表1 北秦岭松树沟榴闪岩中石榴石的主量元素组成(wt.%)

Table 1 Major element compositions for garnet from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot No.** | **Occurence** | **SiO2** | **TiO2** | **Al2O3** | **FeO** | **MnO** | **MgO** | **CaO** | **Total** | **Si** | **Al iv** | **Al vi** | **Fe3+** | **Fe2+** | **Mn** | **Mg** | **Ca** | **Sum** | **Mg#** | **Alm** | **And** | **Grs** | **Pyr** | **Sps** |
| Grt1-1 | rim | 37.31 | 0.05 | 21.25 | 28.70 | 0.22 | 4.50 | 7.98 | 100.00 | 2.94 | 0.06 | 1.92 | 0.07 | 1.83 | 0.02 | 0.53 | 0.68 | 8.04 | 0.22 | 58.58 | 3.31 | 19.62 | 17.99 | 0.50 |
| Grt1-2 | rim | 36.81 | 0.03 | 21.36 | 30.01 | 0.48 | 3.95 | 7.34 | 99.98 | 2.92 | 0.08 | 1.93 | 0.06 | 1.93 | 0.03 | 0.47 | 0.63 | 8.05 | 0.20 | 61.53 | 3.17 | 18.21 | 16.00 | 1.10 |
| Grt1-3 | outer core | 36.98 | 0.05 | 21.52 | 29.16 | 0.94 | 3.49 | 8.02 | 100.17 | 2.93 | 0.07 | 1.95 | 0.05 | 1.89 | 0.06 | 0.41 | 0.68 | 8.04 | 0.18 | 60.51 | 2.29 | 20.96 | 14.08 | 2.16 |
| Grt1-4 | outer core | 36.72 | 0.05 | 21.54 | 29.25 | 1.30 | 3.39 | 7.92 | 100.17 | 2.92 | 0.08 | 1.94 | 0.05 | 1.89 | 0.09 | 0.40 | 0.67 | 8.05 | 0.17 | 60.14 | 2.62 | 20.47 | 13.76 | 3.01 |
| Grt1-5 | outer core | 37.09 | 0.03 | 20.48 | 29.06 | 1.74 | 3.06 | 8.23 | 99.69 | 2.97 | 0.04 | 1.90 | 0.09 | 1.86 | 0.12 | 0.36 | 0.71 | 8.03 | 0.16 | 59.97 | 4.34 | 19.43 | 12.28 | 3.98 |
| Grt1-6 | inter core | 36.84 | 0.16 | 20.91 | 27.77 | 2.36 | 2.45 | 8.76 | 99.23 | 2.96 | 0.04 | 1.94 | 0.04 | 1.82 | 0.16 | 0.29 | 0.75 | 8.02 | 0.14 | 59.18 | 2.17 | 23.21 | 9.93 | 5.41 |
| Grt1-7 | inter core | 36.08 | 0.15 | 20.77 | 28.54 | 3.21 | 2.26 | 8.39 | 99.39 | 2.91 | 0.09 | 1.90 | 0.08 | 1.85 | 0.22 | 0.27 | 0.73 | 8.05 | 0.13 | 58.20 | 4.23 | 20.69 | 9.34 | 7.55 |
| Grt1-8 | inter core | 36.52 | 0.21 | 20.51 | 28.27 | 4.07 | 1.93 | 8.24 | 99.74 | 2.94 | 0.06 | 1.90 | 0.08 | 1.83 | 0.28 | 0.23 | 0.71 | 8.04 | 0.11 | 58.52 | 4.05 | 20.12 | 7.87 | 9.44 |
| Grt1-9 | inter core | 36.66 | 0.19 | 20.73 | 28.95 | 3.30 | 2.12 | 8.30 | 100.23 | 2.94 | 0.06 | 1.90 | 0.08 | 1.86 | 0.22 | 0.25 | 0.71 | 8.04 | 0.12 | 59.51 | 3.98 | 20.19 | 8.61 | 7.62 |
| Grt1-10 | outer core | 36.66 | 0.15 | 20.85 | 28.97 | 2.08 | 2.62 | 8.37 | 99.70 | 2.94 | 0.06 | 1.92 | 0.07 | 1.87 | 0.14 | 0.31 | 0.72 | 8.04 | 0.14 | 60.10 | 3.46 | 21.00 | 10.63 | 4.81 |
| Grt1-11 | outer core | 36.73 | 0.04 | 20.80 | 29.34 | 1.74 | 2.44 | 8.24 | 99.32 | 2.96 | 0.04 | 1.93 | 0.06 | 1.92 | 0.12 | 0.29 | 0.71 | 8.03 | 0.13 | 62.06 | 2.90 | 21.11 | 9.91 | 4.00 |
| Grt1-12 | rim | 37.08 | 0.04 | 21.24 | 29.98 | 1.62 | 2.81 | 7.69 | 100.47 | 2.95 | 0.05 | 1.94 | 0.05 | 1.94 | 0.11 | 0.33 | 0.66 | 8.03 | 0.15 | 62.78 | 2.51 | 19.65 | 11.30 | 3.71 |
| Grt1-13 | rim | 37.15 | 0.06 | 21.14 | 29.39 | 1.31 | 3.03 | 8.00 | 100.08 | 2.96 | 0.05 | 1.94 | 0.05 | 1.91 | 0.09 | 0.36 | 0.68 | 8.03 | 0.16 | 61.77 | 2.47 | 20.55 | 12.18 | 2.98 |
| Grt1-14 | rim | 37.03 | 0.01 | 20.99 | 29.56 | 0.54 | 3.67 | 8.45 | 100.24 | 2.94 | 0.07 | 1.90 | 0.09 | 1.87 | 0.04 | 0.43 | 0.72 | 8.05 | 0.19 | 59.55 | 4.43 | 20.01 | 14.79 | 1.22 |
| Grt2-1 | rim | 36.63 | 0.05 | 21.47 | 28.28 | 0.89 | 3.37 | 9.14 | 99.82 | 2.91 | 0.09 | 1.93 | 0.06 | 1.82 | 0.06 | 0.40 | 0.78 | 8.05 | 0.18 | 57.49 | 3.03 | 23.69 | 13.71 | 2.06 |
| Grt2-2 | rim | 36.28 | 0.04 | 21.56 | 28.34 | 1.48 | 2.82 | 9.06 | 99.57 | 2.90 | 0.10 | 1.94 | 0.05 | 1.85 | 0.10 | 0.34 | 0.78 | 8.06 | 0.15 | 58.21 | 2.53 | 24.23 | 11.57 | 3.46 |
| Grt2-3 | rim | 36.35 | 0.15 | 21.63 | 27.96 | 1.96 | 2.39 | 9.05 | 99.50 | 2.92 | 0.08 | 1.96 | 0.03 | 1.85 | 0.13 | 0.29 | 0.78 | 8.04 | 0.13 | 58.95 | 1.33 | 25.34 | 9.81 | 4.57 |
| Grt2-4 | outer core | 36.62 | 0.14 | 21.23 | 28.27 | 2.39 | 2.42 | 8.22 | 99.28 | 2.94 | 0.06 | 1.96 | 0.03 | 1.87 | 0.16 | 0.29 | 0.71 | 8.03 | 0.13 | 60.59 | 1.47 | 22.57 | 9.85 | 5.52 |
| Grt2-5 | outer core | 36.00 | 0.16 | 21.34 | 28.78 | 3.05 | 1.82 | 7.96 | 99.12 | 2.92 | 0.08 | 1.96 | 0.03 | 1.92 | 0.21 | 0.22 | 0.69 | 8.04 | 0.10 | 61.59 | 1.40 | 22.29 | 7.53 | 7.18 |
| Grt2-6 | outer core | 35.76 | 0.12 | 21.26 | 28.50 | 3.44 | 1.70 | 8.00 | 98.78 | 2.91 | 0.09 | 1.95 | 0.03 | 1.91 | 0.24 | 0.21 | 0.70 | 8.05 | 0.10 | 60.79 | 1.65 | 22.21 | 7.09 | 8.14 |
| Grt2-7 | inter core | 36.40 | 0.11 | 21.14 | 27.53 | 3.76 | 1.70 | 8.51 | 99.14 | 2.94 | 0.06 | 1.96 | 0.03 | 1.83 | 0.26 | 0.20 | 0.74 | 8.03 | 0.10 | 59.25 | 1.43 | 23.57 | 6.95 | 8.74 |
| Grt2-8 | inter core | 36.33 | 0.20 | 21.31 | 27.35 | 3.74 | 1.88 | 8.60 | 99.40 | 2.93 | 0.07 | 1.96 | 0.03 | 1.82 | 0.26 | 0.23 | 0.74 | 8.04 | 0.11 | 58.22 | 1.48 | 23.87 | 7.71 | 8.71 |
| Grt2-9 | inter core | 36.45 | 0.08 | 21.38 | 27.72 | 2.60 | 2.47 | 8.39 | 99.08 | 2.93 | 0.07 | 1.97 | 0.03 | 1.84 | 0.18 | 0.30 | 0.72 | 8.04 | 0.14 | 59.20 | 1.31 | 23.36 | 10.10 | 6.03 |

