附表1 官坡地区花岗伟晶岩主量元素（wt%）和微量元素（×10-6）组成

Table 1 Major（wt%）and trace（×10-6）element data of Guanpo pegmatites

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 岩石类型 | 样号 | SiO2 | Al2O3 | Fe2O3 | FeO | CaO | MgO | K2O | Na2O | TiO2 | P2O5 | MnO | 灼失 | 总量 | *σ* | K2O/Na2O | A/CNK |
| 锂辉石钠长石伟晶岩 | H2/PD06 | 87.99 | 8.10 | 0.12 | 0.10 | 0.42 | 0.12 | 1.03 | 0.94 | 0.015 | 0.10 | 0.05 | 0.99 | 99.97 | 0.09 | 1.10 | 2.36 |
| 锂辉石微斜长石钠长石伟晶岩 | H3/PD06 | 78.00 | 13.35 | 0.21 | 0.15 | 0.52 | 0.08 | 2.52 | 3.33 | 0.034 | 0.37 | 0.12 | 1.30 | 99.99 | 0.98 | 0.76 | 1.46 |
| 锂辉石微斜长石伟晶岩 | H4/PD06 | 71.55 | 15.52 | 0.03 | 0.07 | 1.00 | 0.14 | 6.83 | 2.97 | 0.023 | 0.53 | 0.10 | 1.21 | 99.98 | 3.36 | 2.30 | 1.10 |
| 粉色电气石钠长石伟晶岩 | H1/PD15 | 63.45 | 24.31 | 0.01 | 0.10 | 0.33 | 0.05 | 3.30 | 5.74 | 0.021 | 0.16 | 0.18 | 2.34 | 100.00 | 2.29 | 0.57 | 1.17 |
| 电气石钠长石微斜长石伟晶岩 | B2/D02 | 74.45 | 15.01 | 0.51 | 0.10 | 0.60 | 0.16 | 4.03 | 4.45 | 0.060 | 0.14 | 0.01 | 0.45 | 99.97 | 3.53 | 0.91 | 1.13 |
| 电气石钠长石微斜长石伟晶岩 | B3/D02 | 73.73 | 14.60 | 0.22 | 0.10 | 0.16 | 0.10 | 7.99 | 2.42 | 0.046 | 0.15 | 0.01 | 0.44 | 99.97 | 1.65 | 3.30 | 1.15 |
| 电气石钠长石微斜长石伟晶岩 | B1/D03 | 78.59 | 11.76 | 0.42 | 0.26 | 0.34 | 0.10 | 5.45 | 2.22 | 0.029 | 0.13 | 0.10 | 0.58 | 99.97 | 2.28 | 2.45 | 1.22 |
| 电气石钠长石微斜长石伟晶岩 | B1/D04 | 75.08 | 14.17 | 0.59 | 0.12 | 0.37 | 0.13 | 5.67 | 2.89 | 0.038 | 0.21 | 0.03 | 0.69 | 99.99 | 4.00 | 1.96 | 1.78 |
| 锂辉石锂云母伟晶岩 | B1/GP | 72.32 | 15.26 | 0.24 | 0.73 | 1.17 | 0.22 | 3.93 | 2.45 | 0.012 | 0.79 | 0.26 | 2.55 | 99.93 | 1.39 | 1.60 | 1.46 |
| 锂辉石锂云母伟晶岩 | B2/GP | 70.03 | 16.97 | 0.06 | 0.67 | 1.53 | 0.26 | 3.38 | 2.52 | 0.009 | 1.16 | 0.14 | 3.15 | 99.88 | 1.29 | 1.34 | 1.60 |
| 锂辉石锂云母伟晶岩 | B3/GP | 71.64 | 15.26 | 0.24 | 0.56 | 1.78 | 0.18 | 4.10 | 1.82 | 0.007 | 0.86 | 0.15 | 3.29 | 99.88 | 1.22 | 2.25 | 1.43 |
| 锂辉石锂云母伟晶岩 | B4/GP | 74.51 | 14.19 | 0.05 | 0.79 | 1.51 | 0.18 | 2.46 | 2.45 | 0.007 | 0.57 | 0.11 | 3.03 | 99.85 | 0.77 | 1.00 | 1.50 |
| 黑色电气石白云母伟晶岩 | B5/GP | 77.24 | 13.62 | 1.23 | 0.73 | 0.27 | 0.10 | 1.24 | 4.43 | 0.028 | 0.13 | 0.05 | 0.84 | 99.91 | 0.94 | 0.28 | 1.49 |
