10-6）分析结果

| 样号 | YQ2634-1 | YQ2664-1 | PM01YQ6 |  | YQ2571-1 | TL06YQ3 |  | YQ6361-1 | YQ6741-1 | YQ6392-1 |  | YQD258 | YQD260 | YQD39 |  | YQD259 | YQD38 | YQ42 | YQ06 |  | YQD3890 | YQD3891 | YQ38 | YQ43 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 西林陶乐 | | |  | 西林陶乐 | |  | 阿民乌素 | | |  | 小黄山 | | |  | 小黄山 | | | |  | 小黄山 | | |  |
| 岩石名称 | 变质二长辉长岩 | | |  | 二长闪长岩 | |  | 变质辉长岩 | | |  | 变质辉长岩 | | |  | 橄榄岩 | | | |  | 辉石闪长岩 | | | |
| SiO2 | 51.08 | 50.48 | 48.98 |  | 55.62 | 59.46 |  | 47.58 | 50.35 | 48.72 |  | 50.21 | 50.18 | 48.41 |  | 42.08 | 40.85 | 36.85 | 40.36 |  | 53.61 | 54.38 | 52.69 | 54.01 |
| Al2O3 | 9.1 | 12.14 | 12.56 |  | 16.19 | 16.25 |  | 17.33 | 16.02 | 17.78 |  | 19.1 | 16.86 | 17.08 |  | 1.24 | 1.01 | 2.9 | 0.85 |  | 17.45 | 17.64 | 17.39 | 17.49 |
| Fe2O3 | 3.04 | 2.87 | 4.67 |  | 1.84 | 1.88 |  | 1.21 | 1.26 | 1.28 |  | 0.27 | 0.64 | 1.11 |  | 2.2 | 3.96 | 10.13 | 5.1 |  | 3.49 | 2.75 | 3.85 | 3.41 |
| FeO | 5.28 | 6.78 | 6.71 |  | 5.63 | 4.91 |  | 3.98 | 3.77 | 4.14 |  | 2.32 | 2.37 | 2.13 |  | 2.08 | 2.16 | 5.72 | 0.46 |  | 5.2 | 5.53 | 5.3 | 5.1 |
| CaO | 14.23 | 10.33 | 10.74 |  | 6.58 | 6.5 |  | 13.68 | 14.67 | 13.4 |  | 14.62 | 14.86 | 13.83 |  | 0.12 | 0.14 | 0.75 | 0.18 |  | 7.89 | 7.7 | 7.64 | 8.11 |
| MgO | 10.74 | 9.59 | 7.84 |  | 4.44 | 2.84 |  | 10.82 | 10.09 | 10.54 |  | 9.33 | 11.06 | 11.38 |  | 39.51 | 39.08 | 31.1 | 39.32 |  | 4.2 | 4.21 | 4.72 | 4.07 |
| K2O | 2.79 | 3.26 | 2.1 |  | 2.76 | 1.96 |  | 0.24 | 0.14 | 0.47 |  | 0.13 | 0.22 | 0.99 |  | 0.01 | 0.01 | 0.02 | 0.01 |  | 1.43 | 1.01 | 1.25 | 0.93 |
| Na2O | 0.92 | 1.25 | 2.17 |  | 2.42 | 2.11 |  | 1.19 | 1.32 | 1.26 |  | 1.87 | 1.44 | 2.37 |  | 0.03 | 0.03 | 0.21 | 0.01 |  | 3.09 | 3.18 | 3.32 | 3.4 |
| TiO2 | 0.7 | 0.76 | 1.07 |  | 0.93 | 0.85 |  | 0.2 | 0.24 | 0.19 |  | 0.04 | 0.09 | 0.08 |  | 0.01 | 0.06 | 0.47 | 0.01 |  | 0.82 | 0.82 | 0.99 | 0.83 |
| P2O5 | 0.13 | 0.26 | 0.43 |  | 0.23 | 0.18 |  | 0.012 | 0.018 | 0.013 |  | 0.008 | 0.007 | 0.006 |  | 0.01 | 0.01 | 0.04 | 0.01 |  | 0.205 | 0.191 | 0.311 | 0.212 |
| MnO | 0.16 | 0.18 | 0.24 |  | 0.13 | 0.101 |  | 0.12 | 0.13 | 0.12 |  | 0.09 | 0.077 | 0.083 |  | 0.03 | 0.06 | 0.11 | 0.06 |  | 0.154 | 0.155 | 0.171 | 0.161 |
| 灼失 | 1.64 | 1.92 | 2.02 |  | 3.04 | 2.75 |  | 3.43 | 1.89 | 1.97 |  | 1.9 | 2.06 | 2.38 |  | 12.23 | 11.49 | 11.25 | 13.16 |  | 2.28 | 2.27 | 2.22 | 2.06 |
| 总量 | 99.81 | 99.82 | 99.53 |  | 99.8 | 99.79 |  | 99.79 | 99.9 | 99.87 |  | 99.89 | 99.88 | 99.86 |  | 99.55 | 98.87 | 99.81 | 99.51 |  | 99.82 | 99.83 | 98.87 | 99.79 |
| Cr | 285.76 | 288.67 | 375.92 |  | 93.67 | 32.77 |  | 1162.7 | 349.7 | 311 |  | 393.7 | 364.1 | 439.8 |  | 1593 | 3850 | 2663 | 2768 |  | 19.3 | 21.3 | 28.2 | 20.2 |
| Ni | 72.15 | 126.04 | 81.79 |  | 20.46 | 7.36 |  | 199.6 | 133.1 | 270 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rb | 141.92 | 150.22 | 33.81 |  | 106.24 | 74.83 |  | 11.12 | 5.18 | 24.8 |  | 4.6 | 9.1 | 31.6 |  | 0.5 | 0.8 | 0.7 | 1 |  | 33.4 | 23.7 | 31.1 | 16.4 |
| Cs | 2.15 | 2.43 | 1 |  | 5.2 | 3.03 |  | 1.44 | 1.41 | 3.66 |  | 0.34 | 0.37 | 4.2 |  | 0.04 | 0.05 | 0.38 | 0.1 |  | 1.21 | 1.84 | 1.32 | 0.5 |
| Sr | 220.72 | 229.2 | 616.4 |  | 378.96 | 367.9 |  | 356.8 | 175.2 | 198 |  | 248.6 | 261.9 | 278.5 |  | 59.9 | 10.4 | 14 | 12.1 |  | 669.2 | 549 | 527.8 | 558.6 |
| Ba | 753 | 625.07 | 1918.19 |  | 758.25 | 899.28 |  | 27.22 | 27.33 | 53.3 |  | 185 | 251.5 | 193.1 |  | 129.8 | 63.8 | 8.2 | 6.5 |  | 923.7 | 1015 | 538.3 | 412.7 |
| V | 224.78 | 241.47 | 234.94 |  | 142.2 | 146.61 |  | 104.7 | 144.15 | 114 |  | 121.6 | 159.3 | 125.7 |  | 50.2 | 77.9 | 68.5 | 50.23 |  | 231.1 | 243.3 | 220.9 | 229.6 |
| Nb | 4.03 | 7.32 | 18.56 |  | 11.16 | 15.65 |  | 0.36 | 0.43 | 1.79 |  | 0.34 | 0.54 | 0.36 |  | 0.53 | 2.36 | 2.23 | 0.36 |  | 8.88 | 10.6 | 10.06 | 8.26 |
| Ta | 0.87 | 0.5 | 1.32 |  | 1.22 | 0.85 |  | 0.54 | 0.31 | 0.04 |  | 0.31 | 0.23 | 0.17 |  | 0.23 | 0.3 | 0.13 | 0.06 |  | 0.72 | 0.72 | 0.74 | 0.42 |
| Zr | 62.93 | 87.11 | 127.94 |  | 155.89 | 199.99 |  | 6.45 | 6.35 | 39.3 |  | 19.8 | 21.1 | 15.7 |  | 5.8 | 13.4 | 29.8 | 15.1 |  | 119.7 | 114 | 120.9 | 153 |
| Hf | 2.79 | 2.84 | 6.4 |  | 8.5 | 9.12 |  | 0.25 | 0.29 | 0.97 |  | 0.75 | 0.9 | 0.69 |  | 0.18 | 0.34 | 0.75 | 0.47 |  | 6.74 | 7.64 | 6.22 | 9.23 |
| Ga | 11.23 | 14.1 | 13.82 |  | 18.67 | 22.72 |  | 11.37 | 12.98 | 12.8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pb | 17.53 | 7.53 | 10.69 |  | 18.8 | 13.82 |  | 2.78 | 5.6 | 4.78 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| U | 2.93 | 1.92 | 1.72 |  | 1.49 | 1.02 |  | 0.35 | 0.09 | 0.09 |  | 0.05 | 0.11 | 0.06 |  | 3.73 | 0.16 | 0.72 | 0.04 |  | 1.45 | 0.74 | 1.75 | 1.01 |
| Th | 6.52 | 4.9 | 5.13 |  | 9.47 | 10.11 |  | 0.4 | 0.92 | 0.27 |  | 0.41 | 0.35 | 0.24 |  | 0.27 | 0.39 | 0.24 | 0.89 |  | 6.41 | 4.7 | 6.72 | 4.11 |
| La | 17.57 | 19.79 | 19.33 |  | 27.34 | 31.49 |  | 0.48 | 0.69 | 1.21 |  | 0.21 | 0.12 | 0.11 |  | 0.15 | 0.53 | 1.86 | 0.43 |  | 23.77 | 20.42 | 22.99 | 16.65 |
| Ce | 41.39 | 47.82 | 41.11 |  | 65.6 | 63.23 |  | 1.05 | 1.62 | 1.89 |  | 0.42 | 0.29 | 0.29 |  | 0.3 | 1.08 | 4.3 | 0.82 |  | 50.53 | 45.21 | 50.9 | 38.3 |
| Pr | 5.78 | 7.11 | 5.73 |  | 8.13 | 7.36 |  | 0.19 | 0.26 | 0.29 |  | 0.05 | 0.05 | 0.05 |  | 0.03 | 0.14 | 0.6 | 0.08 |  | 6.34 | 5.72 | 6.55 | 5.53 |
| Nd | 25.21 | 29.61 | 22.43 |  | 31.72 | 27.57 |  | 0.95 | 1.34 | 1.37 |  | 0.25 | 0.37 | 0.3 |  | 0.14 | 0.56 | 2.87 | 0.24 |  | 25.27 | 22.67 | 26.12 | 23.13 |
| Sm | 5.62 | 6.62 | 4.28 |  | 6.12 | 4.8 |  | 0.36 | 0.43 | 0.48 |  | 0.09 | 0.19 | 0.14 |  | 0.04 | 0.14 | 0.83 | 0.05 |  | 4.9 | 4.43 | 5.11 | 4.87 |
| Eu | 1.15 | 1.57 | 1.22 |  | 1.53 | 1.09 |  | 0.23 | 0.25 | 0.28 |  | 0.16 | 0.15 | 0.12 |  | 0.01 | 0.03 | 0.22 | 0.01 |  | 1.41 | 1.25 | 1.46 | 1.27 |
| Gd | 4.19 | 5.06 | 3.61 |  | 5.25 | 3.79 |  | 0.31 | 0.39 | 0.46 |  | 0.16 | 0.32 | 0.23 |  | 0.03 | 0.13 | 0.91 | 0.05 |  | 4.19 | 3.89 | 4.53 | 4.12 |
| Tb | 0.76 | 0.85 | 0.63 |  | 0.94 | 0.67 |  | 0.1 | 0.12 | 0.13 |  | 0.04 | 0.07 | 0.05 |  | 0.01 | 0.02 | 0.19 | 0.01 |  | 0.67 | 0.62 | 0.67 | 0.7 |
| Dy | 3.99 | 4.29 | 3.59 |  | 5.51 | 3.49 |  | 0.69 | 0.87 | 0.72 |  | 0.28 | 0.56 | 0.4 |  | 0.05 | 0.18 | 1.14 | 0.06 |  | 3.96 | 3.8 | 3.72 | 4.19 |
| Ho | 0.73 | 0.81 | 0.68 |  | 1.11 | 0.63 |  | 0.15 | 0.19 | 0.16 |  | 0.06 | 0.12 | 0.08 |  | 0.01 | 0.03 | 0.21 | 0.01 |  | 0.78 | 0.76 | 0.66 | 0.81 |
| Er | 1.87 | 2.21 | 1.97 |  | 3.13 | 1.97 |  | 0.37 | 0.49 | 0.42 |  | 0.17 | 0.31 | 0.22 |  | 0.05 | 0.12 | 0.54 | 0.05 |  | 2.17 | 2.11 | 2 | 2.37 |
| Tm | 0.3 | 0.36 | 0.26 |  | 0.54 | 0.31 |  | 0.07 | 0.09 | 0.1 |  | 0.02 | 0.05 | 0.04 |  | 0.01 | 0.02 | 0.08 | 0.01 |  | 0.38 | 0.38 | 0.32 | 0.37 |
| Yb | 1.77 | 2.13 | 1.86 |  | 3.36 | 1.98 |  | 0.42 | 0.57 | 0.52 |  | 0.14 | 0.28 | 0.22 |  | 0.05 | 0.15 | 0.55 | 0.15 |  | 2.31 | 2.23 | 2.08 | 2.65 |
| Lu | 0.28 | 0.33 | 0.32 |  | 0.44 | 0.28 |  | 0.06 | 0.07 | 0.074 |  | 0.02 | 0.04 | 0.03 |  | 0.01 | 0.03 | 0.09 | 0.02 |  | 0.34 | 0.32 | 0.3 | 0.38 |
| Y | 18.42 | 21.77 | 17.8 |  | 29.9 | 19.39 |  | 3.56 | 4.74 | 4.86 |  | 1.51 | 2.89 | 2.09 |  | 0.28 | 0.97 | 5.12 | 0.48 |  | 20.68 | 20.14 | 18.42 | 21.17 |