续表1

Table 1(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot No.** | **Occurence** | **SiO2** | **TiO2** | **Al2O3** | **FeO** | **MnO** | **MgO** | **CaO** | **Total** | **Si** | **Al iv** | **Al vi** | **Fe3+** | **Fe2+** | **Mn** | **Mg** | **Ca** | **Sum** | **Mg#** | **Alm** | **And** | **Grs** | **Pyr** | **Sps** |
| Grt2-10 | inter core | 36.74 | 0.13 | 21.32 | 28.37 | 1.81 | 2.78 | 8.50 | 99.64 | 2.94 | 0.06 | 1.95 | 0.04 | 1.86 | 0.12 | 0.33 | 0.73 | 8.03 | 0.15 | 59.79 | 1.96 | 22.82 | 11.26 | 4.17 |
| Grt2-11 | inter core | 36.63 | 0.12 | 21.37 | 28.39 | 1.81 | 2.97 | 8.39 | 99.67 | 2.93 | 0.07 | 1.94 | 0.04 | 1.85 | 0.12 | 0.35 | 0.72 | 8.04 | 0.16 | 59.19 | 2.28 | 22.27 | 12.08 | 4.19 |
| Grt2-12 | inter core | 36.95 | 0.14 | 21.42 | 28.37 | 1.88 | 2.91 | 8.12 | 99.78 | 2.95 | 0.05 | 1.96 | 0.03 | 1.86 | 0.13 | 0.35 | 0.69 | 8.03 | 0.15 | 60.41 | 1.38 | 22.17 | 11.75 | 4.30 |
| Grt2-13 | outer core | 36.51 | 0.09 | 21.65 | 28.94 | 1.83 | 3.00 | 8.11 | 100.13 | 2.91 | 0.09 | 1.95 | 0.04 | 1.88 | 0.12 | 0.36 | 0.69 | 8.05 | 0.16 | 59.73 | 2.24 | 21.55 | 12.23 | 4.25 |
| Grt2-14 | outer core | 36.56 | 0.03 | 21.50 | 28.39 | 1.52 | 2.85 | 8.74 | 99.60 | 2.92 | 0.08 | 1.95 | 0.04 | 1.86 | 0.10 | 0.34 | 0.75 | 8.04 | 0.15 | 59.23 | 2.07 | 23.55 | 11.63 | 3.52 |
| Grt2-15 | rim | 36.36 | 0.06 | 21.54 | 27.83 | 1.17 | 3.08 | 9.29 | 99.32 | 2.91 | 0.09 | 1.94 | 0.05 | 1.82 | 0.08 | 0.37 | 0.80 | 8.05 | 0.16 | 57.28 | 2.38 | 24.93 | 12.61 | 2.73 |
| Grt2-16 | rim | 36.68 | 0.03 | 21.20 | 27.69 | 0.98 | 3.45 | 9.21 | 99.23 | 2.93 | 0.07 | 1.93 | 0.06 | 1.79 | 0.07 | 0.41 | 0.79 | 8.05 | 0.18 | 56.83 | 3.10 | 23.79 | 14.02 | 2.26 |
| Almandine=Fe2+/（Mn+Mg+Fe2++Ca）；Andradite==Fe3+/(Cr+Al+Fe3+）；Grossular=Ca/（Mn+Mg+Fe2++Ca）；  Pyrope=Mg/（Mn+Mg+Fe2++Ca）；Spessartine=Mn/（Mn+Mg+Fe2++Ca）；Mg#=Mg/（Mg+Fe)； | | | | | | | | | | | | | | | | | | | | | | | | |

Note: Mineral abbreviations are after Whitney and Evans (2010): Alm, almandine; And,andradite; Grs, grossular; Pyr, pyrope; Sps, spessartine.

表2 北秦岭松树沟榴闪岩中石榴石微量元素成分(ppm)

Table 2 Trace element composition of garnet from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Garnet** | **Occurrence** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **HREE** |
| Grt1-1 | Rim | b.d.l. | 0.035 | 0.011 | 0.51 | 3.97 | 3.66 | 40.2 | 11.6 | 85.0 | 10.7 | 19.6 | 2.08 | 10.1 | 0.93 | 43.4 |
| Grt1-2 | outer core | b.d.l. | 0.014 | b.d.l. | 0.44 | 1.46 | 0.97 | 13.0 | 4.52 | 48.4 | 10.8 | 32.9 | 4.31 | 26.9 | 3.84 | 78.8 |
| Grt1-3 | outer core | b.d.l. | 0.034 | 0.011 | 0.33 | 0.46 | 0.65 | 10.1 | 5.51 | 96.8 | 32.6 | 119 | 16.5 | 110 | 13.9 | 292 |
| Grt1-4 | outer core | b.d.l. | 0.0070 | 0.0054 | 0.06 | 0.63 | 0.45 | 9.10 | 6.11 | 108 | 32.7 | 127 | 20.9 | 151 | 23.8 | 355 |
| Grt1-5 | inter core | 0.014 | 0.041 | 0.011 | 0.28 | 0.43 | 0.29 | 6.81 | 4.21 | 100 | 50.0 | 269 | 50.2 | 391 | 59.8 | 820 |
| Grt1-6 | inter core | b.d.l. | 0.021 | b.d.l. | 0.11 | 0.58 | 0.35 | 7.15 | 4.75 | 119 | 61.2 | 338 | 67.3 | 498 | 69.6 | 1034 |
| Grt1-7 | inter core | b.d.l. | 0.062 | 0.0045 | 0.33 | 0.61 | 0.55 | 6.64 | 4.52 | 108 | 51.2 | 301 | 64.6 | 544 | 81.0 | 1042 |
| Grt1-8 | inter core | b.d.l. | 0.027 | b.d.l. | 0.22 | 0.76 | 0.48 | 5.96 | 3.68 | 75.8 | 32.3 | 198 | 48.0 | 463 | 73.0 | 814 |
| Grt1-9 | inter core | b.d.l. | b.d.l. | 0.010 | 0.10 | 0.29 | 0.40 | 3.81 | 2.50 | 57.6 | 31.8 | 243 | 72.1 | 775 | 124 | 1246 |
| Grt1-10 | inter core | b.d.l. | 0.11 | 0.027 | 0.34 | 1.13 | 0.40 | 6.35 | 3.72 | 77.8 | 37.6 | 248 | 67.9 | 704 | 119 | 1177 |
| Grt1-11 | inter core | b.d.l. | b.d.l. | 0.016 | 0.17 | 0.57 | 0.38 | 5.31 | 3.65 | 95.2 | 48.5 | 322 | 77.0 | 678 | 106 | 1232 |
| Grt1-12 | inter core | b.d.l. | 0.040 | 0.010 | 0.11 | 0.57 | 0.39 | 5.42 | 4.56 | 130 | 68.6 | 412 | 83.3 | 659 | 91.7 | 1315 |
| Grt1-13 | inter core | b.d.l. | 0.019 | 0.0049 | 0.21 | 0.57 | 0.33 | 8.01 | 5.39 | 135 | 66.1 | 338 | 63.4 | 454 | 61.4 | 983 |
| Grt1-14 | outer core | b.d.l. | 0.014 | 0.010 | 0.22 | 0.57 | 0.46 | 5.80 | 2.36 | 36.4 | 13.7 | 57.5 | 9.44 | 64.0 | 9.36 | 154 |
| Grt1-15 | outer core | b.d.l. | b.d.l. | 0.027 | 0.89 | 3.07 | 2.48 | 36.5 | 11.1 | 106 | 18.3 | 44.1 | 4.91 | 26.0 | 2.62 | 95.9 |
| Grt1-16 | Rim | b.d.l. | b.d.l. | b.d.l. | 0.82 | 1.75 | 1.59 | 15.8 | 4.71 | 45.4 | 7.72 | 19.7 | 2.07 | 11.9 | 1.27 | 42.7 |
| Grt1-17 | Rim | 0.0068 | 0.0068 | 0.0052 | 0.87 | 5.81 | 4.25 | 41.4 | 9.56 | 50.7 | 6.10 | 11.7 | 1.19 | 6.42 | 0.73 | 26.1 |
| Grt1-18 | Rim | b.d.l. | 0.0041 | b.d.l. | 0.54 | 0.76 | 0.46 | 6.62 | 1.70 | 16.9 | 3.48 | 10.5 | 1.60 | 10.4 | 1.45 | 27.4 |
| Grt1-19 | outer core | b.d.l. | 0.0063 | b.d.l. | 0.25 | 0.53 | 0.43 | 7.26 | 3.59 | 53.6 | 14.8 | 51.3 | 7.25 | 47.3 | 7.06 | 128 |