| 黑色电气石白云母伟晶岩 | B6/GP | 72.64 | 16.35 | 0.23 | 0.36 | 0.47 | 0.03 | 1.98 | 6.33 | 0.016 | 0.52 | 0.10 | 0.90 | 99.92 | 2.33 | 0.31 | 1.22 |
| 黑色电气石白云母伟晶岩 | B7/GP | 74.90 | 14.05 | 0.32 | 0.40 | 0.56 | 0.03 | 4.69 | 3.74 | 0.015 | 0.38 | 0.09 | 0.71 | 99.89 | 2.23 | 1.25 | 1.15 |
| 黑色电气石白云母伟晶岩 | B8/GP | 74.91 | 14.93 | 0.53 | 0.32 | 0.34 | 0.20 | 3.08 | 3.31 | 0.015 | 0.26 | 0.04 | 2.01 | 99.95 | 1.28 | 0.93 | 1.59 |
| 黑色电气石白云母伟晶岩 | B9/GP | 70.65 | 16.13 | 0.32 | 0.44 | 0.37 | 0.13 | 8.03 | 2.18 | 0.005 | 0.41 | 0.03 | 1.20 | 99.89 | 3.77 | 3.68 | 1.24 |
| 岩石类型 | 样号 | Rb | Cs | Sr | Ba | Nb | Ta | Zr | Hf | Ga | U | Th | La | Ce | Pr | Nd | Sm |
| 锂辉石钠长石伟晶岩 | H2/PD06 | 759 |  | 25.10 | 20.10 | 31.60 | 8.47 | 6.83 | 0.68 | 18.80 | 1.49 | 0.27 | 0.280 | 0.560 | 0.064 | 0.250 | 0.056 |
| 锂辉石微斜长石钠长石伟晶岩 | H3/PD06 | 2170 |  | 24.40 | 25.80 | 66.10 | 31.80 | 6.39 | 0.82 | 31.20 | 3.86 | 0.81 | 0.660 | 1.340 | 0.120 | 0.430 | 0.070 |
| 锂辉石微斜长石伟晶岩 | H4/PD06 | 3970 |  | 17.60 | 20.00 | 26.10 | 22.40 | 5.93 | 0.77 | 21.30 | 1.02 | 0.30 | 0.150 | 0.150 | 0.017 | 0.051 | 0.008 |
| 粉色电气石钠长石伟晶岩 | H1/PD15 | 5660 |  | 11.90 | 14.00 | 59.40 | 108.00 | 8.63 | 2.16 | 35.80 | 10.60 | 1.30 | 0.140 | 0.200 | 0.030 | 0.100 | 0.020 |
| 电气石钠长石微斜长石伟晶岩 | B2/D02 | 200 |  | 7.92 | 23.60 | 1.35 | 0.68 | 16.30 | 0.80 | 12.90 | 1.62 | 2.15 | 3.210 | 6.740 | 0.830 | 3.040 | 1.220 |
| 电气石钠长石微斜长石伟晶岩 | B3/D02 | 396 |  | 11.80 | 52.20 | 3.02 | 0.30 | 3.30 | 0.11 | 9.66 | 0.36 | 0.17 | 0.240 | 0.630 | 0.054 | 0.200 | 0.110 |
| 电气石钠长石微斜长石伟晶岩 | B1/D03 | 288 |  | 11.30 | 83.80 | 17.00 | 8.92 | 18.80 | 1.43 | 10.10 | 1.54 | 0.78 | 0.830 | 1.410 | 0.180 | 0.640 | 0.210 |
| 电气石钠长石微斜长石伟晶岩 | B1/D04 | 382 |  | 5.38 | 42.00 | 14.80 | 2.02 | 9.38 | 0.58 | 15.90 | 1.13 | 0.85 | 0.970 | 1.920 | 0.280 | 1.050 | 0.770 |
| 锂辉石锂云母伟晶岩 | B1/GP | 1804 | 739 | 106.00 | 47.00 | 103.00 | 88.30 | 7.30 | 1.00 | 33.60 | 9.12 | 1.50 | 0.510 | 0.800 | 0.077 | 0.230 | 0.086 |