表2 公婆泉岩浆弧TTG主量元素（%）、微量元素（×10-6）分析结果

| 样号 | TL01YQ1 | TL02YQ8 | TL07YQ1 | PM01YQ4 | PM02-YQ7 | PM30YQ1 |  | TL02YQ5 | TL02YQ7 | PM01YQ3 |  | PM23YQ3 | TL06YQ2 | TL16YQ1 | TL30YQ1 | PM01YQ1 | PM02-YQ10 | PM02-YQ16 | PM04YQ3 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 西林陶乐 | | | | | |  | 西林陶乐 | | |  | 西林陶乐 | | | | | | | |
| 岩石名称 | 片麻状石英闪长岩 | | | | | |  | 片麻状英云闪长岩 | | |  | 片麻状花岗闪长岩 | | | | | | | |
| SiO2 | 60.82 | 64.24 | 59.8 | 59.76 | 62.05 | 59.66 |  | 68.64 | 67.38 | 64.87 |  | 69.2 | 72.91 | 71.38 | 69.61 | 68.52 | 69.77 | 69.81 | 70.7 |
| Al2O3 | 15.77 | 15.71 | 15.81 | 16.88 | 17.17 | 15.75 |  | 14.91 | 17.21 | 15.95 |  | 16.17 | 14.46 | 15.72 | 15.29 | 16.23 | 16.58 | 15.89 | 14.41 |
| Fe2O3 | 2.71 | 2.77 | 1.71 | 3.06 | 2.2 | 1.96 |  | 1.1 | 0.74 | 1.65 |  | 0.99 | 0.44 | 0.3 | 1.07 | 1.09 | 0.62 | 0.71 | 0.52 |
| FeO | 3.42 | 2.66 | 5.08 | 3.34 | 2.69 | 4.59 |  | 1.51 | 1.46 | 2.01 |  | 1.53 | 1.08 | 0.93 | 2 | 1.36 | 1.01 | 1.52 | 1.82 |
| CaO | 5.92 | 4.91 | 6.5 | 6.52 | 4.84 | 6.61 |  | 2.68 | 3.52 | 5.04 |  | 3.59 | 2.38 | 2.81 | 2.74 | 3.39 | 2.74 | 2.91 | 2.25 |
| MgO | 2.44 | 1.87 | 3.29 | 2.9 | 1.83 | 3.43 |  | 0.89 | 1.04 | 1.92 |  | 0.94 | 0.54 | 0.68 | 0.7 | 1.11 | 0.76 | 0.73 | 0.7 |
| K2O | 2.85 | 1.54 | 2.72 | 1.06 | 2.79 | 2.82 |  | 4.72 | 1.35 | 1.95 |  | 2.12 | 3.68 | 1.63 | 4.18 | 2.12 | 1.43 | 2.28 | 4.44 |
| Na2O | 2.27 | 3.74 | 1.94 | 3.74 | 3.57 | 2 |  | 2.97 | 5.21 | 4.27 |  | 3.79 | 3.18 | 5.06 | 2.78 | 4.67 | 5.48 | 4.63 | 2.77 |
| TiO2 | 0.82 | 0.64 | 0.8 | 0.79 | 0.64 | 0.8 |  | 0.36 | 0.37 | 0.43 |  | 0.37 | 0.22 | 0.24 | 0.28 | 0.39 | 0.26 | 0.29 | 0.41 |
| P2O5 | 0.252 | 0.234 | 0.167 | 0.18 | 0.28 | 0.18 |  | 0.167 | 0.171 | 0.12 |  | 0.13 | 0.046 | 0.076 | 0.109 | 0.11 | 0.089 | 0.1 | 0.086 |
| MnO | 0.101 | 0.056 | 0.115 | 0.14 | 0.069 | 0.11 |  | 0.045 | 0.038 | 0.087 |  | 0.046 | 0.043 | 0.013 | 0.027 | 0.05 | 0.018 | 0.05 | 0.031 |
| 灼失 | 2.32 | 1.36 | 1.89 | 1.48 | 1.52 | 1.93 |  | 1.65 | 1.34 | 1.53 |  | 0.97 | 0.83 | 0.98 | 0.95 | 0.8 | 1.06 | 0.84 | 1.58 |
| 总量 | 99.7 | 99.73 | 99.82 | 99.85 | 99.65 | 99.84 |  | 99.64 | 99.83 | 99.83 |  | 99.85 | 99.79 | 99.81 | 99.72 | 99.83 | 99.82 | 99.75 | 99.71 |
| Cr | 13.51 | 15.59 | 53.9 | 13.4 | 12.96 | 40.43 |  | 6.89 | 4.98 | 29.19 |  | 4.31 | 5.32 | 12.77 | 4.67 | 8.45 | 4.06 | 2.95 | 4.03 |
| Ni | 5.81 | 10.79 | 7.72 | 6.89 | 5.81 | 7.45 |  | 2.1 | 1.57 | 12.44 |  | 1.23 | 0.82 | 3.27 | 0.97 | 2.72 | 1.67 | 1.79 | 1.06 |
| Rb | 77.96 | 61.11 | 123.6 | 29.93 | 84.54 | 72.04 |  | 124.4 | 26.26 | 40.43 |  | 52.08 | 141.2 | 14.02 | 119 | 40.19 | 19.46 | 38.32 |  |
| Cs | 4.06 | 2.95 | 6.3 | 1.62 | 3.6 | 6.54 |  | 3.75 | 2.61 | 1.96 |  | 2.3 | 2.57 | 0.79 | 2.64 | 1.22 | 2.07 | 1.75 | 110.48 |
| Sr | 587.2 | 897.2 | 309.2 | 414.59 | 733.31 | 287.68 |  | 538.1 | 507.3 | 461.75 |  | 459.52 | 457.1 | 641.2 | 430.5 | 550.28 | 718.52 | 410.13 | 3.51 |
| Ba | 1262.16 | 1205.28 | 851.76 | 336.37 | 1531.79 | 704.48 |  | 1713.6 | 461.23 | 492.08 |  | 655.73 | 1133.28 | 633.96 | 1753.92 | 559.24 | 380.87 | 643.07 | 414.41 |
| V | 109.26 | 96.21 | 146.52 | 112.96 | 74.48 | 113.4 |  | 39.2 | 30.1 | 53.49 |  | 23.85 | 27.78 | 22.73 | 26.83 | 24.52 | 11.25 | 4.36 | 1546.74 |
| Nb | 16.04 | 10.62 | 13.38 | 9.1 | 8.59 | 10.47 |  | 7.59 | 5.97 | 10.4 |  | 5.16 | 13.42 | 1.52 | 15.6 | 4.71 | 2.22 | 4.84 | 10.83 |
| Ta | 1.16 | 0.56 | 0.83 | 0.7 | 0.52 | 1.63 |  | 0.52 | 0.45 | 0.96 |  | 1.39 | 0.79 | 0.17 | 0.81 | 0.47 | 0.21 | 0.37 |  |
| Zr | 205.86 | 156.25 | 184.02 | 173.37 | 183.83 | 193.7 |  | 108.98 | 188.21 | 135.65 |  | 172.08 | 121.84 | 113.14 | 164.15 | 113.72 | 129.75 | 144.56 | 7.02 |
| Hf | 11.45 | 4.89 | 9.28 | 8.32 | 8.53 | 8.47 |  | 3.8 | 5.82 | 5.7 |  | 4.51 | 4.1 | 3.59 | 5.01 | 6.2 | 3.78 | 4.13 | 0.31 |
| Ga | 18.79 | 20.59 | 18.79 | 16.49 | 18.62 | 17.88 |  | 15.69 | 19.11 | 15.66 |  | 17.82 | 18.48 | 20.83 | 14.36 | 16.15 | 15.18 | 14.7 | 307.1 |
| Pb | 13.31 | 11.12 | 12.17 | 7.3 | 8.74 | 9.64 |  | 18.91 | 20.27 | 7.08 |  | 11.98 | 23.31 | 15.85 | 14.68 | 12.79 | 9.16 | 11.63 | 8.5 |
| U | 2.57 | 1.96 | 2.27 | 1.66 | 0.85 | 2.27 |  | 1.38 | 0.59 | 1.63 |  | 0.55 | 1.37 | 0.37 | 1.39 | 0.83 | 0.58 | 0.33 | 16.18 |
| Th | 2.78 | 4.74 | 12.8 | 5.96 | 4.92 | 8.38 |  | 6.22 | 1.82 | 6.36 |  | 3.32 | 9.54 | 2.91 | 14.78 | 5.31 | 1.91 | 3.32 | 17.28 |
| La | 11.36 | 21.17 | 34.76 | 17.89 | 32.19 | 29.05 |  | 16.48 | 7.9 | 14.33 |  | 17.7 | 17.66 | 19.31 | 66.19 | 21.85 | 13.67 | 14.11 | 0.87 |
| Ce | 39.49 | 43.86 | 72.68 | 36.07 | 67.19 | 67.43 |  | 39.4 | 15.7 | 27.94 |  | 33 | 35.18 | 35.77 | 144.4 | 46.63 | 26.06 | 26.64 | 13.25 |
| Pr | 6.36 | 5.29 | 8.14 | 4.87 | 8.59 | 8.53 |  | 4.78 | 1.93 | 3.54 |  | 3.78 | 3.5 | 3.96 | 15.65 | 6 | 3.44 | 3.29 | 61.13 |
| Nd | 29.07 | 21.16 | 30.44 | 19.16 | 31 | 34.16 |  | 17.44 | 7.52 | 12.45 |  | 13.4 | 12.29 | 14.26 | 53.49 | 21.87 | 12.38 | 11.32 | 127.47 |
| Sm | 6.03 | 4.02 | 5.15 | 3.75 | 4.91 | 6.42 |  | 2.91 | 1.74 | 2.22 |  | 2.04 | 1.94 | 1.97 | 7.14 | 3.64 | 2.02 | 1.84 | 16.01 |
| Eu | 1.65 | 1.33 | 1.32 | 1.18 | 1.32 | 1.28 |  | 0.81 | 0.8 | 0.69 |  | 0.93 | 0.72 | 0.78 | 1.92 | 1.09 | 0.8 | 0.79 | 53.56 |
| Gd | 4.68 | 3.03 | 4.35 | 3.25 | 4.33 | 5.78 |  | 2.34 | 1.65 | 1.97 |  | 2.05 | 1.58 | 1.41 | 5.27 | 3.37 | 1.8 | 1.75 | 6.75 |
| Tb | 0.9 | 0.53 | 0.75 | 0.56 | 0.61 | 0.98 |  | 0.38 | 0.37 | 0.32 |  | 0.3 | 0.27 | 0.17 | 0.67 | 0.51 | 0.23 | 0.28 | 1.66 |
| Dy | 4.96 | 2.66 | 4.07 | 3.53 | 2.87 | 5.46 |  | 1.89 | 2.31 | 1.8 |  | 1.51 | 1.41 | 0.65 | 2.68 | 2.53 | 1.09 | 1.65 | 7.29 |
| Ho | 0.91 | 0.46 | 0.81 | 0.72 | 0.5 | 1.07 |  | 0.34 | 0.42 | 0.36 |  | 0.3 | 0.26 | 0.1 | 0.47 | 0.44 | 0.19 | 0.3 | 0.66 |
| Er | 2.7 | 1.37 | 2.43 | 2.07 | 1.46 | 3.02 |  | 0.96 | 1.38 | 1.04 |  | 0.81 | 0.81 | 0.37 | 1.41 | 1.28 | 0.56 | 0.9 | 1.56 |
| Tm | 0.43 | 0.2 | 0.39 | 0.31 | 0.18 | 0.51 |  | 0.14 | 0.23 | 0.15 |  | 0.14 | 0.12 | 0.05 | 0.21 | 0.17 | 0.07 | 0.13 | 0.24 |
| Yb | 2.8 | 1.18 | 2.53 | 2.17 | 1.18 | 2.92 |  | 0.9 | 1.4 | 1.06 |  | 0.77 | 0.83 | 0.29 | 1.37 | 1.08 | 0.46 | 0.84 | 0.98 |
| Lu | 0.36 | 0.18 | 0.35 | 0.33 | 0.2 | 0.4 |  | 0.17 | 0.22 | 0.18 |  | 0.14 | 0.18 | 0.06 | 0.3 | 0.2 | 0.11 | 0.17 | 0.07 |
| Y | 27.84 | 13.31 | 23.99 | 19.21 | 13.73 | 29.66 |  | 9.93 | 14.05 | 9.76 |  | 8.83 | 8.18 | 3.2 | 14.8 | 12.18 | 5.42 | 8.85 | 0.53 |
| ∑REE | 139.54 | 119.73 | 192.17 | 115.06 | 170.25 | 196.65 |  | 98.84 | 57.62 | 77.81 |  | 85.65 | 84.94 | 82.34 | 315.96 | 122.83 | 68.29 | 72.85 | 0.19 |

续表1

| 样号 | P5YQ1 | P5YQ11 | P10YQ1 | P10YQ2 | P10YQ3 | P10YQ4 | P10YQ5 | P10YQ6 | D2285YQ1 |  | D2610YQ1 | D2610YQ2 | D2613YQ1 | D2621YQ1 | D2621YQ2 | D2659YQ2 | D8053YQ1 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 标山 | | | | | | | | |  | 标山 | | | | | | |
| 岩石名称 | 片麻状细中粒英云闪长岩 | | | | | | | | |  | 片麻状细中粒花岗闪长岩 | | | | | | |
| SiO2 | 56.84 | 57.42 | 58.91 | 57.55 | 57.93 | 57.5 | 58.53 | 57.79 | 60.15 |  | 63.22 | 67.69 | 70.52 | 67.01 | 67.68 | 70.88 | 69.59 |
| Al2O3 | 16.37 | 16.15 | 16.07 | 16.35 | 16.23 | 15.89 | 15.92 | 15.71 | 15.92 |  | 15.49 | 14.85 | 15.94 | 17.05 | 16.75 | 15.45 | 14.83 |
| Fe2O3 | 2.9 | 2.94 | 2.26 | 2.99 | 2.57 | 3.13 | 2.82 | 1.86 | 2.82 |  | 2.36 | 2.09 | 0 | 1.38 | 1.36 | 0.61 | 0.73 |
| FeO | 5.08 | 4.86 | 4.72 | 4.67 | 4.64 | 4.8 | 4.45 | 5.49 | 3.93 |  | 2.91 | 2.01 | 1.03 | 1.23 | 1.52 | 1.32 | 2.43 |
| CaO | 6.66 | 6.69 | 6.42 | 6.62 | 6.64 | 6.42 | 6.63 | 5.89 | 5.97 |  | 4.83 | 3.94 | 2.75 | 3.54 | 3.46 | 2.59 | 3.52 |
| MgO | 3.49 | 3.48 | 3.14 | 3.41 | 3.28 | 3.51 | 3.26 | 3.45 | 2.77 |  | 2.12 | 1.38 | 0.57 | 0.79 | 0.82 | 0.81 | 1.21 |
| K2O | 2.79 | 2.75 | 2.84 | 2.84 | 2.8 | 3 | 2.66 | 3.2 | 2.64 |  | 3.22 | 2.74 | 1.35 | 2.9 | 2.35 | 2.76 | 2.12 |
| Na2O | 2.21 | 1.96 | 2.25 | 2.13 | 2.12 | 1.97 | 2.01 | 2.22 | 2.35 |  | 3.36 | 3.5 | 5.93 | 4.24 | 4.44 | 4.21 | 3.28 |
| TiO2 | 1.11 | 1.09 | 1.03 | 1.07 | 1.03 | 1.15 | 1.08 | 1.12 | 0.96 |  | 0.82 | 0.51 | 0.25 | 0.34 | 0.33 | 0.29 | 0.48 |
| P2O5 | 0.34 | 0.33 | 0.31 | 0.34 | 0.32 | 0.33 | 0.31 | 0.33 | 0.29 |  | 0.27 | 0.18 | 0.06 | 0.11 | 0.12 | 0.07 | 0.12 |
| MnO | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 | 0.12 | 0.11 | 0.11 | 0.11 |  | 0.05 | 0.04 | 0.01 | 0.04 | 0.05 | 0.03 | 0.05 |
| 灼失 | 1.85 | 1.96 | 1.68 | 1.68 | 2.09 | 1.93 | 1.98 | 2.63 | 1.86 |  | 0.99 | 0.8 | 0.98 | 0.8 | 0.81 | 0.85 | 1.49 |
| 总量 | 99.76 | 99.75 | 99.74 | 99.76 | 99.76 | 99.75 | 99.76 | 99.8 | 99.77 |  | 99.64 | 99.73 | 99.39 | 99.43 | 99.69 | 99.87 | 99.85 |
| Rb | 99.87 | 112.63 | 97.15 | 107.95 | 102.18 | 136.66 | 91.77 | 154.96 | 108.78 |  | 97.61 | 81.53 | 14.7 | 96.03 | 61.57 | 78.94 | 64.52 |
| Sr | 475.9 | 511.4 | 517.8 | 528.8 | 511.2 | 533.6 | 452.9 | 510.3 | 567.4 |  | 575.7 | 581.4 | 656.9 | 885.5 | 907.3 | 413.1 | 502.5 |
| Ba | 915.24 | 1120.8 | 1028.28 | 1026 | 1041.84 | 1047 | 913.08 | 976.56 | 996.24 |  | 1789.2 | 1471.2 | 231.9 | 2877.6 | 1650 | 348.96 | 682.56 |
| Nb | 14.95 | 17.15 | 19.22 | 18.91 | 17.32 | 24.66 | 20.36 | 25.06 | 17.92 |  | 20.63 | 10.56 | 1.25 | 19.32 | 7.85 | 5.56 | 10.56 |
| Ta | 0.77 | 0.84 | 1.15 | 1.06 | 0.98 | 1.87 | 1.43 | 1.86 | 0.89 |  | 1.47 | 0.68 | 0.13 | 0.91 | 0.47 | 0.52 | 1.16 |
| Zr | 186.48 | 247.73 | 211.89 | 225.76 | 226.75 | 223.49 | 210.53 | 223.35 | 211.59 |  | 190.13 | 153.25 | 82.1 | 164.99 | 174.85 | 97.1 | 167.12 |
| Hf | 12.46 | 19.49 | 13.39 | 15.05 | 13.98 | 14.89 | 15.57 | 13.04 | 12.7 |  | 8.31 | 5.74 | 2.08 | 4.26 | 4.29 | 2.81 | 5.71 |
| U | 1.84 | 1.92 | 2.02 | 2.62 | 1.96 | 3.25 | 2.23 | 3.63 | 2.78 |  | 2.54 | 3.47 | 0.21 | 1.53 | 1.26 | 1.36 | 2.45 |
| Th | 20.42 | 5.77 | 12.89 | 12.08 | 4.86 | 24.52 | 3.97 | 21.72 | 7.06 |  | 7.98 | 31.97 | 2.64 | 9.08 | 6.69 | 7.2 | 15.41 |
| La | 110.5 | 28.13 | 43.9 | 48.73 | 25.24 | 80.84 | 22.78 | 71.4 | 30.35 |  | 32.4 | 62.08 | 15.95 | 29.25 | 30.75 | 18.76 | 39.16 |
| Ce | 192.19 | 68.11 | 99.96 | 99.17 | 66.75 | 166.46 | 64.35 | 141.5 | 72.77 |  | 87.18 | 94.19 | 29.34 | 57.25 | 56.15 | 36.31 | 74.33 |
| Pr | 20.07 | 9.31 | 12.46 | 12.2 | 9.21 | 19.43 | 9.71 | 16.63 | 9.46 |  | 11.87 | 8.84 | 3.36 | 6.57 | 5.65 | 4.17 | 8.44 |
| Nd | 66.5 | 37.86 | 48.31 | 46.56 | 39.23 | 70 | 41.93 | 60.1 | 38.49 |  | 46.78 | 28.71 | 14.92 | 23.19 | 18.72 | 15.06 | 30.33 |
| Sm | 9.86 | 7.88 | 9.19 | 8.05 | 8.28 | 11.63 | 9.36 | 10.37 | 7.42 |  | 8.87 | 4.39 | 2.43 | 4.43 | 2.81 | 2.82 | 5.28 |
| Eu | 2.09 | 1.86 | 2.08 | 1.84 | 1.86 | 2.53 | 2.27 | 2.33 | 1.76 |  | 2.13 | 1.04 | 0.78 | 1.18 | 0.93 | 0.67 | 0.98 |
| Gd | 8.68 | 6.28 | 7.27 | 6.6 | 6.2 | 9.27 | 6.98 | 8.39 | 6.12 |  | 6.78 | 3.96 | 1.21 | 3.42 | 2.46 | 2.35 | 4.08 |
| Tb | 1.16 | 0.98 | 1.11 | 0.97 | 1.05 | 1.39 | 1.21 | 1.3 | 0.98 |  | 1.01 | 0.46 | 0.16 | 0.47 | 0.31 | 0.3 | 0.56 |
| Dy | 5.72 | 5.3 | 6.12 | 5.39 | 5.73 | 7.29 | 6.58 | 6.66 | 5.5 |  | 5.34 | 2.36 | 0.65 | 2.52 | 1.37 | 1.58 | 3.08 |
| Ho | 1.06 | 1.03 | 1.17 | 1.03 | 1.08 | 1.34 | 1.25 | 1.27 | 1.05 |  | 1.03 | 0.42 | 0.11 | 0.47 | 0.27 | 0.26 | 0.57 |
| Er | 2.78 | 2.55 | 2.82 | 2.64 | 2.77 | 3.52 | 3.31 | 3.28 | 2.83 |  | 2.43 | 1.11 | 0.29 | 1.19 | 0.71 | 0.7 | 1.64 |
| Tm | 0.44 | 0.4 | 0.46 | 0.41 | 0.46 | 0.54 | 0.53 | 0.54 | 0.46 |  | 0.38 | 0.19 | 0.04 | 0.19 | 0.11 | 0.13 | 0.28 |
| Yb | 2.8 | 2.79 | 3.26 | 2.68 | 2.96 | 3.64 | 3.38 | 3.4 | 3.22 |  | 2.44 | 1.2 | 0.22 | 1.21 | 0.73 | 0.81 | 1.77 |
| Lu | 0.39 | 0.39 | 0.46 | 0.4 | 0.4 | 0.54 | 0.47 | 0.46 | 0.47 |  | 0.38 | 0.23 | 0.07 | 0.24 | 0.16 | 0.23 | 0.34 |
| Y | 27.11 | 26.33 | 30.33 | 25.94 | 27.79 | 35.25 | 32.43 | 32.12 | 28.34 |  | 25.63 | 10.99 | 2.81 | 12.4 | 7.02 | 7.47 | 14.52 |
| ∑REE | 451.35 | 199.2 | 268.9 | 262.61 | 199.01 | 413.67 | 206.54 | 359.75 | 209.22 |  | 234.65 | 220.17 | 72.34 | 143.98 | 128.15 | 91.62 | 185.36 |

