附件2 山东章丘、邹平和莱阳地区早白垩世中基性火山岩全岩主量（wt.%）和微量元素（ppm）组成表

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样品号 | 19ZQ01 | 19ZQ02 | 19ZQ03 | 19ZQ04 | 19ZQ06 | 19ZQ07 | 19ZQ08 | 19ZQ09 | 19ZQ10 | 20ZP01 | 20ZP02 |
| SiO2 | 59.9 | 52.8 | 55.0 | 53.0 | 53.1 | 53.3 | 53.6 | 54.1 | 55.2 | 53.5  | 53.3  |
| TiO2 | 1.06 | 0.81 | 0.77 | 0.87 | 0.73 | 0.80 | 0.94 | 0.68 | 0.70 | 0.95  | 0.96  |
| Al2O3 | 16.7 | 16.2 | 14.8 | 15.3 | 14.9 | 14.5 | 15.8 | 14.8 | 15.7 | 18.0  | 17.8  |
| Fe2O3T | 6.75 | 8.27 | 10.2 | 8.47 | 8.55 | 9.53 | 8.64 | 7.97 | 8.30 | 8.64  | 8.48  |
| MnO | 0.05 | 0.12 | 0.13 | 0.12 | 0.15 | 0.11 | 0.11 | 0.15 | 0.10 | 0.14  | 0.13  |
| MgO | 2.06 | 6.68 | 6.54 | 6.40 | 7.12 | 7.99 | 6.32 | 6.86 | 5.62 | 3.55  | 3.60  |
| CaO | 3.19 | 8.22 | 6.02 | 7.11 | 7.82 | 6.58 | 7.36 | 6.90 | 6.24 | 6.89  | 6.82  |
| Na2O | 4.27 | 3.42 | 2.96 | 4.77 | 3.33 | 2.66 | 3.61 | 4.33 | 4.09 | 3.56  | 3.52  |
| K2O | 3.76 | 1.02 | 1.89 | 1.29 | 1.64 | 2.29 | 1.36 | 1.81 | 1.23 | 2.77  | 2.79  |
| P2O5 | 0.50 | 0.45 | 0.30 | 0.45 | 0.28 | 0.39 | 0.47 | 0.29 | 0.36 | 0.48  | 0.47  |
| LOI | 1.30 | 1.38 | 1.19 | 1.45 | 1.80 | 1.42 | 1.45 | 1.45 | 1.85 | 0.70  | 1.00  |
| Total | 99.5 | 99.3 | 99.8 | 99.2 | 99.4 | 99.6 | 99.7 | 99.4 | 99.3 | 99.2  | 98.9  |
| Mg# | 37.6 | 61.5 | 56.0 | 60.0 | 62.3 | 62.4 | 59.2 | 63.0 | 57.0 | 44.9 | 45.7 |
| La | 27.2 | 20.3 | 17.9 | 23.4 | 15.5 | 15.2 | 24.5 | 19.4 | 24.8 | 26.0  | 26.7 |
| Ce | 64.7 | 48.5 | 34.0 | 54.0 | 32.3 | 33.7 | 57.4 | 35.3 | 49.8 | 54.5  | 55.4  |
| Pr | 8.23 | 6.47 | 3.81 | 6.85 | 4.04 | 4.44 | 7.43 | 3.94 | 5.73 | 6.90  | 6.90  |
| Nd | 34.6 | 27.2 | 14.9 | 28.3 | 16.9 | 19.3 | 31.3 | 15.8 | 22.6 | 29.1  | 28.9  |
| Sm | 6.76 | 5.48 | 2.74 | 5.45 | 3.54 | 4.16 | 6.00 | 3.11 | 4.04 | 5.86  | 6.01  |
| Eu | 1.97 | 1.73 | 0.80 | 1.80 | 1.06 | 1.17 | 2.05 | 0.95 | 1.27 | 1.79  | 1.82  |
| Gd | 5.62 | 4.76 | 2.46 | 4.65 | 3.22 | 3.89 | 5.12 | 2.85 | 3.46 | 5.25  | 5.21  |
| Tb | 0.78 | 0.64 | 0.35 | 0.62 | 0.46 | 0.54 | 0.69 | 0.39 | 0.49 | 0.69  | 0.65  |