续表2

Table 2 (continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Garnet** | **Occurrence** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **HREE** |
| Grt1-20 | outer core | 0.0064 | 0.038 | b.d.l. | b.d.l. | 0.65 | 0.72 | 11.1 | 6.41 | 101 | 34.0 | 153 | 28.0 | 220 | 35.6 | 471 |
| Grt1-21 | outer core | 0.0067 | 0.027 | 0.0051 | 0.04 | 0.94 | 0.84 | 13.3 | 8.25 | 124 | 34.0 | 123 | 18.7 | 136 | 20.7 | 332 |
| Grt1-22 | outer core | 0.041 | 0.093 | 0.024 | 0.49 | 0.81 | 0.73 | 15.3 | 7.71 | 129 | 36.3 | 132 | 20.3 | 156 | 24.1 | 369 |
| Grt1-23 | outer core | 0.0068 | 0.0068 | b.d.l. | 0.16 | 0.76 | 0.72 | 13.7 | 8.04 | 131 | 41.0 | 148 | 22.8 | 169 | 25.5 | 406 |
| Grt1-24 | outer core | b.d.l. | 0.027 | 0.0051 | 0.31 | 0.63 | 0.59 | 11.3 | 5.56 | 82.3 | 24.9 | 92.0 | 13.7 | 93.3 | 14.4 | 238 |
| Grt1-25 | outer core | b.d.l. | b.d.l. | 0.0027 | b.d.l. | 1.11 | 0.78 | 14.6 | 8.08 | 129 | 39.8 | 139 | 18.8 | 115 | 16.4 | 329 |
| Grt1-26 | outer core | 0.0076 | 0.061 | 0.012 | 0.18 | 1.28 | 0.74 | 13.6 | 5.41 | 58.4 | 12.3 | 34.5 | 5.03 | 34.2 | 4.52 | 90.6 |
| Grt1-27 | outer core | 0.0057 | 0.096 | 0.015 | 0.25 | 0.75 | 0.61 | 9.52 | 4.69 | 57.4 | 13.6 | 44.8 | 6.48 | 45.1 | 6.35 | 116 |
| Grt1-28 | outer core | b.d.l. | 0.013 | 0.0050 | 0.31 | 0.75 | 0.77 | 9.61 | 4.28 | 60.9 | 18.0 | 65.5 | 10.4 | 72.7 | 10.8 | 177 |
| Grt1-29 | outer core | 0.0063 | 0.025 | 0.0075 | 0.30 | 0.98 | 0.54 | 8.26 | 4.70 | 64.9 | 17.1 | 50.9 | 6.21 | 40.9 | 6.20 | 121 |
| Grt1-30 | Rim | 0.0064 | 0.025 | 0.010 | 0.25 | 2.52 | 2.35 | 28.2 | 9.13 | 76.8 | 11.4 | 24.4 | 2.53 | 13.0 | 1.49 | 52.8 |

The trace element contents below the detection limit of the electron microprobe analyses are denoted as b.d.l.

表3 北秦岭松树沟榴闪岩中金红石微量元素成分(ppm)

Table 3 Trace element compositions of rutile from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rutile | 09-1-RT1-2 | 09-1-RT2-1 | 09-1-RT5-1 | 09-1-RT6-1 |
| Zr (ppm) | 362 | 350 | 333 | 352 |
| Sc (ppm) | 3.88 | 2.52 | 4.17 | 3.09 |
| V (ppm) | 1871 | 1856 | 1902 | 1862 |
| Cr (ppm) | 186 | 179 | 183 | 155 |
| Sr (ppm) | 1.05 | 0.88 | 0.73 | 0.90 |
| Nb (ppm) | 2762 | 2334 | 3287 | 2533 |
| Sb (ppm) | 31.5 | 29.1 | 33.7 | 27.8 |
| Hf (ppm) | 16.2 | 14.4 | 19.4 | 19.1 |
| Ta (ppm) | 135 | 192 | 149 | 195 |
| W (ppm) | 46.8 | 47.2 | 46.1 | 44.2 |
| U (ppm) | 4.71 | 1.09 | 5.27 | 3.17 |
| T (℃) | 749 | 746 | 742 | 747 |

备注：T表示在压力3.0GPa条件下使用金红石Zr含量温度计(Tomkins *et* *al*., 2007)计算的温度值。

表4 北秦岭松树沟榴闪岩角闪石和斜长石矿物对主量元素组成(wt.%)

Table 4 The composition of major elements in paired amphibole and plagioclase from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **矿物对** | **1** | | **2** | | **3** | | **4** | | **5** | | **6** | | **7** | | **8** | |
| Type | Pl-ma | Amp-ma | Pl-ma | Amp-ma | Pl-ma | Amp-ma | Pl-ma | Amp-ma | Pl-in | Amp-in | Pl-in | Amp-in | Pl-in | Amp-in | Pl-in | Amp-in |
| Spot No. | pl09-6-15 | amp09-3-2ma | pl09-21-4 | amp09-7-1ma | pl09-12-4 | amp09-2a-1 | pl09-6-5 | 09amp1-1 | pl09-21-6 | amp09-4-1in | pl09-6-7 | 09amp3-2 | pl09-6-4 | amp09-3a-2in | pl09-11-3 | amp09-2-2in |
| SiO2 | 57.98 | 47.50 | 57.66 | 47.56 | 57.97 | 46.77 | 58.19 | 47.34 | 68.25 | 39.14 | 67.19 | 39.92 | 64.25 | 41.71 | 64.10 | 41.74 |
| TiO2 | 0.33 | 0.23 | b.d.l. | 0.26 | 0.11 | 0.27 | 0.31 | 0.21 | b.d.l. | 0.08 | b.d.l. | 0.06 | 0.04 | 0.45 | 0.03 | 0.26 |
| Al2O3 | 26.50 | 6.87 | 25.70 | 7.28 | 26.38 | 7.41 | 26.02 | 7.37 | 19.31 | 17.07 | 19.94 | 17.41 | 23.15 | 13.73 | 21.98 | 14.25 |
| FeO | 0.68 | 15.86 | 0.36 | 15.81 | 0.42 | 17.79 | 0.71 | 17.41 | 0.53 | 18.33 | 0.46 | 16.96 | 0.80 | 16.65 | 0.48 | 16.39 |
| MnO | b.d.l. | 0.12 | b.d.l. | 0.13 | 0.01 | 0.12 | b.d.l. | 0.15 | 0.03 | 0.03 | 0.02 | 0.07 | 0.04 | 0.06 | 0.02 | 0.04 |
| MgO | 0.01 | 13.85 | 0.01 | 13.59 | 0.01 | 13.37 | b.d.l. | 13.18 | 0.02 | 8.28 | b.d.l. | 8.33 | b.d.l. | 10.42 | 0.08 | 10.02 |
| CaO | 8.26 | 11.01 | 7.73 | 11.25 | 7.83 | 9.82 | 7.61 | 10.51 | 0.08 | 11.28 | 0.93 | 11.13 | 4.11 | 11.08 | 3.49 | 10.97 |
| Na2O | 6.87 | 1.02 | 7.37 | 1.10 | 7.24 | 1.18 | 6.79 | 1.10 | 12.04 | 2.35 | 11.13 | 2.42 | 8.99 | 2.22 | 9.96 | 2.20 |
| K2O | 0.02 | 0.16 | 0.04 | 0.17 | 0.01 | 0.16 | b.d.l. | 0.13 | 0.03 | 0.49 | 0.04 | 0.49 | 0.04 | 0.29 | 0.05 | 0.32 |
| Cr2O3 | 0.02 | 0.04 | b.d.l. | 0.05 | 0.01 | 0.04 | 0.03 | b.d.l. | 0.03 | 0.03 | b.d.l. | b.d.l. | 0.02 | 0.06 | b.d.l. | 0.05 |
| BaO | b.d.l. | — | b.d.l. | — | b.d.l. | — | 0.06 | — | b.d.l. | — | b.d.l. | — | b.d.l. | — | b.d.l. | — |
| NiO | — | b.d.l. | — | b.d.l | — | 0.09 | — | b.d.l. | — | 0.02 | — | b.d.l. | — | 0.01 | — | b.d.l. |
| Total | 100.65 | 96.65 | 98.87 | 97.19 | 99.97 | 97.00 | 99.71 | 97.40 | 100.32 | 97.09 | 99.71 | 96.80 | 101.45 | 96.68 | 100.19 | 96.25 |

备注：“b.d.l.”代表所测数据低于检出限；“—”代表未测试。

表5北秦岭松树沟榴闪岩变质温压计算

Table 5 Metamorphic temperature and pressure calculation from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prograde stage (℃/kbar) | Peak stage (℃) | Retrograde stage (℃/kbar) |
|  | Amp-Pl thermobarometry | Zr-in-rutile thermometer (at 3.0 GPa) | Amp-Pl thermobarometry |
| 1 | 522/1.4 | 749 | 737/7.4 |
| 2 | 500/2.4 | 746 | 726/7.3 |
| 3 | 655/2.2 | 742 | 764/8.2 |
| 4 | 611/3.0 | 747 | 741/8.3 |
| Average | 572/2.3 | 746 | 742/7.8 |

