表1亚干地区花岗岩类锆石LA-ICP-MS U-Pb分析结果

Table1 LA-ICP-MS U-Pb isotopic analysis for zircons from the granitoids in Yagan area

| 点位 | 元素含量 (ppm) | 232Th 238U | 同位素比值 | 　 | 年龄(Ma) |
| --- | --- | --- | --- | --- | --- |
| Th | U | 207Pb206Pb | 1σ | 207Pb 235U | 1σ | 206Pb238U | 1σ | 208Pb232Th | 1σ | 　 | 207Pb206Pb | 1σ | 207Pb 235U | 1σ | 206Pb238U | 1σ |
| 18AX04亚东花岗闪长岩 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 206  | 298  | 0.69  | 0.0528  | 0.0007  | 0.3122  | 0.0052  | 0.0429  | 0.0005  | 0.0185  | 0.0017  |  | 320  | 31  | 276  | 4  | 271  | 3  |
| 2 | 489  | 458  | 1.07  | 0.0526  | 0.0010  | 0.3115  | 0.0060  | 0.0430  | 0.0005  | 0.0180  | 0.0015  |  | 322  | 10  | 275  | 5  | 271  | 3  |
| 3 | 278  | 317  | 0.88  | 0.0510  | 0.0008  | 0.3065  | 0.0056  | 0.0437  | 0.0004  | 0.0167  | 0.0015  |  | 239  | 32  | 271  | 4  | 276  | 3  |
| 4 | 305  | 310  | 0.99  | 0.0532  | 0.0008  | 0.3126  | 0.0052  | 0.0426  | 0.0004  | 0.0175  | 0.0015  |  | 339  | 35  | 276  | 4  | 269  | 2  |
| 5 | 423  | 430  | 0.98  | 0.0526  | 0.0007  | 0.3077  | 0.0039  | 0.0425  | 0.0005  | 0.0171  | 0.0015  |  | 322  | 30  | 272  | 3  | 268  | 3  |
| 6 | 271  | 362  | 0.75  | 0.0521  | 0.0008  | 0.3088  | 0.0045  | 0.0430  | 0.0003  | 0.0181  | 0.0017  |  | 300  | 33  | 273  | 4  | 272  | 2  |
| 7 | 213  | 257  | 0.83  | 0.0539  | 0.0009  | 0.3144  | 0.0060  | 0.0423  | 0.0004  | 0.0175  | 0.0017  |  | 369  | 39  | 278  | 5  | 267  | 3  |
| 8 | 327  | 362  | 0.90  | 0.0509  | 0.0006  | 0.3079  | 0.0045  | 0.0439  | 0.0004  | 0.0182  | 0.0019  |  | 235  | 30  | 273  | 4  | 277  | 3  |
| 9 | 291  | 290  | 1.00  | 0.0541  | 0.0012  | 0.3226  | 0.0070  | 0.0433  | 0.0004  | 0.0177  | 0.0020  |  | 376  | 53  | 284  | 5  | 273  | 3  |
| 10 | 416  | 401  | 1.04  | 0.0525  | 0.0007  | 0.3152  | 0.0047  | 0.0435  | 0.0004  | 0.0172  | 0.0017  |  | 309  | 31  | 278  | 4  | 275  | 2  |
| 11 | 192  | 268  | 0.71  | 0.0530  | 0.0009  | 0.3165  | 0.0054  | 0.0433  | 0.0004  | 0.0162  | 0.0016  |  | 332  | 34  | 279  | 4  | 273  | 2  |
| 12 | 159  | 212  | 0.75  | 0.0542  | 0.0010  | 0.3240  | 0.0052  | 0.0435  | 0.0004  | 0.0158  | 0.0015  |  | 389  | 41  | 285  | 4  | 274  | 3  |
| 13 | 277  | 322  | 0.86  | 0.0538  | 0.0008  | 0.3167  | 0.0054  | 0.0427  | 0.0004  | 0.0162  | 0.0015  |  | 361  | 35  | 279  | 4  | 270  | 3  |
| 14 | 195  | 169  | 1.16  | 0.0535  | 0.0012  | 0.3204  | 0.0072  | 0.0435  | 0.0004  | 0.0157  | 0.0014  |  | 350  | 52  | 282  | 6  | 275  | 3  |