续表2

| 样号 | P7YQ7 |  | PM02YQ8 | JDYQ12 |  | PM02YQ1 | PM02YQ3 | PM13YQ5 | PM13YQ15 | PM25YQ5 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 旱山 |  | 基东 | |  | 基东 | | | | |
| 岩石名称 | 片麻状花岗闪长岩 |  | 片麻状英云闪长岩 | 片麻状英云闪长岩 |  | 片麻状花岗闪长岩 | 片麻状花岗闪长岩 | 片麻状花岗闪长岩 | 片麻状花岗闪长岩 | 片麻状花岗闪长岩 |
| SiO2 | 65.34 |  | 66.62 | 61.99 |  | 64.14 | 59.58 | 66.64 | 65.26 | 73.92 |
| Al2O3 | 15.65 |  | 15.54 | 16.35 |  | 15.43 | 16.07 | 15.34 | 16.05 | 14.06 |
| Fe2O3 | 1.21 |  | 0.91 | 1.83 |  | 2 | 2.44 | 1.56 | 1.74 | 0.19 |
| FeO | 2.73 |  | 3.74 | 3.31 |  | 3.03 | 3.94 | 2.28 | 2.78 | 0.81 |
| CaO | 4.13 |  | 4.5 | 6 |  | 4.59 | 5.73 | 3.77 | 4.08 | 1.69 |
| MgO | 1.92 |  | 1.45 | 2.98 |  | 1.95 | 2.74 | 1.59 | 1.78 | 0.41 |
| K2O | 2.6 |  | 1.82 | 1.77 |  | 3.45 | 2.73 | 2.77 | 2.04 | 3.37 |
| Na2O | 3.13 |  | 2.84 | 3.39 |  | 2.43 | 2.34 | 3.08 | 3.46 | 3.95 |
| TiO2 | 0.59 |  | 0.62 | 0.63 |  | 0.69 | 0.94 | 0.59 | 0.73 | 0.16 |
| P2O5 | 0.144 |  | 0.16 | 0.16 |  | 0.23 | 0.32 | 0.15 | 0.25 | 0.05 |
| MnO | 0.061 |  | 0.06 | 0.11 |  | 0.09 | 0.1 | 0.07 | 0.08 | 0.03 |
| 灼失 | 2.35 |  | 1.74 | 1.28 |  | 1.74 | 2.82 | 1.96 | 1.57 | 1.24 |
| 总量 | 99.2 |  | 100 | 99.8 |  | 99.77 | 99.74 | 99.8 | 99.82 | 99.88 |
| Cr | 36.9 |  | 8.05 | 18.18 |  | 10 | 10.76 | 20.45 | 24.35 | 1.98 |
| Ni |  |  | 2.87 | 21 |  | 3.71 | 5.28 | 6.09 | 10.19 | 1.46 |
| Co |  |  | 8.01 | 26.2 |  | 9.72 | 12.2 | 8.83 | 10.38 | 4.39 |
| Rb | 89.6 |  | 116.27 | 18.11 |  | 117.7 | 104.9 | 126.3 | 118.7 | 103.3 |
| Cs | 1.84 |  | 5.38 | 2.05 |  | 2.42 | 2.95 | 5.94 | 10.11 | 2.22 |
| Sr | 497.1 |  | 390.61 | 461.89 |  | 543.73 | 532.95 | 456.4 | 452.1 | 453.18 |
| Ba | 968.5 |  | 592.24 | 685.29 |  | 1104.4 | 1159.4 | 801.36 | 679.68 | 252.77 |
| V | 77.7 |  | 71.04 | 102.06 |  | 71.45 | 76.97 | 60.89 | 75.3 | 25.75 |
| Nb | 12.91 |  | 15.04 | 0.35 |  | 16.24 | 15.82 | 15.05 | 18.53 | 0.44 |
| Ta | 1.2 |  | 0.91 | 5.15 |  | 1.27 | 1.24 | 0.81 | 1.53 | 4.38 |
| Zr | 154.4 |  | 203.63 | 164.06 |  | 199.82 | 230.04 | 209.24 | 212.65 | 97.97 |
| Hf | 7.5 |  | 6.07 | 9.73 |  | 10.47 | 14.25 | 5.19 | 4.68 | 3.19 |
| Pb |  |  | 9.17 | 10.11 |  | 10.66 | 8.73 | 15.44 | 19.06 | 20.91 |
| U | 3.29 |  | 1.08 | 1.84 |  | 3.49 | 2.74 | 3.42 | 1.98 | 1.75 |
| Th | 10.26 |  | 14.48 | 6.99 |  | 22.04 | 14.94 | 20.91 | 14.46 | 6.75 |
| La | 24.1 |  | 51.23 | 18.98 |  | 33.2 | 46.87 | 46.07 | 37.98 | 12.55 |
| Ce | 47.68 |  | 98.79 | 39.18 |  | 73.59 | 97.85 | 81.59 | 68.52 | 24.37 |
| Pr | 5.59 |  | 11.26 | 5.02 |  | 9.32 | 11.93 | 8.94 | 8.3 | 2.99 |
| Nd | 21 |  | 38.44 | 20.71 |  | 35.24 | 44.95 | 31.17 | 31.31 | 11.33 |
| Sm | 3.95 |  | 5.48 | 4.47 |  | 6 | 7.67 | 5.05 | 6.15 | 2.44 |
| Eu | 1.18 |  | 1.46 | 1.25 |  | 1.46 | 1.78 | 1.11 | 1.25 | 0.55 |
| Gd | 3.22 |  | 4.38 | 3.52 |  | 4.98 | 6.3 | 4.36 | 4.97 | 2.24 |
| Tb | 0.45 |  | 0.54 | 0.55 |  | 0.76 | 0.92 | 0.62 | 0.8 | 0.35 |
| Dy | 2.24 |  | 2.5 | 3.35 |  | 3.84 | 4.66 | 3.05 | 4.16 | 2.21 |
| Ho | 0.39 |  | 0.42 | 0.68 |  | 0.72 | 0.84 | 0.57 | 0.72 | 0.38 |
| Er | 1.01 |  | 1.24 | 1.65 |  | 2.08 | 2.45 | 1.74 | 2.01 | 0.99 |
| Tm | 0.17 |  | 0.19 | 0.33 |  | 0.35 | 0.38 | 0.26 | 0.28 | 0.19 |
| Yb | 0.98 |  | 1.21 | 1.93 |  | 2.2 | 2.37 | 1.71 | 1.57 | 1.17 |
| Lu | 0.16 |  | 0.26 | 0.26 |  | 0.34 | 0.36 | 0.26 | 0.22 | 0.21 |
| Y | 11.05 |  | 11.21 | 16.66 |  | 18.27 | 21.29 | 17.08 | 20.27 | 10.8 |
| ∑REE | 123.16 |  | 228.6 | 118.54 |  | 192.35 | 250.62 | 203.58 | 188.51 | 72.77 |