表6北秦岭松树沟榴闪岩中锆石U-Pb同位素组成

Table 6 U-Pb isotope data for zircons from the garnet amphibolite at Songshugou in the North Qinling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** | **Type** | **Th** | **U** | **Th/U** | **Isotopic ratios** | | | | | | **Apparent age (Ma)** | | | | | |
|  |  | **ppm** | **ppm** | **Ratio** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |
| **17NQL09-02-1** | G1 | 0.85 | 46.7 | 0.02 | 0.057 | 0.011 | 0.60 | 0.13 | 0.0792 | 0.0026 | 498 | 385 | 480 | 84 | 491 | 16 |
| **17NQL09-02-3** | G1 | 1.95 | 50.5 | 0.04 | 0.0588 | 0.0065 | 0.599 | 0.051 | 0.0774 | 0.0026 | 561 | 243 | 477 | 32 | 480 | 16 |
| **17-NQL09-1** | G2 | 1.71 | 32.0 | 0.05 | 0.0588 | 0.0029 | 0.667 | 0.032 | 0.0828 | 0.0013 | 561 | 107 | 519 | 19 | 513 | 8 |
| **17-NQL09-2** | G2 | 11.9 | 122 | 0.10 | 0.0592 | 0.0019 | 0.699 | 0.021 | 0.0832 | 0.0010 | 576 | 70 | 538 | 13 | 515 | 6 |
| **17-NQL09-3** | G2 | 2.75 | 57.5 | 0.05 | 0.0638 | 0.0022 | 0.765 | 0.027 | 0.0869 | 0.0010 | 744 | 72 | 577 | 15 | 537 | 6 |
| **17-NQL09-6** | G2 | 1.17 | 49.5 | 0.02 | 0.0568 | 0.0026 | 0.683 | 0.028 | 0.0854 | 0.0011 | 483 | 97 | 529 | 17 | 528 | 7 |
| **17-NQL09-7** | G2 | 0.57 | 23.4 | 0.02 | 0.0634 | 0.0044 | 0.740 | 0.044 | 0.0868 | 0.0017 | 720 | 146 | 562 | 26 | 536 | 10 |
| **17-NQL09-8** | G2 | 1.11 | 18.0 | 0.06 | 0.0664 | 0.0048 | 0.788 | 0.053 | 0.0870 | 0.0020 | 820 | 150 | 590 | 30 | 538 | 12 |
| **17-NQL09-9** | G2 | 1.07 | 30.2 | 0.04 | 0.0581 | 0.0031 | 0.688 | 0.031 | 0.0847 | 0.0013 | 532 | 121 | 532 | 19 | 524 | 8 |
| **17-NQL09-11** | G2 | 0.95 | 17.6 | 0.05 | 0.0602 | 0.0036 | 0.680 | 0.038 | 0.0844 | 0.0018 | 609 | 134 | 527 | 23 | 522 | 10 |
| **17-NQL09-12** | G2 | 0.95 | 20.2 | 0.05 | 0.0590 | 0.0049 | 0.702 | 0.057 | 0.0877 | 0.0018 | 569 | 181 | 540 | 34 | 542 | 11 |
| **17-NQL09-13** | G2 | 1.43 | 21.3 | 0.07 | 0.0564 | 0.0033 | 0.688 | 0.038 | 0.0865 | 0.0015 | 478 | 130 | 532 | 23 | 535 | 9 |
| **17-NQL09-14** | G2 | 1.38 | 24.5 | 0.06 | 0.0671 | 0.0041 | 0.790 | 0.046 | 0.0871 | 0.0020 | 843 | 128 | 591 | 26 | 538 | 12 |
| **17-NQL09-15** | G2 | 1.17 | 35.4 | 0.03 | 0.0571 | 0.0036 | 0.662 | 0.038 | 0.0837 | 0.0015 | 494 | 139 | 516 | 24 | 518 | 9 |
| **17-NQL09-16** | G2 | 0.70 | 20.2 | 0.03 | 0.0637 | 0.0053 | 0.698 | 0.049 | 0.0818 | 0.0022 | 733 | 177 | 538 | 30 | 507 | 13 |
| **17-NQL09-17** | G3 | 35.7 | 586 | 0.06 | 0.0674 | 0.0016 | 1.094 | 0.025 | 0.1181 | 0.0012 | 850 | -149 | 750 | 12 | 720 | 7 |
| **17-NQL09-18** | G2 | 7.81 | 29.4 | 0.27 | 0.0557 | 0.0031 | 0.625 | 0.032 | 0.0805 | 0.0014 | 439 | 122 | 493 | 20 | 499 | 9 |
| **17-NQL09-19** | G2 | 6.05 | 527 | 0.01 | 0.0567 | 0.0011 | 0.656 | 0.012 | 0.0851 | 0.0008 | 480 | 41 | 512 | 7 | 526 | 5 |
| **17-NQL09-20** | G2 | 0.96 | 28.8 | 0.03 | 0.0623 | 0.0030 | 0.706 | 0.031 | 0.0852 | 0.0014 | 683 | 104 | 542 | 18 | 527 | 8 |
| **17-NQL09-21** | G2 | 0.28 | 14.4 | 0.02 | 0.0549 | 0.0036 | 0.648 | 0.039 | 0.0843 | 0.0020 | 409 | 148 | 507 | 24 | 522 | 12 |
| **17-NQL09-22** | G2 | 4.65 | 21.5 | 0.22 | 0.0601 | 0.0044 | 0.682 | 0.050 | 0.0841 | 0.0018 | 607 | 162 | 528 | 30 | 520 | 11 |
| **17-NQL09-25** | G2 | 3.57 | 37.3 | 0.10 | 0.0601 | 0.0025 | 0.708 | 0.027 | 0.0864 | 0.0011 | 606 | 86 | 543 | 16 | 534 | 6 |

续表6

Table 6 (continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** |  | **Th** | **U** | **Th/U** | **Isotopic ratios** | | | | | | **Apparent age (Ma)** | | | | | |
|  |  | **ppm** | **ppm** | **Ratio** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |
| **17-NQL09-27** | G2 | 0.65 | 42.4 | 0.02 | 0.0566 | 0.0031 | 0.693 | 0.032 | 0.0868 | 0.0014 | 476 | 122 | 534 | 19 | 537 | 9 |
| **17-NQL09-30** | G2 | 1.09 | 24.8 | 0.04 | 0.0609 | 0.0039 | 0.736 | 0.039 | 0.0860 | 0.0015 | 639 | 135 | 560 | 23 | 532 | 9 |
| **NQL-09-A02** | G2 | 1.26 | 18.9 | 0.07 | 0.0616 | 0.0073 | 0.683 | 0.069 | 0.0822 | 0.0026 | 661 | 254 | 528 | 41 | 509 | 16 |
| **NQL-09-A03** | G2 | 1.37 | 72.0 | 0.02 | 0.0642 | 0.0039 | 0.763 | 0.046 | 0.0860 | 0.0014 | 748 | 130 | 576 | 27 | 532 | 8 |
| **NQL-09-A05** | G2 | 3.27 | 66.8 | 0.05 | 0.0581 | 0.0054 | 0.661 | 0.053 | 0.0852 | 0.0018 | 600 | 202 | 515 | 33 | 527 | 11 |
| **NQL-09-A06** | G2 | 0.88 | 19.4 | 0.05 | 0.0615 | 0.0070 | 0.704 | 0.068 | 0.0857 | 0.0024 | 657 | 248 | 541 | 41 | 530 | 14 |
| **NQL-09-A07** | G2 | 0.61 | 22.6 | 0.03 | 0.0629 | 0.0097 | 0.643 | 0.076 | 0.0823 | 0.0034 | 706 | 333 | 504 | 47 | 510 | 20 |
| **NQL-09-A08** | G2 | 1.36 | 57.4 | 0.02 | 0.0559 | 0.0059 | 0.635 | 0.063 | 0.0838 | 0.0026 | 450 | 269 | 499 | 39 | 519 | 16 |
| **NQL-09-A09** | G2 | 1.31 | 25.8 | 0.05 | 0.0600 | 0.0082 | 0.702 | 0.087 | 0.0884 | 0.0034 | 606 | 300 | 540 | 52 | 546 | 20 |
| **NQL-09-A10** | G2 | 2.41 | 96.8 | 0.02 | 0.0590 | 0.0066 | 0.708 | 0.077 | 0.0885 | 0.0030 | 565 | 246 | 544 | 46 | 546 | 18 |
| **NQL-09-A11** | G2 | 1.20 | 16.5 | 0.07 | 0.067 | 0.012 | 0.68 | 0.10 | 0.0850 | 0.0040 | 831 | 375 | 529 | 63 | 526 | 24 |
| **NQL-09-A18** | G2 | 3.04 | 90.3 | 0.03 | 0.0516 | 0.0033 | 0.582 | 0.034 | 0.0826 | 0.0014 | 265 | 142 | 466 | 22 | 512 | 9 |
| **NQL-09-A19** | G1 | 0.82 | 130 | 0.01 | 0.0561 | 0.0035 | 0.606 | 0.035 | 0.0788 | 0.0015 | 454 | 139 | 481 | 22 | 489 | 9 |
| **NQL-09-A21** | G2 | 0.16 | 13.9 | 0.01 | 0.065 | 0.011 | 0.635 | 0.072 | 0.0814 | 0.0031 | 787 | 359 | 499 | 45 | 504 | 18 |
| **NQL-09-A22** | G2 | 1.23 | 17.1 | 0.07 | 0.065 | 0.010 | 0.660 | 0.080 | 0.0828 | 0.0027 | 776 | 331 | 515 | 49 | 513 | 16 |
| **NQL-09-A23** | G2 | 1.11 | 28.1 | 0.04 | 0.0589 | 0.0050 | 0.657 | 0.049 | 0.0843 | 0.0021 | 561 | 190 | 513 | 30 | 522 | 12 |
| **NQL-09-A24** | G2 | 1.03 | 21.0 | 0.05 | 0.060 | 0.010 | 0.719 | 0.091 | 0.0886 | 0.0029 | 613 | 376 | 550 | 54 | 547 | 17 |
| **NQL-09-A27** | G2 | 4.53 | 41.8 | 0.11 | 0.0618 | 0.0044 | 0.754 | 0.049 | 0.0880 | 0.0018 | 665 | 156 | 571 | 29 | 544 | 11 |
| **NQL-09-A28** | G2 | 1.36 | 49.5 | 0.03 | 0.0565 | 0.0046 | 0.662 | 0.048 | 0.0850 | 0.0018 | 472 | 186 | 516 | 30 | 526 | 11 |
| **NQL-09-A29** | G2 | 41.3 | 671 | 0.06 | 0.0580 | 0.0021 | 0.662 | 0.023 | 0.0803 | 0.0010 | 532 | 78 | 516 | 14 | 498 | 6 |
| **NQL-09-A30** | G2 | 0.69 | 54.0 | 0.01 | 0.0551 | 0.0042 | 0.624 | 0.048 | 0.0812 | 0.0017 | 417 | 177 | 492 | 30 | 503 | 10 |
| **NQL-09-A31** | G2 | 1.89 | 49.5 | 0.04 | 0.0606 | 0.0043 | 0.724 | 0.045 | 0.0884 | 0.0017 | 633 | 153 | 553 | 27 | 546 | 10 |
| **NQL-09-A32** | G2 | 1.17 | 34.8 | 0.03 | 0.0590 | 0.0053 | 0.728 | 0.055 | 0.0871 | 0.0018 | 569 | 194 | 555 | 32 | 538 | 11 |

