附表1凤水山地区安山岩全岩主量元素（%）、微量元素和稀土元素（10-6）数据

Table 1 Bulk-rock major elements（%），trace elements and rare earth elements（10-6）data of andesites in the Fengshui mountain area

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样品号 | PM22YQ3 | YQ3772-1-1 | PM01YQ1 | PM01YQ2 | 样品号 | PM22YQ3 | YQ3772-1-1 | PM01YQ1 | PM01YQ2 |
| SiO2 | 53.52 | 60.38 | 56.52 | 55.53 | Tm | 0.36 | 0.42 | 0.32 | 0.53 |
| TiO2 | 1.10 | 0.97 | 1.14 | 1.67 | Yb | 2.32 | 2.65 | 1.90 | 3.18 |
| Al2O3 | 17.41 | 16.64 | 16.90 | 16.17 | Lu | 0.36 | 0.54 | 0.31 | 0.52 |
| Fe2O3 | 6.46 | 2.05 | 4.98 | 4.94 | Y | 23.9 | 29.6 | 24.3 | 40.7 |
| FeO | 0.95 | 3.18 | 2.08 | 3.63 | ΣREE | 183.3 | 238.5 | 266.7 | 313.0 |
| MnO | 0.12 | 0.089 | 0.11 | 0.14 | LREE | 165.8 | 218.2 | 248.1 | 285.0 |
| MgO | 5.97 | 1.96 | 3.04 | 3.09 | HREE | 17.5 | 20.3 | 18.6 | 28.0 |
| CaO | 5.27 | 3.64 | 4.72 | 5.11 | LREE/HREE | 9.49 | 10.74 | 13.33 | 10.17 |
| Na2O | 4.00 | 4.65 | 3.85 | 3.83 | *δ*Eu | 0.99 | 0.92 | 0.84 | 0.74 |
| K2O | 1.60 | 3.40 | 3.11 | 3.06 | (La/Yb)N | 11.41 | 13.46 | 20.40 | 13.05 |
| P2O5 | 0.26 | 0.24 | 0.59 | 0.86 | Cs | 1.07 | 3.39 | 7.35 | 3.61 |
| LOI | 3.13 | 2.59 | 2.65 | 1.70 | Rb | 54.9 | 100 | 95.5 | 90.3 |
| Total | 99.79 | 99.77 | 99.69 | 99.72 | Sr | 379 | 380 | 988 | 833 |
| Mg# | 75 | 47 | 57 | 50 | Ba | 944 | 1257 | 1169 | 1031 |
| Na2O /K2O | 2.51 | 1.37 | 1.23 | 1.25 | Ga | 23.3 | 22.1 | 23.1 | 23.7 |
| A/NK | 2.09 | 1.47 | 1.74 | 1.68 | Nb | 10.8 | 14.1 | 16.0 | 28.3 |
| A/CNK | 0.97 | 0.93 | 0.92 | 0.86 | Ta | 0.69 | 0.79 | 0.83 | 1.46 |
| La | 39.1 | 52.8 | 57.4 | 61.4 | Zr | 229 | 427 | 370 | 467 |
| Ce | 75.5 | 98.0 | 114 | 128 | Hf | 5.91 | 9.66 | 9.01 | 11.3 |
| Pr | 8.82 | 12.0 | 13.4 | 16.2 | Th | 7.40 | 8.93 | 8.94 | 7.70 |
| Nd | 34.4 | 45.5 | 52.3 | 65.1 | V | 122 | 88.4 | 137 | 151 |
| Sm | 6.05 | 7.69 | 8.77 | 11.8 | Cr | 161 | 33.1 | 26.8 | 49.9 |
| Eu | 1.90 | 2.24 | 2.27 | 2.70 | Co | 34.3 | 12.4 | 18.0 | 22.0 |
| Gd | 5.47 | 6.87 | 7.42 | 9.93 | Ni | 57.1 | 17.6 | 18.7 | 29.3 |
| Tb | 0.84 | 1.10 | 1.00 | 1.47 | Li | 32.3 | 26.8 | 47.6 | 23.2 |
| Dy | 4.77 | 5.33 | 4.61 | 7.30 | Sc | 18.6 | 14.9 | 12.5 | 17.0 |
| Ho | 0.89 | 1.02 | 0.82 | 1.37 | U | 1.36 | 1.58 | 1.81 | 1.32 |
| Er | 2.47 | 2.40 | 2.24 | 3.73 | Pb | 12.46 | 21.37 | 32.02 | 22.42 |

注：Mg#=100×MgO/（MgO+FeO\*）（摩尔比），FeO\*= FeO+0.899×Fe2O3.