| 锂辉石锂云母伟晶岩 | B2/GP | 2731 | 1317 | 64.00 | 51.00 | 126.00 | 134.50 | 12.40 | 1.86 | 42.60 | 8.70 | 3.47 | 0.330 | 0.540 | 0.051 | 0.180 | 0.088 |
| 锂辉石锂云母伟晶岩 | B3/GP | 2223 | 846 | 136.00 | 55.00 | 105.00 | 104.20 | 4.40 | 0.59 | 35.60 | 6.34 | 3.04 | 0.460 | 0.670 | 0.064 | 0.230 | 0.100 |
| 锂辉石锂云母伟晶岩 | B4/GP | 1531 | 664 | 125.00 | 27.00 | 116.00 | 119.50 | 12.50 | 1.62 | 33.50 | 7.62 | 2.14 | 0.320 | 0.500 | 0.048 | 0.180 | 0.079 |
| 黑色电气石白云母伟晶岩 | B5/GP | 173 | 41 | 7.00 | 15.00 | 310.00 | 39.90 | 37.90 | 2.31 | 28.40 | 1.80 | 5.77 | 2.180 | 4.900 | 0.560 | 1.960 | 1.087 |
| 黑色电气石白云母伟晶岩 | B6/GP | 674 | 93 | 19.00 | 50.00 | 89.00 | 112.00 | 23.50 | 3.10 | 41.00 | 1.09 | 1.98 | 9.060 | 1.860 | 1.752 | 6.240 | 1.031 |
| 黑色电气石白云母伟晶岩 | B7/GP | 991 | 128 | 77.00 | 362.00 | 148.00 | 128.80 | 22.40 | 2.18 | 31.40 | 1.74 | 1.09 | 1.290 | 2.120 | 0.292 | 0.990 | 0.363 |
| 黑色电气石白云母伟晶岩 | B8/GP | 645 | 228 | 11.00 | 39.00 | 61.00 | 32.50 | 11.70 | 1.24 | 37.00 | 0.51 | 0.94 | 0.780 | 1.660 | 0.186 | 0.620 | 0.460 |
| 黑色电气石白云母伟晶岩 | B9/GP | 3028 | 714 | 37.00 | 47.00 | 49.00 | 40.10 | 20.10 | 1.96 | 28.50 | 0.88 | 0.54 | 1.080 | 0.550 | 0.192 | 0.700 | 0.176 |
| 岩石类型 | 样号 | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | Y | Nb/Ta | ∑REE | LREE/HREE | （La/Yb）N | *δ*Eu | TE3,4 |
| 锂辉石钠长石伟晶岩 | H2/PD06 | 0.015 | 0.068 | 0.012 | 0.084 | 0.017 | 0.048 | 0.007 | 0.050 | 0.009 | 0.410 | 3.731 | 1.520 | 4.155 | 4.017 | 0.742 | 0.956 |
| 锂辉石微斜长石钠长石伟晶岩 | H3/PD06 | 0.018 | 0.084 | 0.014 | 0.082 | 0.018 | 0.054 | 0.010 | 0.063 | 0.009 | 0.470 | 2.079 | 2.970 | 7.905 | 7.515 | 0.717 | 1.037 |
| 锂辉石微斜长石伟晶岩 | H4/PD06 | 0.006 | 0.012 | 0.003 | 0.012 | 0.003 | 0.007 | 0.002 | 0.010 | 0.001 | 0.091 | 1.165 | 0.430 | 7.792 | 11.208 | 1.840 | 1.355 |
| 粉色电气石钠长石伟晶岩 | H1/PD15 | 0.004 | 0.016 | 0.004 | 0.026 | 0.004 | 0.010 | 0.002 | 0.010 | 0.001 | 0.140 | 0.550 | 0.567 | 6.792 | 10.247 | 0.628 | 1.379 |
| 电气石钠长石微斜长石伟晶岩 | B2/D02 | 0.040 | 1.510 | 0.310 | 2.540 | 0.510 | 1.220 | 0.180 | 1.050 | 0.130 | 16.50 | 1.985 | 22.530 | 2.024 | 2.193 | 0.090 | 1.097 |