续表6

Table 6(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** |  | **Th** | **U** | **Th/U** | **Isotopic ratios** | | | | | | **Apparent age (Ma)** | | | | | |
|  |  | **ppm** | **ppm** | **Ratio** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |
| **NQL-09-A35** | G2 | 2.48 | 11.3 | 0.22 | 0.058 | 0.011 | 0.706 | 0.083 | 0.0879 | 0.0039 | 543 | 410 | 542 | 49 | 543 | 23 |
| **NQL-09-A36** | G2 | 1.67 | 18.0 | 0.09 | 0.0625 | 0.0076 | 0.703 | 0.086 | 0.0877 | 0.0030 | 700 | 263 | 541 | 51 | 542 | 18 |
| **NQL-09-A37** | G2 | 4.79 | 379 | 0.01 | 0.0598 | 0.0019 | 0.736 | 0.024 | 0.0886 | 0.0012 | 598 | 69 | 560 | 14 | 547 | 7 |
| **17NQL09-B3** | G3 | 13.3 | 25.4 | 0.52 | 0.0618 | 0.0052 | 1.100 | 0.080 | 0.1227 | 0.0028 | 733 | 181 | 753 | 39 | 746 | 16 |
| **17NQL09-B4** | G3 | 5.39 | 15.3 | 0.35 | 0.067 | 0.010 | 1.10 | 0.12 | 0.1228 | 0.0048 | 828 | 329 | 751 | 57 | 746 | 27 |
| **17NQL09C-1** | G2 | 1.70 | 57.2 | 0.03 | 0.0626 | 0.0049 | 0.692 | 0.049 | 0.0813 | 0.0018 | 694 | 168 | 534 | 30 | 504 | 11 |
| **17NQL09C-4** | G2 | 3.21 | 91.7 | 0.04 | 0.0611 | 0.0035 | 0.707 | 0.039 | 0.0840 | 0.0013 | 643 | 120 | 543 | 23 | 520 | 8 |
| **17NQL09C-5** | G2 | 8.36 | 73.3 | 0.11 | 0.0613 | 0.0039 | 0.677 | 0.038 | 0.0824 | 0.0016 | 650 | 139 | 525 | 23 | 510 | 9 |
| **17NQL09C-6** | G2 | 2.54 | 19.5 | 0.13 | 0.0605 | 0.0073 | 0.699 | 0.069 | 0.0800 | 0.0025 | 620 | 260 | 538 | 41 | 496 | 15 |
| **17NQL09C-7** | G2 | 0.56 | 16.4 | 0.03 | 0.0607 | 0.0088 | 0.654 | 0.073 | 0.0802 | 0.0030 | 628 | 317 | 511 | 45 | 497 | 18 |
| **17NQL09C-12** | G2 | 0.50 | 41.2 | 0.01 | 0.0655 | 0.0056 | 0.712 | 0.054 | 0.0814 | 0.0018 | 791 | 181 | 546 | 32 | 504 | 11 |
| **17NQL09C-13** | G2 | 1.64 | 24.1 | 0.07 | 0.0669 | 0.0078 | 0.729 | 0.070 | 0.0841 | 0.0027 | 835 | 243 | 556 | 41 | 521 | 16 |
| **17NQL09C-14** | G2 | 1.08 | 12.3 | 0.09 | 0.068 | 0.013 | 0.75 | 0.13 | 0.0850 | 0.0031 | 861 | 402 | 566 | 76 | 526 | 18 |
| **17NQL09C-15** | G2 | 4.27 | 23.2 | 0.18 | 0.0567 | 0.0063 | 0.654 | 0.062 | 0.0844 | 0.0025 | 480 | 246 | 511 | 38 | 522 | 15 |
| **17NQL09C-16** | G2 | 2.15 | 45.8 | 0.05 | 0.0590 | 0.0043 | 0.676 | 0.047 | 0.0838 | 0.0019 | 569 | 125 | 524 | 28 | 519 | 11 |
| **17NQL09C-18** | G2 | 2.85 | 24.0 | 0.12 | 0.0598 | 0.0068 | 0.702 | 0.075 | 0.0845 | 0.0026 | 598 | 250 | 540 | 45 | 523 | 15 |
| **17NQL09C-20** | G2 | 2.39 | 11.6 | 0.21 | 0.063 | 0.010 | 0.616 | 0.079 | 0.0812 | 0.0033 | 720 | 343 | 488 | 49 | 503 | 20 |
| **17NQL09C-21** | G2 | 1.83 | 35.6 | 0.05 | 0.0614 | 0.0067 | 0.668 | 0.065 | 0.0793 | 0.0024 | 654 | 203 | 519 | 39 | 492 | 15 |
| **17NQL09C-22** | G2 | 4.91 | 65.1 | 0.08 | 0.0599 | 0.0039 | 0.676 | 0.044 | 0.0813 | 0.0014 | 611 | 145 | 524 | 26 | 504 | 8 |
| **17NQL09C-23** | G2 | 6.45 | 45.2 | 0.14 | 0.0578 | 0.0043 | 0.645 | 0.044 | 0.0817 | 0.0017 | 524 | 165 | 505 | 27 | 506 | 10 |
| **17NQL09C-24** | G2 | 1.30 | 17.8 | 0.07 | 0.0617 | 0.0080 | 0.631 | 0.057 | 0.0802 | 0.0023 | 665 | 277 | 497 | 35 | 497 | 14 |
| **17NQL09C-26** | G2 | 4.02 | 102 | 0.04 | 0.0560 | 0.0027 | 0.630 | 0.030 | 0.0809 | 0.0011 | 450 | 106 | 496 | 19 | 502 | 6 |
| **17NQL09C-28** | G2 | 1.51 | 21.0 | 0.07 | 0.0566 | 0.0054 | 0.650 | 0.049 | 0.0847 | 0.0024 | 476 | 213 | 509 | 30 | 524 | 14 |