表3 公婆泉岩浆弧闪长岩主量元素（%）、微量元素（×10-6）分析结果

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样号 | TL01YQ3 | TL03YQ1 | PM02-YQ17 | PM02-YQ18 | PM08YQ2 | PM15-YQ1 | PM15-YQ2 |  | YQ0774-1 | TL08YQ1 | TL30YQ2 | PM30YQ2 | PM33YQ2 | PM34YQ1 |  | TK145N1-1 | TK145N1-4 | TK145N1-5 |
| 产地 | 西林陶乐 | | | | | | |  | 西林陶乐 | | | | | |  | 千条沟 | | |
| 岩石名称 | 片麻状细粒闪长岩 | | | | | | |  | 片麻状细粒石英闪长岩 | | | | | |  | 片麻状闪长岩 | | |
| SiO2 | 52.14 | 50.77 | 51.94 | 54.39 | 51.57 | 52.24 | 51.62 |  | 51.89 | 58.66 | 52.93 | 58.54 | 55.3 | 57.9 |  | 56.47 | 55.48 | 55.09 |
| Al2O3 | 15.5 | 16.85 | 16.39 | 17.12 | 18.72 | 15.88 | 15.52 |  | 16.71 | 17.17 | 16.37 | 17.65 | 17.04 | 17.34 |  | 16.87 | 17.44 | 18.06 |
| Fe2O3 | 3.62 | 2.79 | 4.06 | 1.62 | 4 | 3.62 | 3.12 |  | 3.38 | 2.32 | 2.3 | 2.36 | 2.8 | 2.67 |  | 2.13 | 2.89 | 2.95 |
| FeO | 6.3 | 4.12 | 6.2 | 3.54 | 4.27 | 7.29 | 7.49 |  | 7.72 | 4.43 | 6.94 | 4.11 | 5.65 | 4.27 |  | 4.72 | 4.72 | 4.48 |
| CaO | 8.46 | 7.32 | 8.65 | 8.8 | 9.11 | 6.9 | 7.91 |  | 6.91 | 6.61 | 7.09 | 6.5 | 6.75 | 7.29 |  | 6.71 | 6.8 | 6.7 |
| MgO | 6.18 | 5.07 | 5.26 | 6.19 | 4.58 | 3.09 | 4.67 |  | 3.08 | 3.02 | 4.12 | 2.89 | 4.13 | 3.43 |  | 4.01 | 3.55 | 3.39 |
| K2O | 1.61 | 2.59 | 0.96 | 1.5 | 1.02 | 2.03 | 1.77 |  | 1.53 | 2.14 | 1.93 | 2.51 | 2.33 | 1.19 |  | 1.53 | 1.24 | 1.5 |
| Na2O | 2.19 | 2.25 | 3.13 | 3.92 | 3.62 | 3.87 | 3.28 |  | 3.99 | 2.05 | 3.62 | 2.63 | 2.41 | 3.27 |  | 3.77 | 3.32 | 3.82 |
| TiO2 | 1.13 | 0.68 | 1.08 | 0.74 | 1.06 | 2.29 | 2.18 |  | 2.44 | 0.91 | 1.92 | 0.85 | 1.09 | 0.91 |  | 0.87 | 0.92 | 0.76 |
| P2O5 | 0.232 | 0.186 | 0.13 | 0.14 | 0.23 | 0.52 | 0.46 |  | 0.58 | 0.213 | 0.373 | 0.23 | 0.24 | 0.22 |  | 0.25 | 0.36 | 0.28 |
| MnO | 0.147 | 0.118 | 0.2 | 0.12 | 0.13 | 0.17 | 0.17 |  | 0.18 | 0.089 | 0.16 | 0.1 | 0.14 | 0.11 |  | 0.12 | 0.13 | 0.11 |
| 灼失 | 2.31 | 7.02 | 1.81 | 1.75 | 1.49 | 1.93 | 1.66 |  | 1.43 | 2.15 | 1.46 | 1.44 | 1.99 | 1.24 |  | 2.31 | 2.89 | 2.55 |
| 总量 | 99.81 | 99.77 | 99.82 | 99.82 | 99.79 | 99.83 | 99.85 |  | 99.84 | 99.77 | 99.21 | 99.81 | 99.86 | 99.85 |  | 99.75 | 99.73 | 99.7 |
| Cr | 137.28 | 115.25 | 167.11 | 98.52 | 6.96 | 3.91 | 11.84 |  | 6.42 | 41.9 | 35.82 | 28.48 | 35.51 | 20.11 |  | 57.5 | 27.65 | 31.56 |
| Ni | 31.42 | 20.36 | 41.52 | 108.69 | 8.8 | 2.25 | 8.34 |  | 10.86 | 11.71 | 20.93 | 10.89 | 15.81 | 11.05 |  | 26.25 | 12.45 | 15.19 |
| Co |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 19.69 | 17.99 | 19.35 |
| Rb | 59.08 | 97.19 | 15.87 | 26.23 | 16.98 | 43.29 | 35.15 |  | 43.11 | 87.48 | 86.37 | 86.96 | 92.4 | 15.25 |  | 50.05 | 34.67 | 51.71 |
| Cs | 3.24 | 1.64 | 0.9 | 1.89 | 1.67 | 1.48 | 1.61 |  | 1.47 | 4.15 | 2.04 | 4.13 | 6.86 | 1.44 |  | 2.49 | 1.16 | 3.21 |
| Sr | 354.1 | 776.5 | 454.58 | 565.35 | 826.58 | 363.76 | 367.6 |  | 389.05 | 536.1 | 441 | 430.8 | 325.44 | 542.24 |  | 703.23 | 806.3 | 812.68 |
| Ba | 457.56 | 496.66 | 327.74 | 249.08 | 287.72 | 550.58 | 335.4 |  | 337.12 | 1224.72 | 700.27 | 783 | 374.1 | 367.43 |  | 723.4 | 725.6 | 997.7 |
| V | 212.49 | 203.85 | 246.81 | 79.98 | 189.81 | 129.45 | 188.63 |  | 175.17 | 156.78 | 184.18 | 113.25 | 153.6 | 150.45 |  | 146.4 | 140.7 | 163.2 |
| Sc |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 17.61 | 16.1 | 17.84 |
| Nb | 9.08 | 4.23 | 6.92 | 7.74 | 5.22 | 15.11 | 10.29 |  | 17.57 | 13.05 | 25.29 | 10.25 | 13.58 | 5.28 |  | 10.65 | 14.35 | 11.66 |
| Ta | 0.64 | 0.42 | 0.54 | 0.67 | 0.41 | 1.29 | 0.93 |  | 1.22 | 0.61 | 1.4 | 0.61 | 1.79 | 1 |  | 0.65 | 0.8 | 0.65 |
| Zr | 129.62 | 103.66 | 90.66 | 136.58 | 96.8 | 338.92 | 225.04 |  | 322.49 | 217.46 | 287.66 | 246.33 | 237.78 | 125.68 |  | 129.35 | 170.03 | 135.4 |
| Hf | 7.39 | 3.21 | 4.3 | 5.16 | 4.98 | 12.69 | 11.27 |  | 7.94 | 7.63 | 8.97 | 6.7 | 10.24 | 5.48 |  | 10.4 | 13.18 | 7.99 |
| Ga | 16.8 | 16.7 | 18.58 | 14.76 | 21.71 | 22.55 | 21.11 |  | 23.42 | 24.09 | 27.14 | 22.46 | 21.93 | 19.17 |  | 18.36 | 20.75 | 20.17 |
| Pb | 9.99 | 15.23 | 7.78 | 3.83 | 4.43 | 12.68 | 9.92 |  | 12.92 | 10.39 | 15.56 | 5.33 | 7.07 | 10.54 |  | 4.4 | 5.74 | 5.32 |
| U | 1.34 | 0.78 | 0.73 | 1.39 | 0.63 | 1.09 | 1.39 |  | 1.52 | 0.82 | 1.56 | 1.19 | 1.79 | 1.22 |  | 0.75 | 0.73 | 0.72 |
| Th | 5.15 | 2.52 | 4.18 | 4.5 | 2.64 | 5.61 | 4.74 |  | 5.5 | 2.45 | 3.31 | 9.6 | 6.83 | 4.16 |  | 2.82 | 5.85 | 4.61 |
| La | 16.39 | 19.54 | 11.67 | 17.34 | 18.71 | 47.33 | 26.04 |  | 45.53 | 18.2 | 34.91 | 47.01 | 33.01 | 17.14 |  | 21.54 | 57.53 | 23.09 |
| Ce | 36.14 | 41.72 | 23.37 | 33.25 | 39.11 | 107.44 | 60.24 |  | 96.11 | 48.66 | 80.76 | 93.13 | 77.71 | 43.5 |  | 46.87 | 108.86 | 50.46 |
| Pr | 4.82 | 5.26 | 3.19 | 4.62 | 6.22 | 12.67 | 7.33 |  | 12.39 | 6.72 | 10.35 | 10.87 | 10.46 | 5.13 |  | 6.38 | 12.09 | 6.6 |
| Nd | 19.64 | 20.94 | 13.53 | 17.79 | 25.15 | 49.06 | 29.12 |  | 47.91 | 28.93 | 43.23 | 39.63 | 43.67 | 20.55 |  | 26.54 | 43.21 | 25.92 |
| Sm | 3.72 | 3.77 | 3.45 | 3.6 | 4.75 | 9.56 | 5.95 |  | 9.95 | 5.63 | 8.76 | 6.8 | 8.99 | 4.15 |  | 5.51 | 7.7 | 5.17 |
| Eu | 1.14 | 1.24 | 1.07 | 1.1 | 1.43 | 2.74 | 1.65 |  | 2.46 | 1.38 | 2.1 | 1.58 | 1.88 | 1.25 |  | 1.45 | 1.78 | 1.32 |
| Gd | 3.21 | 2.98 | 2.69 | 2.82 | 3.78 | 8.88 | 5.51 |  | 8.79 | 4.24 | 7.51 | 6.42 | 7.22 | 3.46 |  | 4.49 | 6.68 | 4.23 |
| Tb | 0.59 | 0.54 | 0.61 | 0.51 | 0.69 | 1.57 | 1.02 |  | 1.56 | 0.77 | 1.47 | 0.92 | 1.3 | 0.62 |  | 0.72 | 0.92 | 0.64 |
| Dy | 3.18 | 2.94 | 4.39 | 2.9 | 4.12 | 8.89 | 6.01 |  | 8.36 | 3.73 | 8.06 | 4.55 | 7.2 | 3.45 |  | 3.53 | 4.51 | 3.1 |
| Ho | 0.6 | 0.55 | 0.88 | 0.53 | 0.8 | 1.73 | 1.18 |  | 1.64 | 0.68 | 1.58 | 0.82 | 1.39 | 0.67 |  | 0.72 | 0.92 | 0.64 |
| Er | 1.72 | 1.66 | 2.35 | 1.43 | 2.22 | 4.61 | 3.17 |  | 4.62 | 1.97 | 4.41 | 2.25 | 3.62 | 1.81 |  | 1.99 | 2.39 | 1.69 |
| Tm | 0.26 | 0.26 | 0.37 | 0.2 | 0.35 | 0.77 | 0.55 |  | 0.67 | 0.29 | 0.71 | 0.33 | 0.59 | 0.32 |  | 0.31 | 0.38 | 0.28 |
| Yb | 1.81 | 1.78 | 2.48 | 1.31 | 2.21 | 4.34 | 3.27 |  | 4.04 | 1.8 | 4.57 | 1.94 | 3.36 | 1.85 |  | 1.96 | 2.49 | 1.82 |
| Lu | 0.27 | 0.35 | 0.39 | 0.24 | 0.38 | 0.57 | 0.43 |  | 0.66 | 0.26 | 0.62 | 0.28 | 0.45 | 0.25 |  | 0.28 | 0.32 | 0.25 |
| Y | 17.94 | 16.61 | 22.97 | 13.84 | 21.56 | 48.17 | 33.82 |  | 42.16 | 19.94 | 45.02 | 22.48 | 37.81 | 18.51 |  | 17.99 | 22.84 | 15.93 |
| ∑REE | 111.43 | 120.16 | 93.41 | 101.46 | 131.47 | 308.35 | 185.28 |  | 286.84 | 143.2 | 254.05 | 239 | 238.66 | 122.66 |  |  |  |  |

表4 公婆泉岩浆弧GG主量元素（%）、微量元素（×10-6）分析结果

| 样号 | PM04YQ4 | PM22-YQ1 | TL01YQ4 | TL01YQ6 | TL19YQ3 | TL21YQ1 | PM04YQ2 | PM28YQ2 | PM38YQ2 |  | SYQ4 | PM28YQ1 | PM28YQ3 | PM33YQ1 | PM37YQ1 | PM37YQ2 | PM37YQ3 |  | D2611YQ2 | P18YQ1 | P18YQ2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 西林陶乐 | | | | | | | | |  | 西林陶乐 | | | | | | |  | 西林陶乐 | | |
| 岩石名称 | 片麻状细粒黑云二长花岗岩 | | | | | | | | |  | 片麻状中粒斑状黑云二长花岗岩 | | | | | | |  | 片麻状细中粒花岗闪长岩 | | |
| SiO2 | 72.63 | 71.63 | 72.11 | 75.95 | 72.29 | 74.76 | 74.79 | 72.72 | 75.23 |  | 72.91 | 68.3 | 72.16 | 70.78 | 73.87 | 73.68 | 73.37 |  | 70.14 | 63.85 | 63.5 |
| Al2O3 | 14.23 | 13.68 | 14.09 | 13.93 | 14.67 | 13.82 | 13.78 | 13.95 | 13.27 |  | 13.33 | 14.39 | 14.03 | 14.45 | 13.66 | 13.74 | 13.39 |  | 15.39 | 15.71 | 15.42 |
| Fe2O3 | 0.35 | 0.6 | 0.57 | 0.02 | 0.47 | 0.41 | 0.13 | 0.48 | 0.28 |  | 0.5 | 1.17 | 0.63 | 0.48 | 0.47 | 0.75 | 0.59 |  | 0.59 | 1.45 | 1.02 |
| FeO | 1.01 | 1.52 | 1.6 | 0.27 | 0.93 | 0.46 | 0.32 | 0.88 | 0.38 |  | 1.46 | 2.48 | 0.86 | 1.75 | 0.82 | 0.83 | 1.3 |  | 1.63 | 3.73 | 4.2 |
| CaO | 1.93 | 1.93 | 2.01 | 3.33 | 1.8 | 1.4 | 1.39 | 1.8 | 2.31 |  | 1.84 | 3.41 | 1.82 | 1.84 | 1.53 | 1.48 | 1.64 |  | 3.03 | 5.16 | 5.26 |
| MgO | 0.53 | 0.76 | 0.39 | 0.17 | 0.53 | 0.26 | 0.18 | 0.33 | 0.25 |  | 0.5 | 1.14 | 0.57 | 0.65 | 0.27 | 0.33 | 0.51 |  | 0.84 | 2.64 | 2.66 |
| K2O | 4.62 | 5.11 | 4.7 | 2.23 | 4.45 | 4.39 | 5.02 | 5.88 | 4.31 |  | 5.65 | 4.16 | 6.57 | 5.89 | 5.82 | 5.28 | 5.24 |  | 2.68 | 2.37 | 2.33 |
| Na2O | 3.35 | 2.77 | 2.63 | 3.22 | 3.46 | 3.43 | 3.28 | 2.67 | 3 |  | 2.61 | 2.92 | 1.93 | 2.48 | 2.68 | 2.99 | 2.64 |  | 3.09 | 2.68 | 2.42 |
| TiO2 | 0.24 | 0.34 | 0.32 | 0.09 | 0.24 | 0.1 | 0.11 | 0.21 | 0.08 |  | 0.33 | 0.64 | 0.24 | 0.4 | 0.17 | 0.2 | 0.36 |  | 0.37 | 0.64 | 0.63 |
| P2O5 | 0.054 | 0.11 | 0.046 | 0.021 | 0.061 | 0.031 | 0.027 | 0.047 | 0.034 |  | 0.063 | 0.16 | 0.075 | 0.086 | 0.047 | 0.053 | 0.076 |  | 0.1 | 0.15 | 0.13 |
| MnO | 0.03 | 0.041 | 0.033 | 0.015 | 0.019 | 0.021 | 0.011 | 0.028 | 0.012 |  | 0.038 | 0.055 | 0.025 | 0.04 | 0.028 | 0.039 | 0.036 |  | 0.04 | 0.08 | 0.1 |
| 灼失 | 0.8 | 1.34 | 1.06 | 0.67 | 0.93 | 0.8 | 0.79 | 0.9 | 0.72 |  | 0.63 | 1.03 | 0.91 | 1.05 | 0.57 | 0.54 | 0.75 |  | 1.1 | 1.41 | 2.18 |
| 总量 | 99.77 | 99.83 | 99.56 | 99.91 | 99.84 | 99.87 | 99.82 | 99.91 | 99.87 |  | 99.85 | 99.87 | 99.82 | 99.88 | 99.92 | 99.92 | 99.9 |  | 99 | 99.87 | 99.85 |
| Cr | 7.13 | 10.79 | 2.92 | 3.76 | 8.66 | 4.38 | 2.44 | 6.36 | 6.04 |  | 6.61 | 9.9 | 6.4 | 5.39 | 3.43 | 3.97 | 4.73 |  |  |  |  |
| Ni | 2.2 | 3.65 | 0.42 | 0.75 | 1.38 | 0.68 | 0.4 | 0.79 | 6 |  | 2.52 | 4.34 | 0.96 | 2.06 | 0.12 | 0.43 | 0.86 |  |  |  |  |
| Rb | 185.63 | 172.96 | 161.9 | 76.65 | 209.7 | 174.4 | 145.36 | 262 | 164.48 |  | 223.57 | 150.96 | 195.2 | 183.68 | 223.44 | 206.8 | 162.16 |  | 108.4 | 149.7 | 71.37 |
| Cs | 5.47 | 9.92 | 4.76 | 2.46 | 7.23 | 8.02 | 1.85 | 6.17 | 3.21 |  | 4.33 | 4.54 | 3 | 4.98 | 5.22 | 4.65 | 2.71 |  |  |  |  |
| Sr | 234.92 | 301.36 | 466.8 | 240 | 278.2 | 162.5 | 264.21 | 104.56 | 223.04 |  | 120.62 | 159.04 | 213.92 | 151.28 | 96.88 | 97.04 | 136.08 |  | 234.2 | 352.1 | 297.1 |
| Ba | 847.08 | 1005 | 2408.4 | 357.12 | 1008.72 | 812.88 | 645.95 | 474.83 | 848.25 |  | 552.57 | 582.75 | 1068 | 673.43 | 422.93 | 312.75 | 473.63 |  | 1099 | 778.96 | 845.6 |
| V | 11.07 | 32.89 | 7.22 | 14.33 | 27.92 | 19.1 | 2.16 | 22.1 | 42.74 |  | 20.08 | 50.06 | 36.19 | 34.96 | 21.5 | 23.93 | 23.81 |  |  |  |  |
| Nb | 13.68 | 10.31 | 12.95 | 13.59 | 15.1 | 12.42 | 4.64 | 14.09 | 15.59 |  | 11.02 | 13.97 | 6.01 | 10.72 | 10.75 | 11.39 | 8.82 |  | 8.88 | 20 | 13.65 |
| Ta | 0.96 | 1.65 | 0.52 | 1.22 | 1.04 | 1 | 0.21 | 2.58 | 3.93 |  | 0.88 | 2.48 | 0.71 | 2.28 | 2.68 | 1.6 | 1.73 |  | 1.18 | 1.63 | 1.12 |
| Zr | 160.48 | 205.24 | 249.26 | 64.8 | 163.68 | 88.56 | 88.2 | 164.63 | 68.32 |  | 205.98 | 281.01 | 242.21 | 208.75 | 126.67 | 275.98 | 226.53 |  | 562.7 | 180.49 | 174 |
| Hf | 4.4 | 5.64 | 6.23 | 2.42 | 4.47 | 2.98 | 2.9 | 5.13 | 3.16 |  | 6.38 | 8.64 | 6.61 | 7.51 | 4.21 | 8.15 | 6.11 |  | 12.65 | 5.64 | 6.39 |
| Ga | 17.31 | 16.23 | 18.37 | 20.88 | 21.27 | 15.28 | 11.66 | 17.88 | 16.14 |  | 16.06 | 20.14 | 15.83 | 16.66 | 15.26 | 17.51 | 15.81 |  |  |  |  |
| Pb | 30.68 | 38.22 | 29.18 | 28.43 | 29.73 | 36.81 | 33.25 | 26.12 | 26.58 |  | 16.06 | 14.56 | 17.71 | 24.84 | 24.18 | 23.54 | 15.92 |  |  |  |  |
| U | 2.04 | 4.02 | 1.36 | 9.53 | 4.19 | 3.31 | 0.52 | 3.51 | 6.76 |  | 2.57 | 2.98 | 4.55 | 2.94 | 8.06 | 3.4 | 2.13 |  | 4.51 | 2.65 | 3.75 |
| Th | 15.97 | 38.27 | 16.05 | 12.79 | 26.72 | 19.12 | 6.06 | 30.7 | 19.14 |  | 16.28 | 19.8 | 46.52 | 20.1 | 21.18 | 36.49 | 40.12 |  | 24.02 | 26.18 | 18.37 |
| La | 35.21 | 63.72 | 59.54 | 27.91 | 44.86 | 25.75 | 19.95 | 50.88 | 6.82 |  | 39.13 | 65.65 | 87.87 | 74.09 | 37.41 | 54.02 | 93.15 |  | 39.16 | 80.3 | 43.13 |
| Ce | 58.47 | 130.32 | 125.8 | 51.28 | 72.68 | 48.67 | 38.68 | 95.71 | 18.62 |  | 69.22 | 138.12 | 186.84 | 142.56 | 80.23 | 99.29 | 182.16 |  | 86.98 | 154.56 | 86.68 |
| Pr | 6.51 | 14.62 | 13.32 | 5.51 | 7.04 | 5.16 | 5.11 | 10.36 | 2.07 |  | 8.76 | 15.63 | 19.14 | 15.09 | 8.08 | 12.44 | 19.9 |  | 7.57 | 15.89 | 10.21 |
| Nd | 21.49 | 51.7 | 44.65 | 19.61 | 22.35 | 17.03 | 18.67 | 34.99 | 7.25 |  | 29.76 | 56.76 | 65.64 | 51.25 | 27.09 | 42.91 | 66.79 |  | 31.02 | 53.39 | 35.02 |
| Sm | 3.61 | 8.81 | 5.37 | 3.64 | 3.12 | 2.97 | 3.12 | 6.17 | 1.78 |  | 5.36 | 9.54 | 9.7 | 8.07 | 4.51 | 7.79 | 9.81 |  | 5.13 | 8.91 | 5.94 |
| Eu | 0.87 | 0.96 | 1.33 | 0.59 | 0.85 | 0.55 | 0.45 | 0.65 | 0.31 |  | 0.85 | 1.43 | 1.05 | 1.44 | 0.73 | 0.85 | 1.27 |  | 0.9 | 1.78 | 1.46 |
| Gd | 3.63 | 7.95 | 4.03 | 2.77 | 2.54 | 2.63 | 2.86 | 6.25 | 1.6 |  | 5.08 | 9.6 | 9.52 | 8.11 | 4.53 | 6.98 | 9.07 |  | 3.04 | 9.12 | 6.02 |
| Tb | 0.49 | 1.02 | 0.41 | 0.46 | 0.32 | 0.54 | 0.4 | 0.98 | 0.39 |  | 0.81 | 1.43 | 1.02 | 1.25 | 0.77 | 1.08 | 0.99 |  | 0.53 | 1.43 | 0.97 |
| Dy | 2.4 | 4.05 | 1.3 | 2.23 | 1.29 | 3.29 | 1.85 | 5.46 | 2.66 |  | 4.69 | 7.45 | 3.63 | 7.17 | 4.31 | 5.51 | 3.49 |  | 3.09 | 6.95 | 4.79 |
| Ho | 0.44 | 0.64 | 0.2 | 0.38 | 0.2 | 0.64 | 0.3 | 1.11 | 0.55 |  | 0.91 | 1.45 | 0.57 | 1.43 | 0.82 | 1.01 | 0.57 |  | 0.65 | 1.34 | 0.94 |
| Er | 1.19 | 1.61 | 0.65 | 1.11 | 0.61 | 2.11 | 0.81 | 3.11 | 1.52 |  | 2.62 | 3.96 | 1.64 | 4.09 | 2.32 | 2.63 | 1.68 |  | 1.81 | 3.94 | 2.69 |
| Tm | 0.14 | 0.2 | 0.08 | 0.19 | 0.08 | 0.36 | 0.08 | 0.53 | 0.29 |  | 0.39 | 0.62 | 0.21 | 0.71 | 0.39 | 0.41 | 0.21 |  | 0.32 | 0.67 | 0.45 |
| Yb | 0.94 | 1.22 | 0.56 | 1.17 | 0.48 | 2.21 | 0.55 | 3.19 | 1.82 |  | 2.57 | 3.55 | 1.27 | 4.26 | 2.34 | 2.32 | 1.22 |  | 1.97 | 4.35 | 2.99 |
| Lu | 0.28 | 0.41 | 0.25 | 0.26 | 0.28 | 0.43 | 0.12 | 0.54 | 0.31 |  | 0.49 | 0.54 | 0.39 | 0.64 | 0.45 | 0.44 | 0.33 |  | 0.48 | 0.64 | 0.47 |
| Y | 11.69 | 16.23 | 6.14 | 11.23 | 6.18 | 22.15 | 8.02 | 33.93 | 13.74 |  | 25.72 | 40.44 | 15.02 | 41.44 | 23.07 | 26.22 | 14.7 |  | 16.84 | 35.22 | 24.41 |
| ∑REE | 147.38 | 303.47 | 263.63 | 128.33 | 162.89 | 134.49 | 100.98 | 253.85 | 59.73 |  | 196.34 | 356.18 | 403.49 | 361.61 | 197.07 | 263.9 | 405.33 |  | 199.49 | 378.49 | 226.17 |