| Dy | 4.31 | 3.64 | 2.08 | 3.48 | 2.61 | 3.15 | 3.72 | 2.37 | 2.87 | 3.79  | 3.70  |
| Ho | 0.84 | 0.66 | 0.42 | 0.64 | 0.54 | 0.62 | 0.69 | 0.49 | 0.55 | 0.68  | 0.68  |
| Er | 2.40 | 1.89 | 1.23 | 1.78 | 1.53 | 1.75 | 1.87 | 1.38 | 1.53 | 1.83  | 1.90  |
| Tm | 0.36 | 0.27 | 0.17 | 0.25 | 0.22 | 0.25 | 0.28 | 0.19 | 0.22 | 0.27  | 0.27  |
| Yb | 2.17 | 1.66 | 1.16 | 1.62 | 1.38 | 1.47 | 1.72 | 1.33 | 1.38 | 1.68  | 1.63  |
| Lu | 0.31 | 0.24 | 0.18 | 0.25 | 0.21 | 0.23 | 0.26 | 0.19 | 0.22 | 0.25  | 0.24  |
| Rb | 60.1 | 25.2 | 45.5 | 30.3 | 31.7 | 54.3 | 31.7 | 37.3 | 27.1 | 59.3  | 66.4  |
| Ba | 1862 | 462 | 669 | 593 | 744 | 666 | 649 | 721 | 520 | 1363  | 1277  |
| Th | 5.10 | 1.89 | 2.54 | 2.48 | 1.79 | 1.89 | 2.37 | 2.56 | 2.74 | 6.00  | 5.66  |
| U | 1.67 | 0.73 | 0.61 | 0.92 | 0.54 | 0.54 | 0.92 | 0.74 | 0.80 | 1.84  | 1.53  |
| Nb | 9.29 | 4.25 | 4.14 | 6.76 | 4.12 | 4.93 | 6.73 | 4.47 | 4.60 | 7.73  | 7.45  |
| Ta | 0.50 | 0.20 | 0.21 | 0.34 | 0.22 | 0.25 | 0.34 | 0.24 | 0.23 | 0.45  | 0.44  |
| Ti | 6624 | 5030 | 4791 | 5723 | 4815 | 5092 | 5903 | 4543 | 4507 | 6063  | 6150  |
| Pb | 4.39 | 1.43 | 1.70 | 2.47 | 1.55 | 0.96 | 1.38 | 23.01 | 2.57 | 10.10  | 6.40  |
| Sr | 530 | 675 | 511 | 691 | 603 | 541 | 722 | 614 | 649 | 918  | 940  |
| Zr | 183 | 90.69 | 87.45 | 134 | 96.52 | 101 | 132 | 92.18 | 93.12 | 118  | 116  |
| Hf | 4.43 | 2.26 | 2.21 | 3.24 | 2.39 | 2.59 | 3.24 | 2.36 | 2.36 | 3.25  | 3.16  |
| Y | 25.2 | 20.0 | 12.2 | 19.4 | 15.6 | 18.2 | 20.4 | 14.1 | 16.2 | 20.3  | 19.8  |
| V | 201 | 219 | 219 | 205 | 221 | 203 | 210 | 162 | 190 | 239  | 251  |
| Cr | 2.43 | 226 | 339 | 225 | 288 | 291 | 210 | 246 | 316 | 11.8  | 13.4  |
| Co | 12.7 | 23.5 | 35.2 | 27.6 | 32.1 | 36.5 | 23.0 | 37.5 | 32.1 | 20.9  | 23.66  |
| Ni | 6.47 | 67.4 | 88.4 | 84.0 | 93.3 | 94.5 | 68.1 | 74.9 | 78.8 | 12.3  | 13.0  |
| Sc | 13.8 | 24.7 | 23.9 | 23.5 | 27.8 | 27.7 | 25.0 | 24.1 | 24.6 | 20.0  | 20.3  |
| 续表1 |
| 样品号 | 20ZP03 | 20ZP04 | 20ZP05 | 20ZP06 | 20ZP11 | 20ZP12 | 20ZP13 | 20LY01 | 20LY02 | 20LY03 | 20LY05 |