续表6

Table 6(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** |  | **Th** | **U** | **Th/U** | **Isotopic ratios** | | | | | | **Apparent age (Ma)** | | | | | |
|  |  | **ppm** | **ppm** | **Ratio** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |
| **17NQL09C-29** | G2 | 1.03 | 20.1 | 0.05 | 0.0644 | 0.0091 | 0.716 | 0.092 | 0.0818 | 0.0032 | 755 | 297 | 548 | 55 | 507 | 19 |
| **17NQL09C-30** | G2 | 1.99 | 11.4 | 0.18 | 0.076 | 0.012 | 0.711 | 0.089 | 0.0856 | 0.0033 | 1102 | 319 | 545 | 53 | 530 | 20 |
| **17NQL09C-32** | G2 | 1.42 | 30.9 | 0.05 | 0.0608 | 0.0060 | 0.669 | 0.056 | 0.0853 | 0.0020 | 632 | 183 | 520 | 34 | 527 | 12 |
| **17NQL09C-33** | G2 | 1.05 | 20.6 | 0.05 | 0.0622 | 0.0080 | 0.720 | 0.078 | 0.0872 | 0.0025 | 680 | 312 | 551 | 46 | 539 | 15 |
| **17NQL09C-36** | G1 | 0.29 | 45.0 | 0.01 | 0.0510 | 0.0055 | 0.636 | 0.051 | 0.0785 | 0.0019 | 243 | 230 | 500 | 32 | 487 | 11 |
| **17NQL09D-2** | G1 | 0.47 | 37.7 | 0.01 | 0.0587 | 0.0061 | 0.623 | 0.058 | 0.0790 | 0.0018 | 567 | 230 | 492 | 36 | 490 | 11 |
| **17NQL09D-3** | G2 | 1.46 | 31.7 | 0.05 | 0.0587 | 0.0057 | 0.701 | 0.057 | 0.0877 | 0.0020 | 554 | 213 | 540 | 34 | 542 | 12 |
| **17NQL09D-4** | G2 | 1.71 | 26.5 | 0.06 | 0.0616 | 0.0074 | 0.691 | 0.071 | 0.0858 | 0.0020 | 657 | 255 | 533 | 43 | 531 | 12 |
| **17NQL09D-6** | G2 | 13.5 | 59.5 | 0.23 | 0.0581 | 0.0046 | 0.666 | 0.050 | 0.0839 | 0.0014 | 532 | 172 | 518 | 30 | 519 | 8 |
| **17NQL09D-10** | G2 | 0.62 | 22.6 | 0.03 | 0.0605 | 0.0082 | 0.663 | 0.091 | 0.0798 | 0.0026 | 620 | 293 | 517 | 56 | 495 | 15 |
| **17NQL09D-12** | G2 | 5.73 | 131 | 0.04 | 0.0579 | 0.0032 | 0.688 | 0.037 | 0.0871 | 0.0014 | 524 | 122 | 532 | 22 | 538 | 8 |
| **17NQL09D-14** | G2 | 0.97 | 33.4 | 0.03 | 0.0571 | 0.0061 | 0.665 | 0.071 | 0.0854 | 0.0026 | 494 | 242 | 518 | 43 | 528 | 15 |

表7北秦岭松树沟榴闪岩中锆石微量元素组成

Table 7 Trace element compositionsfor zircons in the garnet amphibolite from Songshugou in the North Qinling.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** | **type** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **∑REE** | **(Yb/Sm)N** | **Eu/Eu\*** |
| **17NQL09-02-1** | G1 | 0.03 | 0.67 | 0.06 | 0.21 | 1.25 | 1.40 | 13.7 | 5.76 | 81.5 | 29.6 | 118 | 18.2 | 185 | 29.9 | 485 | 133 | 1.07 |
| **17NQL09-02-3** | G1 | 0.12 | 0.60 | 0.03 | 0.40 | 0.76 | 0.66 | 8.25 | 3.31 | 49.0 | 20.8 | 97.3 | 15.9 | 178 | 28.2 | 404 | 212 | 0.65 |
| **17-NQL09-1** | G2 | 0.01 | 0.78 | 0.01 | 0.19 | 0.34 | 0.32 | 2.65 | 0.90 | 9.76 | 3.28 | 12.3 | 2.40 | 21.0 | 3.92 | 57.8 | 54.8 | 1.02 |
| **17-NQL09-2** | G2 | 0.03 | 1.97 | 0.02 | 0.42 | 0.84 | 0.38 | 7.59 | 3.07 | 40.3 | 15.6 | 68.9 | 15.3 | 147 | 28.8 | 330 | 158 | 0.21 |
| **17-NQL09-3** | G2 | 0.02 | 0.77 | 0.01 | 0.10 | 0.38 | 0.35 | 2.64 | 0.92 | 12.0 | 5.05 | 26.3 | 6.19 | 65.2 | 14.7 | 135 | 152 | 1.13 |
| **17-NQL09-6** | G2 | b.d.l. | 0.55 | b.d.l. | 0.07 | 0.28 | 0.25 | 2.27 | 1.10 | 15.6 | 6.83 | 35.3 | 8.30 | 89.8 | 19.7 | 180 | 291 | 0.93 |
| **17-NQL09-7** | G2 | b.d.l. | 0.30 | b.d.l. | 0.07 | 0.15 | 0.17 | 1.93 | 0.92 | 14.5 | 6.92 | 40.5 | 11.3 | 138 | 34.7 | 249 | 802 | 0.89 |
| **17-NQL09-8** | G2 | b.d.l. | 0.81 | b.d.l. | 0.03 | 0.13 | 0.24 | 1.35 | 0.54 | 7.01 | 2.40 | 10.4 | 2.10 | 18.7 | 3.15 | 46.9 | 133 | 3.11 |
| **17-NQL09-9** | G2 | b.d.l. | 0.74 | b.d.l. | 0.29 | 0.33 | 0.36 | 3.91 | 1.46 | 15.9 | 5.13 | 17.0 | 2.84 | 22.8 | 3.79 | 74.5 | 62.9 | 0.97 |
| **17-NQL09-11** | G2 | b.d.l. | 0.62 | b.d.l. | 0.08 | 0.23 | 0.21 | 2.39 | 0.85 | 9.47 | 3.19 | 13.1 | 2.59 | 23.9 | 4.69 | 61.3 | 95 | 0.77 |
| **17-NQL09-12** | G2 | 0.01 | 0.91 | b.d.l. | 0.06 | 0.23 | 0.21 | 2.29 | 0.96 | 11.3 | 3.88 | 15.2 | 3.23 | 27.1 | 4.99 | 70.4 | 105 | 0.77 |
| **17-NQL09-13** | G2 | b.d.l. | 0.78 | b.d.l. | 0.04 | 0.17 | 0.22 | 2.03 | 0.79 | 9.08 | 3.47 | 15.4 | 3.36 | 33.4 | 7.11 | 75.8 | 181 | 1.40 |
| **17-NQL09-14** | G2 | b.d.l. | 0.75 | 0.01 | 0.03 | 0.16 | 0.15 | 1.08 | 0.49 | 5.71 | 1.88 | 7.95 | 1.68 | 15.2 | 2.78 | 37.9 | 85.1 | 1.14 |
| **17-NQL09-15** | G2 | b.d.l. | 0.40 | b.d.l. | 0.02 | 0.18 | 0.18 | 1.70 | 0.71 | 8.21 | 3.40 | 15.7 | 3.30 | 33.0 | 6.69 | 73.5 | 168 | 1.01 |
| **17-NQL09-16** | G2 | b.d.l. | 0.47 | b.d.l. | 0.03 | 0.16 | 0.12 | 1.49 | 0.57 | 6.24 | 1.88 | 6.95 | 1.20 | 9.83 | 1.73 | 30.7 | 53.7 | 0.52 |
| **17-NQL09-17** | G3 | 0.03 | 3.56 | 0.06 | 0.89 | 2.53 | 0.59 | 13.4 | 5.66 | 76.6 | 31.4 | 149 | 35.2 | 363 | 66.8 | 748 | 129 | 0.10 |
| **17-NQL09-18** | G2 | b.d.l. | 1.06 | 0.01 | 0.14 | 0.31 | 0.26 | 2.16 | 0.70 | 8.14 | 2.97 | 13.2 | 2.84 | 29.0 | 5.64 | 66.4 | 83.8 | 0.97 |
| **17-NQL09-19** | G2 | b.d.l. | 2.38 | 0.01 | 0.34 | 1.90 | 1.81 | 28.9 | 14.9 | 193 | 62.2 | 210 | 35.2 | 280 | 44.7 | 875 | 133 | 0.56 |
| **17-NQL09-20** | G2 | b.d.l. | 0.93 | b.d.l. | 0.01 | 0.26 | 0.20 | 2.70 | 0.99 | 10.6 | 3.32 | 12.4 | 2.37 | 20.9 | 3.66 | 58.3 | 72.0 | 0.53 |
| **17-NQL09-21** | G2 | b.d.l. | 0.24 | 0.04 | 0.02 | 0.08 | 0.14 | 1.09 | 0.49 | 7.08 | 3.35 | 18.3 | 4.90 | 58.7 | 14.5 | 109 | 623 | 2.09 |
| **17-NQL09-22** | G2 | 0.01 | 0.87 | b.d.l. | 0.08 | 0.13 | 0.15 | 1.38 | 0.53 | 6.59 | 2.52 | 11.2 | 2.24 | 22.4 | 4.08 | 52.1 | 151 | 1.20 |
| **17-NQL09-25** | G2 | 0.15 | 1.24 | 0.11 | 0.71 | 0.40 | 0.28 | 2.25 | 0.70 | 8.29 | 3.06 | 13.2 | 2.75 | 27.3 | 5.59 | 65.9 | 60.9 | 0.83 |
| **17-NQL09-27** | G2 | b.d.l. | 0.41 | b.d.l. | 0.05 | 0.27 | 0.27 | 3.28 | 1.42 | 19.3 | 7.66 | 36.0 | 8.01 | 87.5 | 18.2 | 182 | 294 | 0.80 |