续表

| 样号 | D2616YQ1 | D2616YQ2 | D2616YQ3 | D2655YQ1 | D2655YQ2 | D2659YQ1 | D2719YQ1 | D2719YQ2 | D2719YQ3 | P5YQ2 | P5YQ3 | P5YQ4 | P5YQ12 | P5YQ13 | P8YQ1 | P8YQ2 | P8YQ3 | P8YQ5 | P8YQ7 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | zxβηγS1 | | | | | | | | | | | | | | | | | | |
| 岩石名称 | 片麻状含黑云二长花岗岩 | | | | | | | | | | | | | | | | | | |
| 时代 | 早志留 | | | | | | | | | | | | | | | | | | |
| SiO2 | 71.67 | 72.4 | 72.2 | 71.59 | 72.58 | 70.44 | 69.84 | 69.46 | 69.47 | 72.92 | 73.15 | 72.93 | 74.26 | 72.86 | 72.39 | 71.87 | 72.73 | 72.51 | 70.88 |
| Al2O3 | 14.31 | 13.63 | 14.19 | 14.97 | 14.7 | 15.26 | 13.9 | 13.87 | 14 | 13.68 | 13.55 | 13.38 | 13.35 | 13.3 | 13.56 | 14.17 | 13.65 | 13.56 | 13.4 |
| Fe2O3 | 1.24 | 1.54 | 1 | 0.48 | 0.27 | 0.78 | 1.46 | 1.41 | 1.2 | 1.2 | 1.2 | 1.4 | 0.49 | 0.31 | 0.41 | 2.19 | 0.38 | 0.36 | 0.42 |
| FeO | 0.46 | 0.28 | 0.55 | 1.09 | 1.12 | 1.13 | 2.22 | 2.61 | 2.4 | 0.79 | 0.79 | 0.69 | 1.04 | 1.32 | 1.29 | 0.02 | 1.46 | 1.41 | 1.41 |
| CaO | 2.37 | 2.95 | 2.07 | 2.16 | 2 | 2.71 | 1.8 | 1.76 | 1.95 | 2.08 | 2.02 | 2.1 | 1.49 | 2.21 | 2.1 | 1.65 | 1.88 | 2.09 | 2.57 |
| MgO | 0.5 | 0.31 | 0.53 | 0.7 | 0.59 | 0.81 | 0.57 | 0.62 | 0.55 | 0.63 | 0.57 | 0.59 | 0.31 | 0.4 | 0.36 | 0.45 | 0.38 | 0.38 | 0.41 |
| K2O | 4.25 | 4.43 | 3.97 | 3.24 | 3.88 | 3.22 | 4.85 | 4.85 | 5.1 | 3.51 | 3.61 | 3.77 | 5.12 | 5.14 | 5.36 | 5.31 | 5.24 | 5.3 | 5.07 |
| Na2O | 3.63 | 3.15 | 3.94 | 3.91 | 3.57 | 4.02 | 3.41 | 3.33 | 3.37 | 3.8 | 3.74 | 3.61 | 2.92 | 2.77 | 2.78 | 2.99 | 2.81 | 2.76 | 2.78 |
| TiO2 | 0.2 | 0.17 | 0.2 | 0.25 | 0.22 | 0.3 | 0.48 | 0.54 | 0.44 | 0.35 | 0.32 | 0.32 | 0.15 | 0.2 | 0.23 | 0.28 | 0.26 | 0.24 | 0.25 |
| P2O5 | 0.08 | 0.04 | 0.07 | 0.09 | 0.07 | 0.1 | 0.13 | 0.15 | 0.11 | 0.08 | 0.07 | 0.08 | 0.03 | 0.05 | 0.06 | 0.07 | 0.07 | 0.06 | 0.07 |
| MnO | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 | 0.08 | 0.08 | 0.07 | 0.07 | 0.06 | 0.07 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| 灼失 | 0.98 | 0.78 | 0.96 | 1.28 | 0.79 | 1.1 | 1 | 1.07 | 1.07 | 0.77 | 0.81 | 0.97 | 0.75 | 1.32 | 1.26 | 0.77 | 0.93 | 1.13 | 2.53 |
| 总量 | 99.72 | 99.71 | 99.71 | 99.81 | 99.81 | 99.89 | 99.74 | 99.75 | 99.73 | 99.87 | 99.89 | 99.89 | 99.94 | 99.9 | 99.83 | 99.81 | 99.83 | 99.83 | 99.83 |
| Rb | 106.5 | 97.91 | 76.35 | 87.31 | 111.49 | 83.77 | 210.29 | 210.18 | 215.07 | 136.97 | 145.7 | 159.02 | 263.95 | 274.56 | 258.96 | 263.74 | 248.56 | 244.5 | 234.83 |
| Sr | 517.3 | 546.3 | 530 | 305.8 | 277.2 | 378.4 | 169.5 | 157.9 | 149.5 | 149.1 | 151.9 | 154.7 | 70.81 | 87.83 | 141.1 | 154.8 | 133.2 | 134.3 | 131.3 |
| Ba | 1545.6 | 1693.2 | 1588.8 | 780.48 | 928.92 | 419.52 | 1501.2 | 1344 | 1504.8 | 745.08 | 660.72 | 769.56 | 340.56 | 476.64 | 990.24 | 1212 | 980.76 | 977.04 | 912.6 |
| Nb | 7.8 | 7.55 | 9.35 | 6.18 | 5.97 | 6.32 | 22.22 | 21.29 | 16.65 | 10.59 | 9.84 | 10.56 | 19.06 | 19.38 | 19.63 | 20.58 | 20.29 | 18.87 | 19.59 |
| Ta | 0.44 | 0.43 | 0.47 | 0.37 | 0.33 | 0.5 | 1.55 | 1.43 | 0.99 | 0.8 | 0.71 | 0.82 | 2.02 | 1.94 | 1.27 | 1.37 | 1.48 | 1.35 | 1.51 |
| Zr | 98.5 | 107.94 | 90.12 | 102.8 | 94.07 | 92.82 | 354.03 | 315.05 | 336.79 | 135.53 | 129.38 | 127 | 126.54 | 129.26 | 164.87 | 183.78 | 159.54 | 153.63 | 160.26 |
| Hf | 2.89 | 3.44 | 2.68 | 3.35 | 3.5 | 2.86 | 10.82 | 10.83 | 10.17 | 4.86 | 4.73 | 4.6 | 4.46 | 4.72 | 4.87 | 4.95 | 4.53 | 4.54 | 4.55 |
| U | 1.24 | 1.77 | 1.29 | 1.18 | 0.69 | 1.94 | 4.82 | 3.69 | 3.08 | 1.77 | 1.4 | 2.08 | 8.15 | 5.52 | 4.37 | 2.56 | 4.12 | 4.19 | 3.81 |
| Th | 2.86 | 21.95 | 3.26 | 7.05 | 6.3 | 8.49 | 31.13 | 26.54 | 21.89 | 12.54 | 16.11 | 13.91 | 37.57 | 31.91 | 27.78 | 27.74 | 27.2 | 26.11 | 27.41 |
| La | 10.02 | 44.07 | 10.02 | 14.48 | 13.62 | 18.47 | 46.17 | 53.02 | 51.6 | 21.36 | 23.89 | 25.81 | 34.62 | 39.16 | 56.17 | 77.07 | 63.57 | 54.63 | 58.02 |
| Ce | 18.75 | 81.08 | 18.9 | 38.61 | 33.37 | 36.34 | 97.34 | 112.1 | 104.7 | 41.12 | 50.31 | 56.7 | 68.04 | 75.63 | 99.94 | 124.5 | 109.9 | 95.92 | 101.2 |
| Pr | 2.14 | 8.67 | 2.07 | 3.73 | 3.54 | 4.37 | 12.08 | 13.98 | 12.53 | 4.77 | 5.52 | 5.76 | 7.7 | 8.46 | 10.78 | 13.59 | 11.71 | 9.98 | 10.92 |
| Nd | 7.51 | 29.79 | 7.44 | 13.78 | 13.29 | 15.79 | 45.4 | 52.7 | 44.49 | 17.46 | 19.94 | 20.99 | 27.06 | 28.97 | 34.75 | 42.7 | 37.22 | 32.81 | 34.52 |
| Sm | 1.52 | 4.46 | 1.53 | 2.89 | 2.89 | 3.19 | 9.29 | 10.2 | 7.84 | 3.76 | 4.1 | 4.11 | 5.98 | 5.63 | 5.81 | 6.74 | 6.34 | 5.26 | 6 |
| Eu | 0.54 | 0.74 | 0.53 | 0.71 | 0.66 | 0.66 | 1.8 | 1.96 | 1.88 | 0.97 | 0.9 | 0.93 | 0.83 | 0.71 | 0.81 | 0.98 | 0.91 | 0.74 | 0.81 |
| Gd | 1.24 | 3.47 | 1.27 | 2.18 | 2.18 | 2.52 | 7.79 | 8.65 | 6.6 | 3.41 | 3.42 | 3.48 | 5.02 | 4.92 | 5.17 | 5.82 | 5.26 | 4.91 | 4.84 |
| Tb | 0.2 | 0.41 | 0.2 | 0.33 | 0.33 | 0.39 | 1.39 | 1.42 | 1 | 0.62 | 0.62 | 0.6 | 0.82 | 0.82 | 0.7 | 0.68 | 0.76 | 0.7 | 0.71 |
| Dy | 1.1 | 1.74 | 1.24 | 1.73 | 1.63 | 1.85 | 8.49 | 8.32 | 5.62 | 4.03 | 3.72 | 3.67 | 4.89 | 4.8 | 3.49 | 3.33 | 4.1 | 3.74 | 3.72 |
| Ho | 0.21 | 0.32 | 0.24 | 0.29 | 0.27 | 0.36 | 1.58 | 1.68 | 1.09 | 0.85 | 0.82 | 0.8 | 0.95 | 0.96 | 0.68 | 0.64 | 0.76 | 0.73 | 0.72 |
| Er | 0.51 | 0.86 | 0.58 | 0.64 | 0.68 | 0.87 | 4.23 | 4.45 | 2.88 | 2.3 | 2.25 | 2.21 | 2.68 | 2.51 | 1.72 | 1.59 | 1.96 | 1.96 | 1.94 |
| Tm | 0.09 | 0.11 | 0.1 | 0.11 | 0.1 | 0.15 | 0.68 | 0.73 | 0.49 | 0.44 | 0.41 | 0.4 | 0.47 | 0.44 | 0.28 | 0.26 | 0.34 | 0.31 | 0.3 |
| Yb | 0.68 | 0.7 | 0.64 | 0.75 | 0.65 | 0.94 | 4.71 | 4.72 | 3.41 | 3.07 | 2.86 | 2.77 | 3.55 | 2.97 | 1.84 | 1.72 | 2.2 | 2.03 | 2.15 |
| Lu | 0.12 | 0.15 | 0.11 | 0.2 | 0.18 | 0.25 | 0.73 | 0.78 | 0.6 | 0.55 | 0.52 | 0.47 | 0.67 | 0.59 | 0.48 | 0.46 | 0.52 | 0.47 | 0.48 |
| Y | 5.71 | 8.51 | 6.45 | 7.58 | 7.32 | 9.77 | 42.93 | 44.64 | 29.59 | 23.14 | 21.76 | 22.73 | 27.67 | 27.8 | 17.8 | 17.43 | 21.77 | 21.02 | 20.61 |
| ∑REE | 50.34 | 185.08 | 51.32 | 88.01 | 80.71 | 95.92 | 284.61 | 319.35 | 274.32 | 127.85 | 141.04 | 151.43 | 190.95 | 204.37 | 240.42 | 297.51 | 267.32 | 235.21 | 246.94 |