| SiO2 | 56.5 | 56.5  | 56.8 | 58.8  | 56.3  | 56.6 | 57.9  | 62.7  | 60.8  | 62.2  | 52.6  |
| TiO2 | 0.73  | 0.72  | 0.69  | 0.67  | 0.62  | 0.65  | 0.60  | 0.66  | 0.67  | 0.64  | 0.92  |
| Al2O3 | 18.4  | 18.3  | 17.6  | 17.3  | 20.9  | 19.2  | 19.7  | 15.2  | 16.6  | 15.4  | 16.4  |
| Fe2O3T | 6.78  | 7.46  | 7.05  | 6.86  | 5.11  | 5.64  | 4.69  | 4.21  | 4.22  | 4.63  | 5.99  |
| MnO | 0.05  | 0.06  | 0.06  | 0.07  | 0.10  | 0.10  | 0.09  | 0.08  | 0.05  | 0.04  | 0.09  |
| MgO | 3.23  | 2.82  | 2.60  | 2.79  | 1.91  | 2.23  | 1.54  | 2.31  | 3.44  | 3.45  | 3.18  |
| CaO | 6.43  | 5.92  | 6.05  | 5.43  | 5.66  | 5.89  | 5.21  | 3.67  | 2.70  | 2.47  | 8.33  |
| Na2O | 4.21  | 3.95  | 4.05  | 4.24  | 4.20  | 4.20  | 4.42  | 3.57  | 3.52  | 3.26  | 3.28  |
| K2O | 1.85  | 2.90  | 2.85  | 2.88  | 3.61  | 3.41  | 3.68  | 4.04  | 3.98  | 3.92  | 2.40  |
| P2O5 | 0.38  | 0.38  | 0.38  | 0.35  | 0.38  | 0.38  | 0.35  | 0.22  | 0.21  | 0.21  | 0.43  |
| LOI | 1.15  | 0.65  | 0.94  | 0.61  | 0.61  | 0.60  | 0.79  | 2.70  | 3.01  | 2.62  | 5.69  |
| Total | 99.6  | 99.6  | 99.0  | 99.9  | 99.4  | 98.9  | 98.9  | 99.4  | 99.3  | 98.8  | 99.3  |
| Mg# | 48.6 | 42.8 | 42.2 | 44.6 | 42.5 | 44.0 | 39.4 | 52.1 | 61.7 | 59.6 | 51.3 |
| La | 26.6 | 25.5  | 25.0  | 29.0 | 30.0 | 30.0 | 31.4  | 74.1  | 71.9  | 70.2  | 68.3  |
| Ce | 52.1  | 51.8  | 50.0  | 56.9  | 59.2  | 60.0 | 62.7  | 157  | 151  | 145  | 148  |
| Pr | 6.17  | 6.28  | 6.11  | 6.75  | 6.93  | 7.00  | 7.30  | 14.2  | 13.8  | 13.4  | 14.0  |
| Nd | 24.8  | 26.4  | 25.3  | 27.6  | 27.6  | 28.1  | 29.0  | 49.5  | 48.3  | 47.1  | 51.5  |
| Sm | 5.09  | 5.24  | 4.99  | 5.26  | 5.51  | 5.35  | 5.44  | 7.12  | 7.38  | 6.48  | 7.93  |
| Eu | 1.60  | 1.58  | 1.61  | 1.48  | 1.68  | 1.71  | 1.72  | 1.55  | 1.57  | 1.49  | 2.05  |
| Gd | 4.19  | 4.44  | 4.34  | 4.43  | 4.32  | 4.45  | 4.36  | 4.93  | 4.95  | 4.54  | 5.86  |
| Tb | 0.57  | 0.60  | 0.58  | 0.60  | 0.58  | 0.59  | 0.57  | 0.66  | 0.66  | 0.61  | 0.76  |
| Dy | 3.18  | 3.27  | 3.17  | 3.20  | 2.97  | 3.12  | 3.02  | 3.51  | 3.42  | 3.21  | 4.30  |