续表7

Table 7(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** | **type** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **∑REE** | **(Yb/Sm)N** | **Eu/Eu\*** |
| **17-NQL09-28** | G2 | b.d.l. | 0.88 | 0.01 | 0.08 | 0.14 | 0.13 | 1.28 | 0.49 | 5.84 | 2.17 | 9.22 | 1.87 | 18.6 | 3.44 | 44.1 | 120 | 0.96 |
| **17-NQL09-29** | G2 | 0.01 | 0.91 | b.d.l. | 0.09 | 0.18 | 0.22 | 2.60 | 1.32 | 18.0 | 7.01 | 32.0 | 7.07 | 72.1 | 14.1 | 156 | 359 | 0.93 |
| **17-NQL09-30** | G2 | b.d.l. | 0.54 | b.d.l. | 0.06 | 0.25 | 0.21 | 2.09 | 0.86 | 8.23 | 2.55 | 8.70 | 1.58 | 13.9 | 2.34 | 41.3 | 49.6 | 0.79 |
| **NQL-09-A02** | G2 | b.d.l. | 0.53 | 0.01 | 0.07 | 0.34 | 0.27 | 1.72 | 0.67 | 7.57 | 2.46 | 9.54 | 1.61 | 15.3 | 3.03 | 43.2 | 40.3 | 1.19 |
| **NQL-09-A03** | G2 | 0.01 | 0.62 | 0.01 | 0.09 | 0.13 | 0.30 | 2.12 | 0.93 | 16.0 | 7.83 | 46.9 | 12.3 | 152 | 40.4 | 279 | 1017 | 2.97 |
| **NQL-09-A05** | G2 | b.d.l. | 0.89 | b.d.l. | 0.07 | 0.33 | 0.20 | 4.10 | 1.57 | 17.9 | 6.37 | 23.9 | 4.71 | 46.6 | 8.87 | 116 | 128 | 0.28 |
| **NQL-09-A06** | G2 | b.d.l. | 0.60 | 0.01 | 0.08 | 0.17 | 0.16 | 2.56 | 0.76 | 7.85 | 2.45 | 8.62 | 1.49 | 12.3 | 2.03 | 39.1 | 63.8 | 0.51 |
| **NQL-09-A07** | G2 | b.d.l. | 0.52 | b.d.l. | 0.07 | 0.15 | 0.15 | 1.53 | 0.93 | 14.3 | 5.55 | 27.8 | 6.55 | 74.4 | 18.4 | 150 | 455 | 0.94 |
| **NQL-09-A08** | G2 | 0.01 | 0.94 | 0.01 | b.d.l. | 0.36 | 0.30 | 3.49 | 1.26 | 13.3 | 4.42 | 16.1 | 3.38 | 31.0 | 5.27 | 79.8 | 78.5 | 0.68 |
| **NQL-09-A09** | G2 | 0.01 | 0.93 | 0.01 | 0.13 | 0.38 | 0.25 | 4.44 | 1.38 | 15.0 | 4.79 | 18.7 | 3.33 | 30.0 | 5.56 | 84.9 | 70.2 | 0.36 |
| **NQL-09-A10** | G2 | 0.02 | 0.73 | 0.01 | 0.13 | 0.38 | 0.35 | 5.48 | 2.09 | 26.8 | 10.7 | 44.7 | 9.11 | 88.5 | 18.7 | 208 | 209 | 0.56 |
| **NQL-09-A11** | G2 | b.d.l. | 0.82 | b.d.l. | 0.03 | 0.19 | 0.14 | 1.80 | 0.53 | 6.19 | 2.00 | 7.20 | 1.22 | 12.2 | 2.21 | 34.6 | 58.6 | 0.56 |
| **NQL-09-A18** | G2 | 0.01 | 0.99 | b.d.l. | 0.11 | 0.39 | 0.33 | 4.72 | 1.82 | 22.0 | 9.62 | 51.8 | 12.9 | 149 | 41.0 | 295 | 341 | 0.56 |
| **NQL-09-A19** | G1 | b.d.l. | 0.81 | 0.01 | 0.16 | 1.33 | 1.11 | 11.5 | 3.13 | 13.4 | 1.89 | 3.64 | 0.42 | 2.4 | 0.34 | 40.1 | 1.63 | 0.75 |
| **NQL-09-A21** | G2 | b.d.l. | 0.14 | b.d.l. | b.d.l. | 0.06 | 0.08 | 0.58 | 0.31 | 5.28 | 2.86 | 17.3 | 4.53 | 54.1 | 14.6 | 99.8 | 787 | 1.69 |
| **NQL-09-A22** | G2 | b.d.l. | 0.42 | b.d.l. | 0.06 | 0.32 | 0.19 | 2.08 | 0.84 | 7.18 | 2.21 | 8.37 | 1.67 | 11.6 | 2.38 | 37.3 | 32.2 | 0.50 |
| **NQL-09-A23** | G2 | b.d.l. | 0.92 | 0.01 | 0.03 | 0.22 | 0.28 | 2.50 | 0.97 | 11.7 | 4.81 | 21.5 | 4.26 | 41.4 | 8.09 | 96.6 | 169 | 1.31 |
| **NQL-09-A24** | G2 | b.d.l. | 0.60 | b.d.l. | 0.17 | 0.24 | 0.12 | 1.80 | 0.85 | 8.20 | 3.04 | 12.6 | 2.29 | 20.8 | 4.19 | 54.9 | 78.0 | 0.32 |
| **NQL-09-A27** | G2 | b.d.l. | 0.96 | 0.01 | 0.27 | 0.10 | 0.17 | 1.98 | 0.87 | 8.21 | 2.77 | 10.6 | 1.82 | 15.4 | 3.30 | 46.4 | 133 | 1.24 |
| **NQL-09-A28** | G2 | b.d.l. | 0.57 | b.d.l. | 0.04 | 0.12 | 0.16 | 2.49 | 1.33 | 17.5 | 7.22 | 35.3 | 7.94 | 75.8 | 15.8 | 164 | 569 | 0.75 |
| **NQL-09-A29** | G2 | 2.49 | 3.80 | 1.04 | 5.87 | 4.51 | 1.15 | 17.5 | 8.60 | 106 | 47.4 | 249 | 58.1 | 564 | 114 | 1183 | 112 | 0.16 |
| **NQL-09-A30** | G2 | b.d.l. | 0.65 | b.d.l. | 0.14 | 0.23 | 0.16 | 1.98 | 0.70 | 9.03 | 3.93 | 20.9 | 4.60 | 46.8 | 10.1 | 99.3 | 183 | 0.51 |
| **NQL-09-A31** | G2 | b.d.l. | 0.75 | b.d.l. | 0.03 | 0.28 | 0.24 | 1.97 | 0.90 | 11.7 | 5.18 | 29.4 | 7.11 | 74.1 | 17.9 | 150 | 241 | 1.00 |