附表2凤水山地区安山岩锆石LA-MC-ICP-MS U-Pb分析结果

Table 2 Zircon U-Pb analytical data of andesites in the Fengshui mountain area

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 测点号 | 含量（10-6） | Th/U | 同位素比值 | 年龄（Ma） | 谐和度 |
| Pb | Th | U | 207Pb/206Pb | 1*σ* | 207Pb/235U | 1*σ* | 206Pb/238U | 1*σ* | 207Pb/235U | 1*σ* | 206Pb/238U | 1*σ* |
| 样品YQ3772-1 |
| YQ3772-1-1 | 5.76  | 114  | 112  | 1.02  | 0.0788  | 0.0085  | 0.3935  | 0.0434  | 0.0370  | 0.0010  | 336.9 | 32  | 234.0 | 6  | 63% |
| YQ3772-1-2 | 8.00  | 100  | 169  | 0.59  | 0.0546  | 0.0028  | 0.2929  | 0.0148  | 0.0396  | 0.0006  | 260.8 | 12  | 250.1 | 4  | 95% |
| YQ3772-1-3 | 14.04  | 251  | 272  | 0.92  | 0.0521  | 0.0027  | 0.2834  | 0.0150  | 0.0397  | 0.0006  | 253.4 | 12  | 250.8 | 4  | 98% |
| YQ3772-1-4 | 4.37  | 67  | 82  | 0.81  | 0.0665  | 0.0073  | 0.3818  | 0.0435  | 0.0420  | 0.0017  | 328.3 | 32  | 265.3 | 10  | 78% |
| YQ3772-1-5 | 7.49  | 92  | 164  | 0.56  | 0.0572  | 0.0045  | 0.2931  | 0.0219  | 0.0379  | 0.0007  | 261.0 | 17  | 239.8 | 4  | 91% |
| YQ3772-1-6 | 7.51  | 133  | 145  | 0.92  | 0.0570  | 0.0032  | 0.3100  | 0.0162  | 0.0403  | 0.0007  | 274.2 | 13  | 254.7 | 5  | 92% |
| YQ3772-1-7 | 8.75  | 104  | 188  | 0.55  | 0.0563  | 0.0031  | 0.2981  | 0.0161  | 0.0395  | 0.0007  | 264.9 | 13  | 249.8 | 4  | 94% |
| YQ3772-1-8 | 9.48  | 135  | 190  | 0.71  | 0.0541  | 0.0032  | 0.2908  | 0.0168  | 0.0397  | 0.0006  | 259.2  | 13  | 250.9 | 4  | 96% |
| YQ3772-1-9 | 10.83  | 152  | 219  | 0.70  | 0.0574  | 0.0031  | 0.3124  | 0.0166  | 0.0398  | 0.0006  | 276.0 | 13  | 251.3 | 3  | 90% |
| YQ3772-1-10 | 21.76  | 323  | 441  | 0.73  | 0.0516  | 0.0020  | 0.2798  | 0.0110  | 0.0394  | 0.0005  | 250.5 | 9  | 248.9 | 3  | 99% |
| YQ3772-1-11 | 6.63  | 137  | 123  | 1.12  | 0.0560  | 0.0030  | 0.3022  | 0.0163  | 0.0397  | 0.0008  | 268.1 | 13  | 250.9 | 5  | 93% |
| YQ3772-1-12 | 7.82  | 169  | 160  | 1.06  | 0.0542  | 0.0048  | 0.2646  | 0.0228  | 0.0361  | 0.0009  | 238.4 | 18  | 228.8 | 5  | 95% |
| YQ3772-1-13 | 6.00  | 96  | 119  | 0.80  | 0.0540  | 0.0034  | 0.2959  | 0.0186  | 0.0401  | 0.0006  | 263.2 | 15  | 253.5 | 4  | 96% |
| YQ3772-1-14 | 4.61  | 82  | 88  | 0.93  | 0.0692  | 0.0063  | 0.3772  | 0.0364  | 0.0406  | 0.0013  | 325.0 | 27  | 256.8 | 8  | 76% |
| YQ3772-1-15 | 32.52  | 465  | 650  | 0.72  | 0.0493  | 0.0014  | 0.2717  | 0.0076  | 0.0400  | 0.0004  | 244.0 | 6  | 252.6 | 3  | 96% |