| 15 | 276  | 293  | 0.94  | 0.0514  | 0.0008  | 0.3020  | 0.0052  | 0.0427  | 0.0004  | 0.0158  | 0.0013  |  | 257  | 37  | 268  | 4  | 269  | 2  |
| 16 | 219  | 269  | 0.81  | 0.0545  | 0.0010  | 0.3197  | 0.0051  | 0.0426  | 0.0004  | 0.0157  | 0.0014  |  | 394  | 43  | 282  | 4  | 269  | 2  |
| 17 | 214  | 238  | 0.90  | 0.0543  | 0.0009  | 0.3168  | 0.0055  | 0.0423  | 0.0003  | 0.0161  | 0.0013  |  | 383  | 37  | 279  | 4  | 267  | 2  |
| 18 | 215  | 242  | 0.89  | 0.0530  | 0.0012  | 0.3144  | 0.0062  | 0.0431  | 0.0004  | 0.0148  | 0.0012  |  | 328  | 55  | 278  | 5  | 272  | 3  |
| 18AX24 都热糜棱岩化花岗岩 |  |  |  |  |  |  |  |  |  |  |
| 1 | 70  | 46  | 1.51  | 0.0524  | 0.0029  | 0.2465  | 0.0138  | 0.0343  | 0.0006  | 0.0108  | 0.0011  |  | 302  | 124  | 224  | 11  | 217  | 4  |
| 2 | 84  | 77  | 1.09  | 0.0502  | 0.0015  | 0.2378  | 0.0082  | 0.0342  | 0.0005  | 0.0097  | 0.0009  |  | 211  | 67  | 217  | 7  | 217  | 3  |
| 3 | 37  | 36  | 1.02  | 0.0549  | 0.0029  | 0.2586  | 0.0143  | 0.0341  | 0.0004  | 0.0100  | 0.0012  |  | 409  | 120  | 234  | 12  | 216  | 3  |
| 4 | 81  | 63  | 1.29  | 0.0495  | 0.0023  | 0.2342  | 0.0109  | 0.0345  | 0.0005  | 0.0097  | 0.0010  |  | 172  | 107  | 214  | 9  | 218  | 3  |
| 5 | 83  | 89  | 0.93  | 0.0490  | 0.0017  | 0.2316  | 0.0075  | 0.0345  | 0.0004  | 0.0104  | 0.0009  |  | 146  | 86  | 212  | 6  | 219  | 3  |
| 6 | 46  | 52  | 0.88  | 0.0530  | 0.0026  | 0.2478  | 0.0129  | 0.0338  | 0.0005  | 0.0088  | 0.0009  |  | 328  | 109  | 225  | 10  | 214  | 3  |
| 7 | 65  | 66  | 0.98  | 0.0513  | 0.0020  | 0.2372  | 0.0088  | 0.0337  | 0.0005  | 0.0105  | 0.0011  |  | 254  | 89  | 216  | 7  | 214  | 3  |
| 8 | 213  | 178  | 1.20  | 0.0522  | 0.0012  | 0.2380  | 0.0053  | 0.0332  | 0.0003  | 0.0100  | 0.0008  |  | 295  | 54  | 217  | 4  | 210  | 2  |
| 9 | 72  | 77  | 0.94  | 0.0488  | 0.0020  | 0.2229  | 0.0087  | 0.0334  | 0.0004  | 0.0095  | 0.0010  |  | 139  | 98  | 204  | 7  | 212  | 3  |
| 10 | 64  | 68  | 0.94  | 0.0503  | 0.0019  | 0.2318  | 0.0086  | 0.0336  | 0.0005  | 0.0082  | 0.0010  |  | 209  | 87  | 212  | 7  | 213  | 3  |
| 11 | 61  | 70  | 0.88  | 0.0560  | 0.0028  | 0.2520  | 0.0107  | 0.0329  | 0.0007  | 0.0102  | 0.0015  |  | 454  | 114  | 228  | 9  | 209  | 5  |
| 12 | 121  | 79  | 1.54  | 0.0518  | 0.0019  | 0.2363  | 0.0078  | 0.0334  | 0.0004  | 0.0119  | 0.0011  |  | 276  | 85  | 215  | 6  | 212  | 3  |
| 13 | 71  | 59  | 1.19  | 0.0484  | 0.0027  | 0.2190  | 0.0120  | 0.0330  | 0.0005  | 0.0112  | 0.0013  |  | 120  | 122  | 201  | 10  | 209  | 3  |