续表7

Table 7(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** | **type** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **∑REE** | **(Yb/Sm)N** | **Eu/Eu\*** |
| **NQL-09-A32** | G2 | b.d.l. | 0.66 | b.d.l. | 0.03 | 0.17 | 0.14 | 1.63 | 0.93 | 11.9 | 5.17 | 26.6 | 6.47 | 72.3 | 17.3 | 143 | 383 | 0.69 |
| **NQL-09-A35** | G2 | 0.03 | 0.75 | 0.02 | 0.04 | 0.18 | 0.12 | 1.32 | 0.42 | 5.08 | 1.83 | 8.16 | 1.70 | 16.7 | 3.38 | 39.8 | 81.9 | 0.59 |
| **NQL-09-A36** | G2 | b.d.l. | 0.81 | b.d.l. | 0.22 | 0.47 | 0.34 | 2.75 | 1.25 | 12.10 | 4.18 | 17.6 | 3.92 | 34.5 | 7.06 | 85.3 | 65.6 | 0.85 |
| **NQL-09-A37** | G2 | 0.04 | 1.80 | 0.02 | 0.23 | 0.61 | 0.55 | 13.3 | 8.13 | 105 | 39.2 | 164 | 30.1 | 244 | 46.2 | 653 | 358 | 0.35 |
| **17NQL09-B3** | G3 | 0.01 | 1.51 | 0.08 | 2.12 | 5.16 | 1.34 | 34.1 | 11.0 | 150 | 57.8 | 278 | 46.9 | 509 | 78.4 | 1176 | 88.9 | 0.10 |
| **17NQL09-B4** | G3 | b.d.l. | 0.80 | 0.02 | 0.62 | 2.03 | 0.66 | 13.5 | 4.69 | 60.5 | 24.5 | 122 | 21.7 | 237 | 37.0 | 525 | 105 | 0.15 |
| **17NQL09C-1** | G2 | b.d.l. | 0.63 | b.d.l. | 0.11 | 0.20 | 0.20 | 2.58 | 0.92 | 15.4 | 5.61 | 31.0 | 8.49 | 94.2 | 20.5 | 180 | 420 | 0.74 |
| **17NQL09C-4** | G2 | b.d.l. | 0.91 | b.d.l. | 0.09 | 0.57 | 0.42 | 3.67 | 1.57 | 27.7 | 10.3 | 50.1 | 12.3 | 126 | 23.7 | 258 | 198 | 0.77 |
| **17NQL09C-5** | G2 | 0.01 | 0.90 | b.d.l. | 0.09 | 0.32 | 0.20 | 3.04 | 0.74 | 13.3 | 5.22 | 26.0 | 6.82 | 73.3 | 15.3 | 145 | 204 | 0.39 |
| **17NQL09C-6** | G2 | b.d.l. | 0.88 | 0.01 | 0.05 | 0.35 | 0.25 | 3.36 | 0.83 | 12.6 | 4.00 | 16.7 | 3.99 | 33.2 | 6.25 | 82.4 | 85.8 | 0.49 |
| **17NQL09C-7** | G2 | b.d.l. | 0.49 | b.d.l. | b.d.l. | 0.20 | 0.13 | 1.67 | 0.77 | 16.3 | 6.30 | 35.1 | 8.55 | 105 | 21.3 | 196 | 475 | 0.49 |
| **17NQL09C-12** | G2 | b.d.l. | 0.29 | b.d.l. | b.d.l. | 0.17 | 0.18 | 3.45 | 1.17 | 19.9 | 5.64 | 23.4 | 4.53 | 41.6 | 6.31 | 107 | 220 | 0.54 |
| **17NQL09C-13** | G2 | 0.01 | 0.53 | b.d.l. | 0.01 | 0.15 | 0.11 | 1.72 | 0.57 | 7.64 | 2.56 | 10.0 | 2.04 | 20.8 | 3.38 | 49.5 | 128 | 0.42 |
| **17NQL09C-14** | G2 | 0.01 | 0.45 | b.d.l. | 0.04 | 0.06 | 0.04 | 0.90 | 0.38 | 5.36 | 1.61 | 7.57 | 1.53 | 13.7 | 2.73 | 34.4 | 215 | 0.22 |
| **17NQL09C-15** | G2 | 0.01 | 0.78 | b.d.l. | b.d.l. | 0.22 | 0.10 | 1.79 | 0.43 | 6.48 | 1.97 | 8.67 | 2.13 | 20.0 | 3.51 | 46.0 | 81.2 | 0.24 |
| **17NQL09C-16** | G2 | b.d.l. | 0.45 | b.d.l. | 0.03 | 0.17 | 0.21 | 3.14 | 1.10 | 19.6 | 7.81 | 40.6 | 10.1 | 110 | 23.4 | 217 | 580 | 0.78 |
| **17NQL09C-18** | G2 | b.d.l. | 0.77 | 0.01 | 0.01 | 0.22 | 0.10 | 2.44 | 0.66 | 10.2 | 3.18 | 14.8 | 3.37 | 33.7 | 5.99 | 75.4 | 137 | 0.17 |
| **17NQL09C-20** | G2 | b.d.l. | 0.65 | 0.01 | 0.03 | 0.06 | 0.08 | 0.96 | 0.21 | 3.81 | 1.18 | 4.99 | 1.07 | 9.0 | 1.57 | 23.6 | 144 | 1.03 |
| **17NQL09C-21** | G2 | b.d.l. | 0.49 | b.d.l. | 0.10 | 0.26 | 0.06 | 1.90 | 0.78 | 10.5 | 3.99 | 18.0 | 4.16 | 44.0 | 8.43 | 92.6 | 153 | 0.07 |
| **17NQL09C-22** | G2 | 0.16 | 1.16 | 0.04 | 0.67 | 0.45 | 0.19 | 2.01 | 0.53 | 10.5 | 5.05 | 32.1 | 9.84 | 120 | 26.9 | 209 | 238 | 0.38 |
| **17NQL09C-23** | G2 | b.d.l. | 1.71 | b.d.l. | 0.12 | 0.36 | 0.32 | 3.71 | 0.79 | 8.42 | 2.23 | 10.0 | 2.37 | 20.5 | 4.08 | 54.6 | 50.8 | 0.69 |
| **17NQL09C-24** | G2 | b.d.l. | 0.62 | b.d.l. | 0.06 | 0.24 | 0.18 | 2.17 | 0.55 | 9.20 | 2.76 | 10.7 | 2.25 | 20.6 | 3.20 | 52.5 | 78.4 | 0.60 |
| **17NQL09C-26** | G2 | 0.03 | 0.81 | 0.01 | 0.28 | 0.55 | 0.31 | 5.36 | 2.41 | 40.5 | 13.6 | 62.6 | 13.7 | 137 | 24.1 | 301 | 224 | 0.31 |

续表7

Table 7(continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spot** | **type** | **La** | **Ce** | **Pr** | **Nd** | **Sm** | **Eu** | **Gd** | **Tb** | **Dy** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** | **∑REE** | **(Yb/Sm)N** | **Eu/Eu\*** |
| **17NQL09C-28** | G2 | b.d.l. | 0.94 | b.d.l. | 0.03 | 0.18 | 0.13 | 1.51 | 0.57 | 6.28 | 1.85 | 7.42 | 1.54 | 13.5 | 2.39 | 36.3 | 68.7 | 0.62 |
| **17NQL09C-29** | G2 | b.d.l. | 0.51 | 0.01 | b.d.l. | 0.78 | 0.42 | 4.22 | 1.26 | 13.3 | 2.95 | 9.61 | 1.73 | 15.0 | 2.90 | 52.7 | 17.2 | 0.50 |
| **17NQL09C-30** | G2 | b.d.l. | 0.49 | b.d.l. | 0.13 | 0.03 | 0.10 | 0.89 | 0.29 | 3.79 | 1.38 | 5.25 | 1.11 | 11.8 | 1.96 | 27.2 | 388 | 4.19 |
| **17NQL09C-32** | G2 | b.d.l. | 0.86 | b.d.l. | 0.12 | 0.44 | 0.31 | 3.98 | 1.18 | 17.2 | 4.91 | 19.2 | 3.99 | 36.3 | 6.39 | 94.9 | 74.7 | 0.50 |
| **17NQL09C-33** | G2 | 0.01 | 1.16 | b.d.l. | 0.10 | 0.09 | 0.16 | 2.16 | 0.66 | 8.94 | 2.44 | 9.02 | 1.79 | 16.3 | 3.05 | 45.9 | 172 | 1.30 |
| **17NQL09C-36** | G1 | b.d.l. | 0.26 | 0.01 | 0.04 | 0.46 | 0.21 | 3.02 | 0.67 | 4.04 | 0.55 | 1.23 | 0.16 | 2.14 | 0.24 | 13.0 | 4.22 | 0.30 |
| **17NQL09D-2** | G1 | b.d.l. | 0.29 | b.d.l. | 0.07 | 0.20 | 0.26 | 2.36 | 0.57 | 2.88 | 0.33 | 0.68 | 0.04 | 0.52 | 0.15 | 8.34 | 2.39 | 1.41 |
| **17NQL09D-3** | G2 | b.d.l. | 0.78 | 0.01 | 0.07 | 0.29 | 0.18 | 1.75 | 0.63 | 5.74 | 1.57 | 4.32 | 0.81 | 7.33 | 1.40 | 24.9 | 22.8 | 0.61 |
| **17NQL09D-4** | G2 | b.d.l. | 0.78 | b.d.l. | 0.10 | 0.33 | 0.28 | 2.80 | 1.24 | 13.5 | 4.54 | 18.2 | 3.34 | 28.5 | 5.48 | 79.0 | 77.8 | 0.82 |
| **17NQL09D-6** | G2 | 0.01 | 1.66 | 0.03 | 0.26 | 0.79 | 0.52 | 3.94 | 0.85 | 6.87 | 1.92 | 7.12 | 1.40 | 13.7 | 2.66 | 41.8 | 15.7 | 0.83 |
| **17NQL09D-10** | G2 | 0.01 | 0.44 | 0.01 | b.d.l. | 0.23 | 0.15 | 2.23 | 1.12 | 14.4 | 6.13 | 29.3 | 6.69 | 75.1 | 19.0 | 155 | 297 | 0.44 |
| **17NQL09D-12** | G2 | b.d.l. | 1.14 | b.d.l. | 0.01 | 0.18 | 0.19 | 2.86 | 1.24 | 20.3 | 9.59 | 53.3 | 13.3 | 158 | 42.3 | 303 | 806 | 0.69 |
| **17NQL09D-14** | G2 | 0.01 | 0.50 | b.d.l. | 0.04 | 0.37 | 0.25 | 2.90 | 1.01 | 14.0 | 6.61 | 33.4 | 7.71 | 80.2 | 18.5 | 165 | 194 | 0.55 |