| YQ3772-1-16 | 13.67  | 195  | 275  | 0.71  | 0.0484  | 0.0020  | 0.2660  | 0.0115  | 0.0399  | 0.0005  | 239.5 | 9  | 252.0 | 3  | 94% |
| YQ3772-1-17 | 8.76  | 131  | 180  | 0.73  | 0.0567  | 0.0031  | 0.2974  | 0.0156  | 0.0384  | 0.0006  | 264.4 | 12  | 242.9 | 4  | 91% |
| YQ3772-1-18 | 25.73  | 370  | 527  | 0.70  | 0.0502  | 0.0016  | 0.2773  | 0.0092  | 0.0399  | 0.0005  | 248.5 | 7  | 252.1 | 3  | 98% |
| YQ3772-1-19 | 7.83  | 155  | 145  | 1.07  | 0.0577  | 0.0036  | 0.3066  | 0.0179  | 0.0394  | 0.0007  | 271.5 | 14  | 249.2 | 4  | 91% |
| YQ3772-1-20 | 7.67  | 92  | 157  | 0.59  | 0.0542  | 0.0032  | 0.2938  | 0.0165  | 0.0395  | 0.0007  | 261.5 | 13  | 250.0 | 4  | 95% |
| YQ3772-1-21 | 4.76  | 90  | 85  | 1.06  | 0.0591  | 0.0053  | 0.3228  | 0.0286  | 0.0399  | 0.0011  | 284.0 | 22  | 252.0 | 7  | 88% |
| YQ3772-1-22 | 6.62  | 104  | 131  | 0.79  | 0.0560  | 0.0031  | 0.2980  | 0.0155  | 0.0394  | 0.0009  | 264.9 | 12  | 249.0 | 6  | 93% |
| YQ3772-1-23 | 3.90  | 55  | 79  | 0.70  | 0.0727  | 0.0085  | 0.3703  | 0.0421  | 0.0379  | 0.0011  | 319.9 | 31  | 239.8 | 7  | 71% |
| YQ3772-1-24 | 2.68  | 41  | 54  | 0.77  | 0.0816  | 0.0068  | 0.4224  | 0.0397  | 0.0381  | 0.0012  | 357.8 | 28  | 241.2 | 8  | 61% |
| 样品PM01YQ1 |
| PM01YQ1-1 | 16.23  | 205  | 479  | 0.43  | 0.0529  | 0.0012  | 0.2156  | 0.0049  | 0.0297  | 0.0003  | 198.2 | 4  | 188.4 | 2  | 94% |
| PM01YQ1-2 | 16.90  | 232  | 379  | 0.61  | 0.0558  | 0.0015  | 0.2864  | 0.0072  | 0.0373  | 0.0004  | 255.7 | 6  | 236.2 | 2  | 92% |
| PM01YQ1-3 | 15.47  | 252  | 320  | 0.79  | 0.0563  | 0.0018  | 0.2966  | 0.0087  | 0.0384  | 0.0004  | 263.8 | 7  | 242.6 | 2  | 91% |
| PM01YQ1-4 | 18.29  | 231  | 411  | 0.56  | 0.0537  | 0.0012  | 0.2796  | 0.0059  | 0.0379  | 0.0004  | 250.3 | 5  | 239.7 | 2  | 95% |
| PM01YQ1-5 | 43.15  | 599  | 947  | 0.63  | 0.0530  | 0.0010  | 0.2796  | 0.0054  | 0.0383  | 0.0003  | 250.4 | 4  | 242.3 | 2  | 96% |
| PM01YQ1-6 | 10.02  | 140  | 214  | 0.66  | 0.0536  | 0.0026  | 0.2859  | 0.0131  | 0.0391  | 0.0005  | 255.4 | 10  | 247.4 | 3  | 96% |
| PM01YQ1-7 | 22.37  | 110  | 255  | 0.43  | 0.0603  | 0.0013  | 0.6396  | 0.0125  | 0.0772  | 0.0007  | 502  | 8  | 479.6 | 4  | 95% |
| PM01YQ1-8 | 17.06  | 299  | 357  | 0.84  | 0.0552  | 0.0019  | 0.2882  | 0.0088  | 0.0385  | 0.0010  | 257.1 | 7  | 243.3 | 6  | 94% |