| 14 | 39  | 41  | 0.95  | 0.0508  | 0.0024  | 0.2410  | 0.0120  | 0.0344  | 0.0006  | 0.0145  | 0.0017  |  | 232  | 114  | 219  | 10  | 218  | 3  |
| 15 | 59  | 42  | 1.42  | 0.0482  | 0.0028  | 0.2283  | 0.0148  | 0.0340  | 0.0006  | 0.0121  | 0.0015  |  | 109  | 133  | 209  | 12  | 216  | 4  |
| 16 | 116  | 76  | 1.53  | 0.0510  | 0.0023  | 0.2315  | 0.0098  | 0.0332  | 0.0005  | 0.0116  | 0.0011  |  | 243  | 106  | 211  | 8  | 211  | 3  |
| 17 | 71  | 60  | 1.19  | 0.0502  | 0.0027  | 0.2275  | 0.0113  | 0.0333  | 0.0006  | 0.0106  | 0.0014  |  | 211  | 126  | 208  | 9  | 211  | 3  |
| 18 | 57  | 62  | 0.92  | 0.0533  | 0.0022  | 0.2432  | 0.0094  | 0.0334  | 0.0004  | 0.0131  | 0.0016  |  | 339  | 94  | 221  | 8  | 211  | 3  |
| 19AX03切刀黑云母二长花岗岩 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 203  | 375  | 0.54  | 0.0549  | 0.0017  | 0.4540  | 0.0137  | 0.0600  | 0.0005  | 0.0185  | 0.0004  |  | 406  | 66  | 380  | 10  | 375  | 3  |
| 2 | 60  | 129  | 0.46  | 0.0560  | 0.0028  | 0.4739  | 0.0234  | 0.0616  | 0.0007  | 0.0177  | 0.0005  |  | 454  | 108  | 394  | 16  | 386  | 5  |
| 3 | 144  | 339  | 0.43  | 0.0549  | 0.0016  | 0.4574  | 0.0126  | 0.0603  | 0.0006  | 0.0193  | 0.0004  |  | 409  | 63  | 382  | 9  | 378  | 4  |
| 4 | 133  | 310  | 0.43  | 0.0540  | 0.0015  | 0.4542  | 0.0131  | 0.0609  | 0.0005  | 0.0196  | 0.0004  |  | 369  | 63  | 380  | 9  | 381  | 3  |
| 5 | 76  | 193  | 0.39  | 0.0517  | 0.0017  | 0.4340  | 0.0140  | 0.0611  | 0.0007  | 0.0189  | 0.0004  |  | 272  | 76  | 366  | 10  | 382  | 4  |
| 6 | 224  | 452  | 0.49  | 0.0523  | 0.0014  | 0.4347  | 0.0115  | 0.0604  | 0.0006  | 0.0185  | 0.0003  |  | 298  | 66  | 366  | 8  | 378  | 3  |
| 7 | 130  | 276  | 0.47  | 0.0518  | 0.0016  | 0.4355  | 0.0136  | 0.0610  | 0.0006  | 0.0188  | 0.0003  |  | 276  | 70  | 367  | 10  | 381  | 4  |
| 8 | 145  | 315  | 0.46  | 0.0533  | 0.0015  | 0.4433  | 0.0130  | 0.0601  | 0.0005  | 0.0186  | 0.0003  |  | 343  | 63  | 373  | 9  | 376  | 3  |
| 9 | 134  | 294  | 0.46  | 0.0531  | 0.0015  | 0.4451  | 0.0126  | 0.0609  | 0.0005  | 0.0190  | 0.0004  |  | 332  | 67  | 374  | 9  | 381  | 3  |
| 10 | 102  | 243  | 0.42  | 0.0539  | 0.0017  | 0.4568  | 0.0147  | 0.0614  | 0.0006  | 0.0197  | 0.0004  |  | 369  | 72  | 382  | 10  | 384  | 4  |
| 11 | 148  | 346  | 0.43  | 0.0537  | 0.0016  | 0.4530  | 0.0132  | 0.0611  | 0.0006  | 0.0195  | 0.0004  |  | 367  | 60  | 379  | 9  | 382  | 3  |