续表1

| 样号 | P8YQ8 | P9YQ5 |  | D2651YQ1 | D2654YQ1 | D2654YQ2 | D2710YQ1 | D2711YQ1 | D2711YQ2 | D2711YQ3 | D2712YQ1 | D2712YQ2 | D2712YQ3 | D2713YQ1 | D2717YQ1 | D2717YQ2 | P8YQ4 | P8YQ6 | P8YQ9 | P9YQ1 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 西林陶乐 | |  | 标山 | | | | | | | | | | | | | | | | |
| 岩石名称 | 片麻状二长花岗岩 | |  | 片麻状正长花岗岩 | | | | | | | | | | | | | | | | |
| 时代 | 早志留 | | | | | | | | | | | | | | | | | | | |
| SiO2 | 72.58 | 73.01 |  | 75.1 | 75.36 | 74.63 | 75.41 | 75.06 | 75.5 | 75.19 | 75.13 | 75.12 | 75.38 | 74.86 | 72.03 | 72.25 | 73.06 | 73.39 | 74.62 | 74.57 |
| Al2O3 | 13.43 | 13.42 |  | 13.33 | 12.21 | 12.56 | 12.41 | 12.33 | 12.31 | 12.21 | 12.19 | 12.27 | 12.52 | 12.41 | 13.28 | 13.36 | 13.72 | 13.71 | 12.61 | 13.24 |
| Fe2O3 | 0.39 | 0.67 |  | 0.5 | 0.83 | 1.31 | 0.83 | 0.66 | 0.91 | 0.84 | 0.67 | 0.77 | 0.87 | 0.76 | 1.44 | 1.36 | 0.43 | 0.45 | 0.53 | 0.46 |
| FeO | 1.27 | 1.15 |  | 0.63 | 0.91 | 1.13 | 1.07 | 0.9 | 0.99 | 1.17 | 1.22 | 1.03 | 0.67 | 1.07 | 1.72 | 1.22 | 1.37 | 1.19 | 1.41 | 1.03 |
| CaO | 2.11 | 2.08 |  | 0.86 | 1.11 | 0.89 | 0.67 | 1.18 | 0.68 | 0.92 | 1.04 | 0.99 | 0.73 | 0.96 | 1.15 | 1.05 | 1.51 | 1.49 | 1.33 | 1.3 |
| MgO | 0.32 | 0.41 |  | 0.14 | 0.14 | 0.16 | 0.1 | 0.11 | 0.09 | 0.08 | 0.08 | 0.11 | 0.11 | 0.06 | 0.11 | 0.15 | 0.37 | 0.34 | 0.12 | 0.24 |
| K2O | 5.32 | 4.84 |  | 5.86 | 5.75 | 5.68 | 5.09 | 4.97 | 5.01 | 4.95 | 5.05 | 5.06 | 5.06 | 5.01 | 5.44 | 5.62 | 5.37 | 5.44 | 5.4 | 5.38 |
| Na2O | 2.77 | 3 |  | 2.99 | 2.58 | 2.77 | 3.39 | 3.53 | 3.49 | 3.42 | 3.36 | 3.43 | 3.58 | 3.61 | 3.59 | 3.66 | 2.87 | 2.77 | 2.8 | 2.88 |
| TiO2 | 0.23 | 0.21 |  | 0.07 | 0.15 | 0.2 | 0.14 | 0.11 | 0.13 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.27 | 0.25 | 0.25 | 0.23 | 0.15 | 0.16 |
| P2O5 | 0.05 | 0.06 |  | 0.02 | 0.02 | 0.03 | 0.02 | 0.01 | 0.07 | 0.01 | 0.01 | 0.01 | 0.01 | 0.26 | 0.02 | 0.03 | 0.06 | 0.06 | 0.03 | 0.03 |
| MnO | 0.03 | 0.05 |  | 0.02 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.02 | 0.03 | 0.06 | 0.05 | 0.03 | 0.03 | 0.04 | 0.05 |
| 灼失 | 1.33 | 0.99 |  | 0.41 | 0.81 | 0.52 | 0.78 | 1.06 | 0.73 | 0.98 | 1.02 | 0.98 | 0.86 | 0.76 | 0.77 | 0.89 | 0.78 | 0.75 | 0.87 | 0.57 |
| 总量 | 99.84 | 99.9 |  | 99.94 | 99.9 | 99.92 | 99.94 | 99.94 | 99.94 | 99.94 | 99.94 | 99.94 | 99.94 | 99.93 | 99.88 | 99.88 | 99.83 | 99.84 | 99.91 | 99.92 |
| Rb | 237.43 | 295.36 |  | 243.88 | 198.64 | 216.32 | 224.95 | 214.45 | 240.97 | 196.46 | 210.18 | 201.86 | 204.67 | 202.38 | 144.56 | 158.6 | 248.14 | 243.46 | 249.08 | 308.98 |
| Sr | 129.9 | 85.93 |  | 65.74 | 40.17 | 36.39 | 25.61 | 23.87 | 22.8 | 23.79 | 22.22 | 24.46 | 22.57 | 26.8 | 33.32 | 37.65 | 135.7 | 126.1 | 67 | 86.03 |
| Ba | 883.92 | 469.08 |  | 216.24 | 158.88 | 160.8 | 167.64 | 164.4 | 165.24 | 148.92 | 130.44 | 141.6 | 146.04 | 146.76 | 324.24 | 350.52 | 1004.16 | 886.2 | 470.04 | 478.92 |
| Nb | 18.02 | 21.27 |  | 21.92 | 17.93 | 25.86 | 28.18 | 23.9 | 28.44 | 27.31 | 25.71 | 24.92 | 23.82 | 24 | 25.81 | 24.34 | 19.85 | 18.86 | 16.04 | 21.65 |
| Ta | 1.17 | 2.56 |  | 3.8 | 0.64 | 0.78 | 1.71 | 1.59 | 1.74 | 1.76 | 1.67 | 1.65 | 1.57 | 1.53 | 1.14 | 1.1 | 1.28 | 1.03 | 1.33 | 2.45 |
| Zr | 140.87 | 111.35 |  | 104.97 | 207.81 | 293.38 | 269.58 | 206.86 | 238.44 | 238.94 | 238.88 | 240.69 | 224.97 | 231.07 | 557.97 | 461.29 | 155.61 | 138.78 | 137.7 | 88.74 |
| Hf | 4.29 | 4 |  | 4.12 | 7.17 | 9.85 | 9.96 | 7.81 | 8.47 | 9.28 | 8.55 | 8.44 | 8.19 | 8.42 | 16.23 | 12.85 | 4.26 | 4.21 | 4.21 | 3.36 |
| U | 4.63 | 5.62 |  | 7.82 | 2.87 | 4.06 | 4.55 | 3.03 | 3.64 | 3.59 | 3.63 | 2.9 | 4.05 | 3.66 | 1.59 | 2.12 | 2.93 | 3.49 | 5.34 | 10.06 |
| Th | 28.42 | 34.14 |  | 19.91 | 23 | 41.84 | 30.23 | 30.42 | 27.59 | 24.66 | 27.11 | 24.46 | 21.71 | 21.06 | 12.93 | 13.13 | 25.24 | 25.44 | 35.58 | 38.84 |
| La | 52.27 | 46.42 |  | 33.98 | 80.91 | 111.5 | 86.81 | 80.23 | 68.89 | 84.94 | 79.31 | 85.29 | 87.3 | 86.28 | 81.52 | 68.6 | 62.65 | 52.39 | 68.82 | 44.49 |
| Ce | 95.5 | 90.1 |  | 71.43 | 147.46 | 214.56 | 160.03 | 151.78 | 131.62 | 158.11 | 147.55 | 159.36 | 156.67 | 159.84 | 157.92 | 130.27 | 110.59 | 93.11 | 119.33 | 85.33 |
| Pr | 9.83 | 9.92 |  | 8.29 | 17.96 | 25.01 | 19.74 | 17.66 | 14.78 | 18.54 | 17.14 | 18.56 | 19.12 | 18.65 | 18.01 | 15.81 | 12.02 | 9.91 | 13.36 | 9.45 |
| Nd | 31.98 | 33.92 |  | 29.97 | 65.36 | 91.53 | 68.63 | 60.81 | 52.78 | 66.27 | 60.43 | 65.04 | 66.7 | 66.41 | 66.8 | 58.06 | 38.55 | 31.85 | 46.17 | 32.69 |
| Sm | 5.58 | 6.94 |  | 7.99 | 12.96 | 17.52 | 12.23 | 10.78 | 9.99 | 12.17 | 11.01 | 12.26 | 12.38 | 12.21 | 12.36 | 11.34 | 5.97 | 5.62 | 8.2 | 6.32 |
| Eu | 0.75 | 0.67 |  | 0.49 | 0.61 | 0.75 | 0.54 | 0.51 | 0.42 | 0.52 | 0.43 | 0.45 | 0.56 | 0.46 | 1.19 | 1.34 | 0.8 | 0.76 | 0.87 | 0.75 |
| Gd | 4.39 | 5.84 |  | 9.97 | 10.96 | 14.94 | 10.21 | 9.18 | 8.51 | 9.93 | 8.95 | 9.68 | 10.03 | 10.23 | 10.26 | 9.5 | 5.35 | 4.49 | 6.85 | 5.59 |
| Tb | 0.61 | 0.9 |  | 2.8 | 1.78 | 2.45 | 1.62 | 1.38 | 1.4 | 1.65 | 1.39 | 1.59 | 1.61 | 1.62 | 1.55 | 1.58 | 0.72 | 0.61 | 0.99 | 0.95 |
| Dy | 3.3 | 5.32 |  | 24.04 | 10.7 | 14.05 | 9.48 | 7.65 | 8.25 | 9.29 | 8.15 | 9.06 | 8.69 | 9.02 | 9.12 | 8.71 | 3.64 | 3.15 | 5.37 | 5.62 |
| Ho | 0.59 | 1.11 |  | 5.97 | 2.05 | 2.72 | 1.71 | 1.52 | 1.62 | 1.82 | 1.59 | 1.8 | 1.7 | 1.84 | 1.7 | 1.62 | 0.7 | 0.6 | 1 | 1.14 |
| Er | 1.57 | 3.02 |  | 17.31 | 5.1 | 6.91 | 4.56 | 3.94 | 4.3 | 4.79 | 4.2 | 4.44 | 4.29 | 4.93 | 4.21 | 4 | 1.77 | 1.57 | 2.65 | 3.04 |
| Tm | 0.26 | 0.5 |  | 3.11 | 0.76 | 1.04 | 0.77 | 0.65 | 0.73 | 0.83 | 0.7 | 0.73 | 0.71 | 0.82 | 0.62 | 0.61 | 0.28 | 0.23 | 0.45 | 0.53 |
| Yb | 1.62 | 3.51 |  | 19.27 | 4.86 | 6.56 | 5.09 | 4.39 | 4.73 | 5.46 | 4.84 | 4.87 | 4.55 | 5.47 | 4.13 | 3.85 | 1.86 | 1.59 | 3.18 | 3.79 |
| Lu | 0.47 | 0.67 |  | 2.72 | 0.87 | 1.17 | 1.01 | 0.89 | 0.96 | 1.01 | 0.93 | 0.98 | 0.92 | 1.08 | 0.7 | 0.68 | 0.51 | 0.45 | 0.67 | 0.69 |
| Y | 16.53 | 32.17 |  | 172.6 | 49.34 | 66.84 | 46.13 | 41.5 | 42.57 | 49.82 | 43.55 | 46.2 | 43.95 | 50.93 | 41.46 | 40.9 | 18.86 | 16.25 | 29.28 | 35.04 |
| ∑REE | 225.25 | 241.01 |  | 409.94 | 411.68 | 577.55 | 428.56 | 392.87 | 351.55 | 425.15 | 390.17 | 420.31 | 419.18 | 429.79 | 411.55 | 356.87 | 264.27 | 222.58 | 307.19 | 235.42 |