| PM01YQ1-9 | 21.27  | 119  | 510  | 0.23  | 0.0535  | 0.0016  | 0.2856  | 0.0082  | 0.0388  | 0.0003  | 255.1 | 7  | 245.4 | 2  | 96% |
| PM01YQ1-10 | 17.77  | 280  | 382  | 0.73  | 0.0553  | 0.0015  | 0.2929  | 0.0082  | 0.0386  | 0.0005  | 260.8 | 6  | 243.9 | 3  | 93% |
| PM01YQ1-11 | 10.82  | 171  | 236  | 0.72  | 0.0531  | 0.0028  | 0.2781  | 0.0147  | 0.0381  | 0.0004  | 249.1 | 12  | 241.0 | 3  | 96% |
| PM01YQ1-12 | 20.09  | 504  | 377  | 1.34  | 0.0569  | 0.0017  | 0.3003  | 0.0093  | 0.0383  | 0.0004  | 266.6 | 7  | 242.3 | 3  | 90% |
| PM01YQ1-13 | 49.80  | 1002  | 992  | 1.01  | 0.0534  | 0.0011  | 0.2891  | 0.0060  | 0.0393  | 0.0003  | 257.9 | 5  | 248.7 | 2  | 96% |
| PM01YQ1-14 | 16.17  | 61  | 467  | 0.13  | 0.0547  | 0.0016  | 0.2535  | 0.0073  | 0.0337  | 0.0003  | 229.4 | 6  | 213.7 | 2  | 92% |
| PM01YQ1-15 | 6.82  | 107  | 154  | 0.69  | 0.0530  | 0.0023  | 0.2774  | 0.0131  | 0.0379  | 0.0008  | 248.6 | 10  | 239.5 | 5  | 96% |
| PM01YQ1-16 | 34.60  | 662  | 1201  | 0.55  | 0.0538  | 0.0014  | 0.1889  | 0.0053  | 0.0254  | 0.0002  | 175.7 | 5  | 161.7 | 2  | 91% |
| PM01YQ1-17 | 6.87  | 126  | 143  | 0.88  | 0.0575  | 0.0029  | 0.3047  | 0.0145  | 0.0390  | 0.0006  | 270.1 | 11  | 246.4 | 4  | 90% |
| PM01YQ1-18 | 10.33  | 166  | 208  | 0.80  | 0.0567  | 0.0025  | 0.3180  | 0.0132  | 0.0409  | 0.0005  | 280.3 | 10  | 258.3 | 3  | 91% |
| PM01YQ1-19 | 16.09  | 236  | 361  | 0.65  | 0.0570  | 0.0017  | 0.2957  | 0.0087  | 0.0377  | 0.0004  | 263.0 | 7  | 238.3 | 2  | 90% |
| PM01YQ1-20 | 20.81  | 272  | 470  | 0.58  | 0.0827  | 0.0077  | 0.4061  | 0.0366  | 0.0359  | 0.0004  | 346.1 | 26  | 227.5 | 2  | 58% |
| PM01YQ1-21 | 28.55  | 351  | 687  | 0.51  | 0.0534  | 0.0012  | 0.2695  | 0.0063  | 0.0366  | 0.0003  | 242.3 | 5  | 231.9 | 2  | 95% |
| PM01YQ1-22 | 18.84  | 74  | 323  | 0.23  | 0.1662  | 0.0126  | 0.9610  | 0.0821  | 0.0428  | 0.0019  | 683.8 | 43  | 270.0 | 12  | 13% |
| PM01YQ1-23 | 9.47  | 206  | 189  | 1.09  | 0.0518  | 0.0024  | 0.2770  | 0.0131  | 0.0388  | 0.0005  | 248.3 | 10  | 245.5 | 3  | 98% |
| PM01YQ1-24 | 11.03  | 162  | 240  | 0.67  | 0.0656  | 0.0022  | 0.3384  | 0.0128  | 0.0373  | 0.0005  | 296.0 | 10  | 236.2 | 3  | 77% |
| PM01YQ1-25 | 11.36  | 175  | 227  | 0.77  | 0.0741  | 0.0039  | 0.4015  | 0.0192  | 0.0394  | 0.0007  | 342.7 | 14  | 249.4 | 4  | 68% |