| Ho | 0.63  | 0.58  | 0.61  | 0.64  | 0.55  | 0.59  | 0.58  | 0.66  | 0.64  | 0.63  | 0.82  |
| Er | 1.65  | 1.60  | 1.65  | 1.72  | 1.47  | 1.52  | 1.57  | 1.88  | 1.84  | 1.71  | 2.27  |
| Tm | 0.24  | 0.25  | 0.24  | 0.25  | 0.21  | 0.21  | 0.23  | 0.26  | 0.27  | 0.26  | 0.33  |
| Yb | 1.50  | 1.51  | 1.49  | 1.51  | 1.34  | 1.37  | 1.37  | 1.79  | 1.68  | 1.55  | 2.00  |
| Lu | 0.23  | 0.23  | 0.23  | 0.24  | 0.20  | 0.21  | 0.24  | 0.25  | 0.25  | 0.24  | 0.30  |
| Rb | 52.3  | 68.7  | 60.3  | 67.9  | 93.8  | 89.4  | 93.6  | 113  | 107  | 112  | 48.13  |
| Ba | 1190  | 1475  | 1696  | 1465  | 1580  | 1526  | 1632  | 1954  | 1807  | 1823  | 2104  |
| Th | 4.36  | 4.56  | 4.60  | 6.97  | 8.54  | 8.32  | 9.36  | 18.1  | 17.7  | 16.7  | 11.8  |
| U | 1.38  | 1.34  | 1.45  | 2.07  | 2.45  | 2.42  | 2.72  | 3.19  | 3.28  | 2.93  | 2.40  |
| Nb | 6.14  | 6.05  | 6.07  | 8.14  | 9.05  | 8.81  | 9.72  | 12.1  | 11.6  | 11.4  | 12.6  |
| Ta | 0.34  | 0.32  | 0.35  | 0.46  | 0.51  | 0.53  | 0.59  | 0.70  | 0.68  | 0.65  | 0.68  |
| Ti | 4587  | 4541  | 4565  | 4419  | 4011  | 4221  | 3844  | 4270  | 4239  | 4206  | 5999  |
| Pb | 5.50  | 5.69  | 5.81  | 10.56  | 18.55  | 20.27  | 18.72  | 27.7  | 25.3  | 25.2  | 18.3  |
| Sr | 1074  | 996  | 1026  | 916  | 1068  | 1025  | 1014  | 592  | 587  | 569  | 1153  |
| Zr | 115  | 116  | 117  | 144  | 144  | 142  | 156  | 327  | 328  | 313  | 286  |
| Hf | 2.97  | 3.02  | 3.04  | 3.70  | 3.70  | 3.60  | 3.95  | 6.94  | 6.82  | 6.59  | 5.63  |
| Y | 18.1  | 17.8  | 17.9  | 18.8  | 16.6  | 17.4  | 17.4  | 19.9  | 19.6  | 18.3  | 23.7  |
| V | 153  | 153  | 153  | 132  | 91  | 106  | 73  | 77.1  | 74.2  | 71.9  | 138  |
| Cr | 13.1  | 12.7  | 15.8  | 13.5  | 12.8  | 19.4  | 4.93  | 76.5  | 77.0  | 86.4  | 136  |
| Co | 23.66  | 13.1  | 17.9  | 14.9  | 14.5  | 11.4  | 13.2  | 12.3  | 12.6  | 12.6  | 20.2  |
| Ni | 13.0  | 11.3  | 11.7  | 11.0  | 10.9  | 6.91  | 9.54  | 31.4  | 34.7  | 33.7  | 40.5  |
| Sc | 20.3  | 15.6 | 15.7  | 15.0  | 13.8  | 9.37  | 11.4  | 9.78  | 9.77  | 9.81  | 17.2  |