| 电气石钠长石微斜长石伟晶岩 | B3/D02 | 0.038 | 0.140 | 0.042 | 0.320 | 0.068 | 0.170 | 0.027 | 0.150 | 0.018 | 2.110 | 10.07 | 2.207 | 1.360 | 1.148 | 0.936 | 1.220 |
| 电气石钠长石微斜长石伟晶岩 | B1/D03 | 0.092 | 0.350 | 0.064 | 0.450 | 0.110 | 0.360 | 0.062 | 0.460 | 0.074 | 2.220 | 1.906 | 5.292 | 1.742 | 1.294 | 1.031 | 0.987 |
| 电气石钠长石微斜长石伟晶岩 | B1/D04 | 0.048 | 1.050 | 0.250 | 1.920 | 0.400 | 0.970 | 0.160 | 1.000 | 0.120 | 13.40 | 7.327 | 10.908 | 0.858 | 0.696 | 0.163 | 1.169 |
| 锂辉石锂云母伟晶岩 | B1/GP | 0.020 | 0.052 | 0.011 | 0.062 | 0.011 | 0.026 | 0.005 | 0.039 | 0.005 | 0.400 | 1.166 | 1.930 | 8.166 | 9.380 | 0.846 | 1.207 |
| 锂辉石锂云母伟晶岩 | B2/GP | 0.015 | 0.041 | 0.007 | 0.055 | 0.008 | 0.028 | 0.005 | 0.041 | 0.003 | 0.320 | 0.937 | 1.390 | 6.404 | 5.773 | 0.668 | 1.358 |
| 锂辉石锂云母伟晶岩 | B3/GP | 0.021 | 0.063 | 0.011 | 0.079 | 0.014 | 0.042 | 0.004 | 0.044 | 0.006 | 0.560 | 1.008 | 1.810 | 5.875 | 7.499 | 0.754 | 0.951 |
| 锂辉石锂云母伟晶岩 | B4/GP | 0.018 | 0.041 | 0.006 | 0.039 | 0.007 | 0.023 | 0.005 | 0.029 | 0.003 | 0.360 | 0.971 | 1.298 | 7.484 | 7.915 | 0.867 | 1.194 |
| 黑色电气石白云母伟晶岩 | B5/GP | 0.042 | 1.291 | 0.400 | 1.612 | 0.156 | 0.328 | 0.053 | 0.329 | 0.037 | 6.460 | 7.769 | 14.935 | 2.551 | 4.753 | 0.108 | 1.529 |
| 黑色电气石白云母伟晶岩 | B6/GP | 0.247 | 1.160 | 0.153 | 0.799 | 0.132 | 0.335 | 0.045 | 0.292 | 0.035 | 5.000 | 0.795 | 23.141 | 6.842 | 22.256 | 0.688 | 1.015 |
| 黑色电气石白云母伟晶岩 | B7/GP | 0.114 | 0.350 | 0.099 | 0.435 | 0.049 | 0.107 | 0.017 | 0.127 | 0.018 | 1.900 | 1.149 | 6.371 | 4.300 | 7.286 | 0.965 | 1.352 |
| 黑色电气石白云母伟晶岩 | B8/GP | 0.028 | 0.662 | 0.245 | 0.868 | 0.073 | 0.113 | 0.014 | 0.083 | 0.011 | 3.260 | 1.877 | 5.803 | 1.805 | 6.741 | 0.155 | 1.487 |
| 黑色电气石白云母伟晶岩 | B9/GP | 0.034 | 0.137 | 0.018 | 0.107 | 0.023 | 0.059 | 0.008 | 0.050 | 0.012 | 0.680 | 1.222 | 3.146 | 6.599 | 15.494 | 0.645 | 0.800 |

注：H2/PD06、H3/PD06、H4/PD06、H1/PD15、B2/D02、B3/D02、B1/D03、B1/D04样品数据为作者在天津地质调查中心实验室测试，B1/GP、B2/GP、B3/GP、B4/GP、B5/GP、B6/GP、B7/GP、B8/GP、B9/GP样品数据引自王盘喜等（2017），里特曼指数*σ*=（K2O+Na2O）2/（SiO2-43）, A/CNK=n（Al2O3）/[ n（CaO）+n（Na2O）+n（K2O）]（分子数）, A/NK=n（Al2O3）/[n（Na2O）+n（K2O）]（分子数）