续表2

| 样号 | P9YQ2 | P9YQ3 | P9YQ4 |  | GS6009 | GS6010 |  | YQ41 | YQD05 | YQD06 | YQD41 | YQD42 |  | YQ9 | YQ22 |  | P14h4-1 | P14h6-1 | P14h23-1 | P14h25-1 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 标山 | | |  | 风雷山 | |  | 旱山 | | | | |  | 旱山 | |  | 千条沟 | | | |
| 岩石名称 | 片麻状正长花岗岩 | | |  | 弱片麻状黑云母二长花岗岩 | |  | 片麻状细粒二长花岗岩 | | | | |  | 片麻状斑状黑云母二长花岗岩 | |  | 片麻状花岗闪长岩 | | | |
| SiO2 | 75.04 | 74.37 | 75.04 |  | 72.87 | 74.19 |  | 71.25 | 71.51 | 72.58 | 67.54 | 70.65 |  | 74.16 | 67.25 |  | 72.87 | 74.82 | 75.84 | 74.67 |
| Al2O3 | 12.94 | 13.15 | 12.23 |  | 14.3 | 13.98 |  | 15.11 | 14.96 | 14.75 | 16.11 | 15.44 |  | 13.7 | 16.09 |  | 11.9 | 11.16 | 13.65 | 14.18 |
| Fe2O3 | 0.57 | 0.63 | 0.54 |  | 0.41 | 0.13 |  | 0.86 | 0.71 | 0.51 | 1.36 | 0.72 |  | 0.12 | 0.33 |  | 0.89 | 0.99 | 0.11 | 0.02 |
| FeO | 0.96 | 1.07 | 0.94 |  | 1.1 | 0.79 |  | 0.98 | 1.01 | 0.81 | 1.56 | 1.03 |  | 1.03 | 2.73 |  | 3.23 | 2.54 | 0.26 | 0.33 |
| CaO | 1.2 | 1.37 | 1.18 |  | 2.4 | 1.7 |  | 1.42 | 1.27 | 1.41 | 1.98 | 1.35 |  | 0.77 | 0.98 |  | 2.83 | 3.29 | 1.57 | 0.94 |
| MgO | 0.23 | 0.35 | 0.23 |  | 0.46 | 0.26 |  | 0.7 | 0.65 | 0.55 | 1.06 | 0.79 |  | 0.22 | 0.85 |  | 1.73 | 1.93 | 0.09 | 0.13 |
| K2O | 5.37 | 5.29 | 5.02 |  | 3.54 | 4.17 |  | 3.71 | 3.73 | 3.77 | 4.17 | 3.9 |  | 4.84 | 4.54 |  | 2.68 | 1.79 | 1.92 | 5.22 |
| Na2O | 2.76 | 2.82 | 2.6 |  | 3.64 | 3.76 |  | 3.78 | 3.67 | 3.24 | 2.97 | 4.18 |  | 3.9 | 4.6 |  | 1.94 | 1.58 | 5.47 | 3.86 |
| TiO2 | 0.16 | 0.2 | 0.15 |  | 0.18 | 0.11 |  | 0.25 | 0.22 | 0.18 | 0.48 | 0.27 |  | 0.1 | 0.4 |  | 0.51 | 0.43 | 0.02 | 0.03 |
| P2O5 | 0.03 | 0.05 | 0.04 |  | 0.07 | 0.04 |  | 0.117 | 0.1 | 0.082 | 0.187 | 0.114 |  | 0.066 | 0.127 |  | 0.153 | 0.141 | 0.023 | 0.025 |
| MnO | 0.04 | 0.05 | 0.05 |  | 0.03 | 0.02 |  | 0.021 | 0.016 | 0.013 | 0.032 | 0.025 |  | 0.083 | 0.03 |  | 0.064 | 0.058 | 0.118 | 0.041 |
| 灼失 | 0.62 | 0.58 | 1.91 |  | 0.75 | 0.65 |  | 1.64 | 2.02 | 1.94 | 2.33 | 1.33 |  | 0.91 | 1.9 |  | 1.04 | 1.16 | 0.88 | 0.51 |
| 总量 | 99.93 | 99.91 | 99.94 |  | 99.76 | 99.8 |  | 99.68 | 99.17 | 99.14 | 99 | 99.43 |  | 99.9 | 99.83 |  | 99.84 | 99.89 | 99.96 | 99.94 |
| Cr |  |  |  |  |  |  |  | 3.8 | 10 | 5.1 | 5.4 | 5.9 |  | 5.6 | 23.6 |  | 67.38 | 60.18 | 19.35 | 16.34 |
| Ni |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 16.22 | 16.1 | 1.22 | 0.61 |
| Co |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 9.6 | 9.42 | 0.34 | 0.23 |
| Rb | 351.83 | 312.1 | 277.16 |  | 137.06 | 238.37 |  | 118.1 | 100.1 | 130.4 | 147.7 | 95.1 |  | 238.9 | 177.5 |  | 136.34 | 101.86 | 30.3 | 78.34 |
| Cs |  |  |  |  | 6.15 | 9.6 |  | 1.8 | 1.24 | 1.66 | 2.58 | 1.13 |  | 5.4 | 3.62 |  | 9.24 | 9.12 | 0.31 | 0.38 |
| Sr | 81.36 | 82.89 | 71.61 |  | 519.59 | 425.69 |  | 314.8 | 166 | 237.6 | 319.5 | 275.7 |  | 126.2 | 115.1 |  | 138.7 | 170.6 | 78.42 | 101.2 |
| Ba | 340.32 | 467.88 | 274.08 |  | 1227.6 | 970.92 |  | 1044 | 1054 | 1483 | 1655 | 1667 |  | 803.9 | 1220 |  | 675.5 | 503.8 | 151.8 | 228.1 |
| V |  |  |  |  |  |  |  | 29.9 | 29.3 | 23.5 | 46.9 | 34.2 |  | 14.3 | 35.8 |  | 70.81 | 77.95 | 49.22 | 36.5 |
| Sc |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 10.33 | 9.98 | 4.36 | 4.74 |
| Nb | 23.63 | 22.35 | 18.85 |  | 8.15 | 7.32 |  | 10.79 | 8.77 | 8.21 | 12.23 | 10.46 |  | 9.88 | 16.76 |  | 14.98 | 13.29 | 6.44 | 7.25 |
| Ta | 2.86 | 2.46 | 2.18 |  | 0.46 | 0.68 |  | 0.77 | 0.85 | 0.99 | 0.81 | 0.98 |  | 1.12 | 1.29 |  | 0.97 | 0.92 | 0.6 | 0.59 |
| Zr | 99.97 | 103.29 | 97.26 |  | 111.59 | 78.98 |  | 142.8 | 129 | 90.2 | 230.9 | 136.6 |  | 81.7 | 230.8 |  | 217.57 | 168.77 | 35.59 | 36.89 |
| Hf | 3.59 | 3.72 | 3.19 |  | 3.63 | 2.91 |  | 4.12 | 3.74 | 2.99 | 5.85 | 3.82 |  | 2.97 | 8.38 |  | 6.06 | 4.74 | 2.17 | 2.47 |
| Ga |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 14.58 | 15.01 | 18.3 | 17.63 |
| Pb |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 18.66 | 14.25 | 22.64 | 31.61 |
| U | 10.28 | 10.84 | 8.41 |  | 1.46 | 1.56 |  | 2.94 | 1.15 | 1.58 | 3.11 | 3.12 |  | 3.76 | 2.66 |  | 1.88 | 1.48 | 0.69 | 1 |
| Th | 34.92 | 36.33 | 32.52 |  | 7.37 | 7.45 |  | 17.65 | 11.92 | 17.58 | 23.5 | 13.29 |  | 22.91 | 27.44 |  | 15.29 | 14.54 | 2.47 | 4.35 |
| La | 38.63 | 44.71 | 49.28 |  | 19.41 | 16.94 |  | 34.67 | 20.22 | 24.33 | 27.99 | 17.4 |  | 25.35 | 29.6 |  | 29.52 | 27.9 | 6.44 | 13.74 |
| Ce | 81.85 | 82.72 | 92.47 |  | 44.69 | 34.35 |  | 62.89 | 40.57 | 51.6 | 57.53 | 35.37 |  | 52.61 | 64.97 |  | 53.18 | 58.32 | 11.61 | 26.38 |
| Pr | 8.23 | 9.53 | 10.38 |  | 4.99 | 4.18 |  | 7.57 | 4.74 | 5.54 | 6.86 | 4.31 |  | 5.96 | 7.86 |  | 7.02 | 6.84 | 1.57 | 3.63 |
| Nd | 28.37 | 32.52 | 35.05 |  | 18.1 | 16.23 |  | 27.36 | 16.9 | 19.43 | 23.72 | 15.5 |  | 21.44 | 29.57 |  | 25.25 | 24.03 | 5.96 | 14.18 |
| Sm | 5.84 | 6.64 | 7.41 |  | 3.06 | 3.23 |  | 4.6 | 2.86 | 3.13 | 4.09 | 2.86 |  | 4.4 | 7.08 |  | 4.77 | 4.4 | 1.65 | 3.83 |
| Eu | 0.6 | 0.73 | 0.69 |  | 0.92 | 0.61 |  | 1.07 | 0.71 | 0.8 | 0.96 | 0.69 |  | 0.52 | 1.18 |  | 1.08 | 1.12 | 0.14 | 0.3 |
| Gd | 4.9 | 5.45 | 6.15 |  | 2.44 | 2.65 |  | 3.57 | 2.25 | 2.5 | 3.21 | 2.29 |  | 3.75 | 7.06 |  | 4.25 | 3.85 | 1.82 | 3.6 |
| Tb | 0.83 | 0.96 | 0.95 |  | 0.29 | 0.37 |  | 0.43 | 0.29 | 0.3 | 0.42 | 0.34 |  | 0.63 | 1.32 |  | 0.71 | 0.61 | 0.44 | 0.66 |
| Dy | 5.03 | 5.45 | 5.39 |  | 1.3 | 1.8 |  | 1.78 | 1.39 | 1.39 | 1.97 | 1.78 |  | 3.93 | 8.4 |  | 3.95 | 3.36 | 2.82 | 3.83 |
| Ho | 0.98 | 1.14 | 1.06 |  | 0.21 | 0.31 |  | 0.24 | 0.23 | 0.22 | 0.31 | 0.32 |  | 0.76 | 1.65 |  | 0.73 | 0.61 | 0.5 | 0.69 |
| Er | 2.77 | 3.06 | 2.78 |  | 0.61 | 0.95 |  | 0.65 | 0.61 | 0.58 | 0.74 | 0.84 |  | 2.06 | 4.43 |  | 2.22 | 1.81 | 1.47 | 1.91 |
| Tm | 0.49 | 0.56 | 0.48 |  | 0.1 | 0.15 |  | 0.09 | 0.1 | 0.09 | 0.1 | 0.14 |  | 0.38 | 0.76 |  | 0.37 | 0.3 | 0.26 | 0.3 |
| Yb | 3.45 | 3.79 | 3.15 |  | 0.72 | 1.06 |  | 0.53 | 0.57 | 0.57 | 0.53 | 0.85 |  | 2.31 | 4.25 |  | 2.09 | 1.7 | 1.63 | 1.67 |
| Lu | 0.66 | 0.75 | 0.6 |  | 0.2 | 0.23 |  | 0.21 | 0.19 | 0.19 | 0.2 | 0.2 |  | 0.4 | 0.71 |  | 0.35 | 0.29 | 0.28 | 0.31 |
| Y | 30.86 | 34.34 | 31.91 |  | 5.8 | 10.34 |  | 7.67 | 6.87 | 6.49 | 9.02 | 8.86 |  | 21.22 | 48.49 |  | 20.56 | 16.83 | 17.3 | 22.38 |
| ∑REE | 213.49 | 232.35 | 247.75 |  |  |  |  | 153.31 | 98.5 | 117.18 | 137.64 | 91.72 |  | 145.71 | 217.34 |  |  |  |  |  |

续表3

| 样号 | P14h43-1 |  | P21H10-1 | P21H11-1 | P21H13-1 | P21H15-1 | P21H22-1 | P21H26-2 | P21H27-2 | P21H31-1 | P21N33-1 | P21H37-1 | P21H37-2 | P21H39-1 | P21H45-1 | P21H53-1 | P16H6-1 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 千条沟 |  | 千条沟 | | | | | | | | | | | | | | |
| 岩石名称 | 片麻状花岗闪长岩 |  | 片麻状二长花岗岩 | | | | | | | | | | | | | | |
| 时代 | 晚奥陶 |  | 早志留世 | | | | | | | | | | | | | | |
| SiO2 | 71.56 |  | 74.26 | 71.24 | 73.62 | 72 | 71.93 | 73.11 | 73.07 | 72.91 | 73.3 | 71.68 | 72.1 | 71.45 | 72.76 | 75.14 | 71.95 |
| Al2O3 | 13.36 |  | 13.5 | 14.46 | 13.79 | 13.8 | 14.5 | 14.03 | 13.7 | 13.17 | 12.71 | 14.38 | 14.29 | 15.05 | 14.35 | 12.22 | 14.25 |
| Fe2O3 | 0.86 |  | 0.93 | 1.63 | 1.07 | 1.19 | 1.67 | 0.61 | 1.43 | 1.16 | 1.14 | 1.14 | 1.36 | 1.19 | 1.16 | 1.09 | 1.94 |
| FeO | 2.49 |  | 1.48 | 2.15 | 1.47 | 1.92 | 2.07 | 1.17 | 1.81 | 1.69 | 2.03 | 1.79 | 1.84 | 1.81 | 1.66 | 1.69 | 2.4 |
| CaO | 3.71 |  | 1.06 | 2.1 | 1.47 | 1.64 | 1.92 | 0.92 | 1.66 | 1.81 | 1.29 | 2.11 | 1.64 | 1.94 | 1.74 | 1.31 | 2.28 |
| MgO | 1.25 |  | 0.06 | 0.6 | 0.2 | 0.51 | 0.57 | 0.13 | 0.44 | 0.4 | 0.32 | 0.51 | 0.35 | 0.47 | 0.56 | 0.2 | 0.7 |
| K2O | 1.21 |  | 4.3 | 3.6 | 4.8 | 5 | 3.4 | 6.6 | 4.4 | 5 | 5.7 | 4.1 | 4.8 | 3.4 | 3.9 | 5 | 3.4 |
| Na2O | 3.62 |  | 4.3 | 4.32 | 3.62 | 3.61 | 4.27 | 3.03 | 3.8 | 3.51 | 2.53 | 3.95 | 3.5 | 4.49 | 3.77 | 3.29 | 3.64 |
| TiO2 | 0.18 |  | 0.03 | 0.31 | 0.14 | 0.29 | 0.29 | 0.1 | 0.26 | 0.24 | 0.17 | 0.25 | 0.27 | 0.26 | 0.16 | 0.12 | 0.2 |
| P2O5 | 0.061 |  | 0.02 | 0.11 | 0.03 | 0.07 | 0.09 | 0.04 | 0.07 | 0.07 | 0.05 | 0.09 | 0.07 | 0.09 | 0.05 | 0.03 | 0.07 |
| MnO | 0.072 |  | 0.05 | 0.03 | 0.01 | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.03 | 0.04 | 0.03 |
| 灼失 | 1.55 |  | 0.87 | 0.85 | 0.93 | 0.92 | 0.86 | 0.54 | 0.68 | 0.78 | 1.62 | 0.66 | 0.91 | 0.71 | 0.58 | 0.57 | 0.67 |
| 总量 | 99.93 |  | 99.93 | 99.73 | 100 | 99.73 | 99.94 | 99.73 | 99.94 | 99.62 | 99.74 | 99.53 | 99.84 | 99.74 | 99.56 | 99.63 | 99.63 |
| Cr | 22.16 |  | 14.3 | 17.5 | 13.8 | 13.8 | 26 | 12.1 | 14.6 | 21.4 | 14.9 | 16.7 | 59.9 | 14.2 | 16.4 | 14.1 | 28.7 |
| Ni | 4.75 |  | 1.95 | 2.65 | 1.99 | 1.34 | 3.06 | 1.27 | 1.88 | 1.77 | 1.74 | 4.07 | 27.7 | 3.38 | 5.86 | 1.42 | 6.41 |
| Co | 7.13 |  | 0.72 | 3.49 | 1.42 | 1.96 | 3.41 | 0.86 | 2.55 | 2.18 | 2.11 | 2.74 | 2.45 | 2.99 | 2.64 | 1.73 | 3.5 |
| Rb | 53.67 |  | 256.5 | 125.5 | 201.3 | 230.8 | 191.4 | 344 | 299.7 | 247.6 | 263.1 | 169.6 | 226.7 | 185.2 | 140.6 | 355.2 | 105.1 |
| Cs | 1.98 |  | 8.05 | 6.99 | 8.05 | 13 | 25 | 17.9 | 32.3 | 16.7 | 11.2 | 16.7 | 12.9 | 13.5 | 12 | 26.8 | 3.78 |
| Sr | 162.4 |  | 56.16 | 316 | 176.1 | 177.7 | 239.4 | 80.63 | 279.4 | 238 | 142.4 | 295.3 | 174.1 | 246.6 | 301.6 | 103.4 | 302.2 |
| Ba | 164.5 |  | 81.2 | 744 | 413 | 772 | 615 | 331 | 1171 | 998 | 495 | 859 | 754 | 597 | 661 | 321 | 673 |
| V | 65.29 |  | 30.8 | 51.7 | 34.2 | 35.4 | 37.3 | 28.5 | 37.1 | 48.4 | 41.2 | 39.1 | 30.4 | 38.2 | 36.4 | 38.1 | 44.8 |
| Sc | 34.81 |  | 4.86 | 3.08 | 2.12 | 2.93 | 3.13 | 2.86 | 2.33 | 2.53 | 3.47 | 2.68 | 3.31 | 3.04 | 2.9 | 4.14 | 3.72 |
| Nb | 2.03 |  | 34.41 | 9.25 | 13.43 | 16.79 | 13.16 | 23.77 | 11.69 | 15.93 | 14.41 | 7.71 | 15.85 | 11.18 | 13.5 | 39.94 | 9.4 |
| Ta | 0.11 |  | 1.92 | 0.82 | 0.6 | 1.45 | 2.58 | 2.08 | 0.59 | 1.22 | 0.78 | 0.79 | 1.42 | 0.52 | 0.68 | 6.61 | 0.68 |
| Zr | 61.04 |  | 73.21 | 165.6 | 110.8 | 193.9 | 146.3 | 103.1 | 175.8 | 157.4 | 171.5 | 156.8 | 190.6 | 141 | 85.8 | 98.53 | 94.4 |
| Hf | 3.43 |  | 5.38 | 5.47 | 5.05 | 5.58 | 4.42 | 5.1 | 5.84 | 5.44 | 5.32 | 5.52 | 5.32 | 5.01 | 4.37 | 6.24 | 3.91 |
| Ga | 12.04 |  | 22.29 | 19.83 | 20.6 | 20.22 | 21.97 | 21.19 | 20.14 | 21.74 | 16.05 | 18.8 | 19.8 | 21.22 | 15.21 | 20.73 | 15.48 |
| Pb | 16.91 |  | 43.11 | 25.59 | 35.93 | 35.46 | 31.76 | 49.01 | 47.08 | 34.73 | 38.44 | 31.98 | 38.82 | 33.09 | 40.96 | 48.69 | 20.59 |
| U | 0.25 |  | 5.81 | 1.54 | 1.53 | 1.61 | 1.39 | 4.5 | 1.24 | 1.6 | 2.16 | 1.55 | 1.59 | 1.68 | 0.89 | 1.94 | 1.1 |
| Th | 0.44 |  | 31.31 | 15.59 | 14.1 | 22.26 | 9.97 | 39.14 | 20.46 | 15.58 | 55.42 | 20.72 | 21.51 | 16.47 | 11.24 | 30.57 | 9.57 |
| La | 6.78 |  | 14.84 | 35.61 | 19.23 | 44.05 | 5.76 | 36.27 | 42.02 | 34.49 | 68.11 | 29.05 | 45.89 | 24.47 | 22.96 | 9.76 | 18.86 |
| Ce | 12.27 |  | 30.19 | 48.69 | 35.31 | 75.22 | 18.34 | 68.54 | 71.36 | 63.74 | 104.1 | 51.39 | 78.92 | 44.32 | 31.03 | 16.93 | 35.64 |
| Pr | 1.83 |  | 3.77 | 6.84 | 3.94 | 8.77 | 1.23 | 7.98 | 7.76 | 7.19 | 13.27 | 5.73 | 9.01 | 4.78 | 4.55 | 2.32 | 4.18 |
| Nd | 9.16 |  | 13.88 | 22.54 | 12.79 | 27.72 | 4.6 | 26.37 | 23.88 | 22.9 | 43.47 | 18.75 | 28.59 | 16.2 | 15.87 | 7.83 | 14.63 |
| Sm | 3.22 |  | 5.11 | 3.91 | 2.29 | 4.06 | 1.14 | 5.52 | 4.22 | 3.49 | 7.86 | 2.91 | 4.81 | 3.07 | 3.29 | 2.08 | 2.73 |
| Eu | 0.68 |  | 0.21 | 1.07 | 0.57 | 0.8 | 0.48 | 0.56 | 0.83 | 0.8 | 0.81 | 0.8 | 0.91 | 0.77 | 0.71 | 0.34 | 0.8 |
| Gd | 3.94 |  | 6.39 | 3.2 | 2.09 | 4.33 | 1.22 | 5.75 | 4.28 | 3.31 | 6.87 | 2.86 | 4.43 | 3.01 | 3.18 | 2.22 | 2.61 |
| Tb | 0.88 |  | 1.37 | 0.34 | 0.24 | 0.47 | 0.18 | 0.81 | 0.54 | 0.34 | 0.77 | 0.3 | 0.48 | 0.35 | 0.45 | 0.41 | 0.33 |
| Dy | 5.93 |  | 9.38 | 1.5 | 1.11 | 2.11 | 1.22 | 3.7 | 2.8 | 1.41 | 3.27 | 1.16 | 2.23 | 1.84 | 2.1 | 2.57 | 1.44 |
| Ho | 1.22 |  | 1.87 | 0.24 | 0.19 | 0.34 | 0.22 | 0.63 | 0.49 | 0.21 | 0.53 | 0.22 | 0.38 | 0.3 | 0.38 | 0.57 | 0.28 |
| Er | 3.53 |  | 5.42 | 0.72 | 0.52 | 0.91 | 0.69 | 1.61 | 1.37 | 0.61 | 1.48 | 0.63 | 1.01 | 0.77 | 1.08 | 1.83 | 0.73 |
| Tm | 0.6 |  | 0.85 | 0.09 | 0.07 | 0.13 | 0.09 | 0.21 | 0.18 | 0.08 | 0.19 | 0.07 | 0.15 | 0.11 | 0.16 | 0.34 | 0.1 |
| Yb | 3.13 |  | 5.69 | 0.65 | 0.48 | 0.74 | 0.58 | 1.38 | 1.14 | 0.5 | 1.24 | 0.51 | 0.86 | 0.7 | 0.98 | 2.49 | 0.58 |
| Lu | 0.43 |  | 0.83 | 0.09 | 0.07 | 0.11 | 0.08 | 0.2 | 0.15 | 0.07 | 0.19 | 0.08 | 0.12 | 0.08 | 0.15 | 0.43 | 0.09 |
| Y | 30.84 |  | 47.42 | 7.08 | 4.63 | 9.79 | 6.06 | 15.96 | 12.64 | 6.33 | 13.15 | 5.45 | 10.06 | 7.58 | 10.15 | 14.81 | 6.46 |

续表4

| 样号 | P16H8-1 | P16N10-1 | P16H10-2 | P16H12-1 | P16H14-1 | P16H18-1 | P16H20-1 |  | P20H5-1 | P20H9-1 | P20H13-1 | P20H32-1 | P20H35-1 | P20N37-2 |  | PM02YQ6 | PM02YQ7 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 产地 | 千条沟 | | | | | | |  | 千条沟 | | | | | |  | 基东 | |
| 岩石名称 | 片麻状二长花岗岩 | | | | | | |  | 片麻状正长花岗岩 | | | | | |  | 片麻状二长花岗岩 | |
| 时代 | 早志留世 | | | | | | |  | 早志留世 | | | | | |  | 晚奥陶世 | |
| SiO2 | 71.65 | 73.09 | 72.47 | 72.07 | 67.31 | 67.07 | 70.74 |  | 70.13 | 71.23 | 73.81 | 73.71 | 71.64 | 70.07 |  | 73.2 | 71.93 |
| Al2O3 | 13.68 | 12.54 | 12.83 | 14.11 | 15.46 | 14.85 | 12.42 |  | 13.47 | 13.13 | 12.13 | 12.76 | 13.35 | 13.24 |  | 13.04 | 14.04 |
| Fe2O3 | 1.92 | 1.92 | 1.55 | 1.58 | 2.93 | 2.5 | 3.01 |  | 2.38 | 2.04 | 2.04 | 0.49 | 1.69 | 1.92 |  | 0.39 | 0.46 |
| FeO | 2.33 | 2.68 | 2.25 | 1.93 | 4.08 | 3.68 | 3.94 |  | 3.45 | 2.96 | 2.53 | 2.09 | 2.92 | 2.91 |  | 2.1 | 2.02 |
| CaO | 1.83 | 1.99 | 1.55 | 2.45 | 3.21 | 2.57 | 2.65 |  | 1.45 | 1.06 | 0.85 | 1.69 | 1.05 | 1.5 |  | 1.98 | 2.7 |
| MgO | 0.83 | 0.67 | 0.4 | 0.72 | 1.3 | 0.61 | 1 |  | 0.39 | 0.33 | 0.24 | 0.33 | 0.38 | 0.4 |  | 0.53 | 0.66 |
| K2O | 3.2 | 3 | 4.9 | 2.6 | 3 | 5.9 | 3.41 |  | 6.06 | 6.39 | 5.37 | 4.78 | 5.85 | 6.24 |  | 4.54 | 3.67 |
| Na2O | 4.6 | 4.09 | 3.5 | 4.48 | 3.84 | 3.37 | 2.68 |  | 3.37 | 3.25 | 3.41 | 3.11 | 3.19 | 3.57 |  | 2.35 | 2.77 |
| TiO2 | 0.21 | 0.16 | 0.1 | 0.19 | 0.4 | 0.32 | 0.32 |  | 0.33 | 0.3 | 0.21 | 0.32 | 0.37 | 0.37 |  | 0.2 | 0.26 |
| P2O5 | 0.06 | 0.03 | 0.04 | 0.07 | 0.14 | 0.09 | 0.08 |  | 0.07 | 0.06 | 0.04 | 0.06 | 0.08 | 0.15 |  | 0.06 | 0.08 |
| MnO | 0.03 | 0.03 | 0.06 | 0.03 | 0.05 | 0.06 | 0.04 |  | 0.05 | 0.04 | 0.04 | 0.01 | 0.03 | 0.03 |  | 0.04 | 0.04 |
| 灼失 | 1.26 | 1.76 | 1.58 | 1.12 | 0.93 | 1.62 | 2.64 |  | 1 | 1.2 | 1.2 | 1 | 0.9 | 1.6 |  | 1.38 | 1.24 |
| 总量 | 99.72 | 100 | 99.69 | 99.73 | 99.75 | 100.1 | 99.92 |  | 99.73 | 99.95 | 99.83 | 99.83 | 99.73 | 100.05 |  | 99.82 | 99.86 |
| Cr | 17.6 | 24 | 17 | 16.8 | 17.3 | 18.7 | 16.7 |  | 16.4 | 29.2 | 17.7 | 15.3 | 27 | 16.4 |  | 7.79 | 8.07 |
| Ni | 6.97 | 6.1 | 2.15 | 5.89 | 4.34 | 3.5 | 5.39 |  | 1.92 | 1.72 | 1.91 | 2.53 | 8.57 | 1.63 |  | 1.43 | 1.52 |
| Co | 4.13 | 2.86 | 1.39 | 3.18 | 5.58 | 2.51 | 5.5 |  | 2.57 | 2.17 | 1.64 | 2.05 | 2.94 | 2.84 |  | 2.59 | 3.33 |
| Rb | 82.85 | 86.16 | 143.5 | 70.7 | 88.72 | 54.96 | 103.2 |  | 107 | 71.99 | 158.1 | 142.9 | 116.9 | 136.5 |  | 131.7 | 134.1 |
| Cs | 5.53 | 4.3 | 1.94 | 2.95 | 4.9 | 0.96 | 2.37 |  | 1.07 | 1.99 | 3.78 | 5.73 | 2.91 | 1.23 |  | 3.82 | 4.82 |
| Sr | 222 | 281.9 | 158.3 | 299.8 | 475.2 | 502.9 | 336.4 |  | 111.5 | 83.74 | 78.41 | 140.1 | 114 | 119.4 |  | 291.61 | 247.72 |
| Ba | 637 | 446 | 485 | 447 | 798 | 1356 | 1084 |  | 736.5 | 708 | 432.9 | 560.5 | 645.5 | 712.7 |  | 1136.3 | 813.45 |
| V | 44.6 | 45.1 | 38.6 | 55.3 | 75.8 | 68.7 | 51.8 |  | 31.6 | 39.9 | 30.2 | 40.2 | 33.9 | 35.8 |  | 53.79 | 57.28 |
| Sc | 3.69 | 2.86 | 3.42 | 3.19 | 6.47 | 2.78 | 6.09 |  | 5.56 | 4.52 | 3.4 | 3.63 | 5 | 4.57 |  |  |  |
| Nb | 10.4 | 9.71 | 9.76 | 9.78 | 15.4 | 31.81 | 27.54 |  | 36.63 | 38.32 | 29.35 | 31.78 | 30.21 | 30.43 |  | 11.15 | 17.05 |
| Ta | 0.87 | 1.07 | 0.79 | 1 | 1.12 | 2.15 | 1.72 |  | 1.06 | 1.89 | 1.08 | 1.67 | 1.16 | 1.09 |  | 0.86 | 1.32 |
| Zr | 89.23 | 88.25 | 73.08 | 105.7 | 137.1 | 246.7 | 178.8 |  | 384.4 | 352.4 | 265.3 | 323.1 | 346.7 | 325.5 |  | 152.96 | 109.06 |
| Hf | 3.71 | 4.43 | 4.08 | 4.52 | 4.92 | 7.82 | 5.6 |  | 8.86 | 7.82 | 7.35 | 8.66 | 7.97 | 8.19 |  | 5.31 | 3.82 |
| Ga | 15.46 | 15.26 | 13.4 | 16.52 | 19.62 | 17.93 | 17.08 |  | 19.87 | 20.46 | 18.65 | 18.88 | 17.34 | 19.3 |  |  |  |
| Pb | 20.23 | 23.48 | 44.45 | 17.21 | 17.29 | 34.35 | 11.65 |  | 21.87 | 24.09 | 21.78 | 41.75 | 22.6 | 23.07 |  | 13.42 | 15.67 |
| U | 0.86 | 1.02 | 1.94 | 0.91 | 1.53 | 4.76 | 1.39 |  |  |  |  |  |  |  |  | 2.36 | 2.95 |
| Th | 10.12 | 13.67 | 12.03 | 4.72 | 10.88 | 40.58 | 16.63 |  | 12.06 | 9.87 | 14.95 | 63.13 | 14.23 | 14.72 |  | 27.96 | 16.4 |
| La | 20.6 | 29.45 | 20.08 | 11.48 | 33.1 | 61.72 | 39.49 |  | 88.6 | 63.43 | 68.06 | 109.7 | 63.76 | 67.77 |  | 67.62 | 33.37 |
| Ce | 37.22 | 52.21 | 36.22 | 20.71 | 64.09 | 111.1 | 74.74 |  | 180.5 | 133.5 | 130.1 | 194.6 | 121.6 | 129.2 |  | 132.8 | 65.65 |
| Pr | 4.36 | 5.88 | 4.27 | 2.39 | 7.81 | 13 | 8.77 |  | 20.88 | 17.21 | 15.03 | 23.33 | 15.23 | 15.65 |  | 14.98 | 7.5 |
| Nd | 14.36 | 19.19 | 14.21 | 8.04 | 27.57 | 43.51 | 30.32 |  | 73.01 | 61.82 | 49.92 | 72.98 | 52.04 | 54.51 |  | 50.37 | 25.52 |
| Sm | 2.55 | 3.38 | 3.11 | 1.5 | 4.91 | 7.99 | 5.61 |  | 13.6 | 13.2 | 9.25 | 11.9 | 9.38 | 9.75 |  | 7.68 | 4.09 |
| Eu | 0.74 | 0.76 | 0.56 | 0.69 | 1.14 | 1.72 | 1.47 |  | 1.37 | 1.32 | 0.89 | 1.16 | 1.19 | 1.2 |  | 1.45 | 1.05 |
| Gd | 2.39 | 3.5 | 3.01 | 1.71 | 4.42 | 7.35 | 5.49 |  | 13.58 | 12.53 | 8.99 | 10.55 | 9.41 | 9.71 |  | 6.17 | 3.46 |
| Tb | 0.34 | 0.36 | 0.47 | 0.24 | 0.58 | 0.85 | 0.73 |  | 1.86 | 1.92 | 1.19 | 1.16 | 1.24 | 1.28 |  | 0.81 | 0.5 |
| Dy | 1.58 | 1.64 | 3.09 | 1.42 | 2.65 | 4 | 3.84 |  | 9.78 | 10.33 | 6.43 | 5.32 | 6.42 | 6.71 |  | 3.73 | 2.68 |
| Ho | 0.31 | 0.23 | 0.68 | 0.29 | 0.49 | 0.77 | 0.68 |  | 1.7 | 1.9 | 1.2 | 1 | 1.2 | 1.2 |  | 0.67 | 0.53 |
| Er | 0.91 | 0.65 | 2.56 | 0.85 | 1.28 | 2.28 | 1.9 |  | 4.9 | 5.29 | 3.1 | 2.62 | 3.24 | 3.33 |  | 1.92 | 1.6 |
| Tm | 0.14 | 0.07 | 0.45 | 0.13 | 0.2 | 0.35 | 0.29 |  | 0.64 | 0.74 | 0.42 | 0.34 | 0.49 | 0.48 |  | 0.29 | 0.28 |
| Yb | 1.02 | 0.43 | 3.54 | 0.78 | 1.29 | 2.34 | 1.9 |  | 3.61 | 4.33 | 2.53 | 2.09 | 2.69 | 2.79 |  | 1.84 | 1.63 |
| Lu | 0.14 | 0.07 | 0.57 | 0.1 | 0.18 | 0.33 | 0.26 |  | 0.51 | 0.61 | 0.36 | 0.28 | 0.4 | 0.39 |  | 0.34 | 0.37 |
| Y | 7.95 | 6.58 | 18.12 | 7.11 | 11.59 | 19.72 | 15.98 |  | 40.16 | 44.78 | 26.04 | 23.41 | 28.1 | 28.61 |  | 16.19 | 13.68 |