| 12 | 108  | 255  | 0.42  | 0.0538  | 0.0019  | 0.4466  | 0.0150  | 0.0604  | 0.0006  | 0.0181  | 0.0004  |  | 365  | 80  | 375  | 11  | 378  | 4  |
| 13 | 151  | 302  | 0.50  | 0.0525  | 0.0019  | 0.4436  | 0.0150  | 0.0614  | 0.0006  | 0.0186  | 0.0004  |  | 309  | 77  | 373  | 11  | 384  | 4  |
| 14 | 134  | 330  | 0.40  | 0.0549  | 0.0018  | 0.4642  | 0.0143  | 0.0615  | 0.0006  | 0.0189  | 0.0004  |  | 406  | 72  | 387  | 10  | 385  | 3  |
| 15 | 99  | 246  | 0.40  | 0.0542  | 0.0020  | 0.4590  | 0.0161  | 0.0618  | 0.0007  | 0.0179  | 0.0005  |  | 376  | 81  | 384  | 11  | 387  | 4  |
| 16 | 103  | 268  | 0.38  | 0.0537  | 0.0017  | 0.4477  | 0.0138  | 0.0606  | 0.0005  | 0.0200  | 0.0004  |  | 367  | 72  | 376  | 10  | 380  | 3  |
| 17 | 141  | 327  | 0.43  | 0.0540  | 0.0016  | 0.4547  | 0.0131  | 0.0610  | 0.0005  | 0.0188  | 0.0004  |  | 372  | 65  | 381  | 9  | 381  | 3  |
| 18 | 227  | 398  | 0.57  | 0.0559  | 0.0015  | 0.4673  | 0.0126  | 0.0605  | 0.0005  | 0.0188  | 0.0004  |  | 450  | 59  | 389  | 9  | 379  | 3  |
| 19 | 196  | 445  | 0.44  | 0.0542  | 0.0016  | 0.4491  | 0.0131  | 0.0601  | 0.0005  | 0.0183  | 0.0004  |  | 389  | 60  | 377  | 9  | 376  | 3  |
| 20 | 103  | 243  | 0.42  | 0.0568  | 0.0016  | 0.4705  | 0.0126  | 0.0602  | 0.0006  | 0.0186  | 0.0004  |  | 483  | 63  | 392  | 9  | 377  | 3  |
| 21 | 203  | 391  | 0.52  | 0.0552  | 0.0015  | 0.4623  | 0.0120  | 0.0607  | 0.0006  | 0.0183  | 0.0003  |  | 420  | 59  | 386  | 8  | 380  | 3  |
| 22 | 175  | 399  | 0.44  | 0.0531  | 0.0014  | 0.4477  | 0.0112  | 0.0611  | 0.0005  | 0.0189  | 0.0004  |  | 332  | 59  | 376  | 8  | 382  | 3  |
| 23 | 114  | 265  | 0.43  | 0.0524  | 0.0015  | 0.4396  | 0.0129  | 0.0609  | 0.0006  | 0.0194  | 0.0004  |  | 302  | 67  | 370  | 9  | 381  | 4  |
| 24 | 203  | 409  | 0.50  | 0.0519  | 0.0015  | 0.4306  | 0.0128  | 0.0599  | 0.0005  | 0.0180  | 0.0004  |  | 283  | 65  | 364  | 9  | 375  | 3  |
| 19AX24 亚干片麻状花岗岩 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | 947  | 1251  | 0.76  | 0.0540  | 0.0011  | 0.2706  | 0.0064  | 0.0361  | 0.0004  | 0.0115  | 0.0002  |  | 372  | 46  | 243  | 5  | 229  | 2  |
| 2 | 673  | 911  | 0.74  | 0.0466  | 0.0022  | 0.2225  | 0.0097  | 0.0351  | 0.0003  | 0.0104  | 0.0002  |  | 28  | 172  | 204  | 8  | 222  | 2  |
| 3 | 91  | 140  | 0.65  | 0.0572  | 0.0032  | 0.2733  | 0.0139  | 0.0353  | 0.0005  | 0.0127  | 0.0004  |  | 498  | 122  | 245  | 11  | 223  | 3  |
| 4 | 87  | 168  | 0.52  | 0.0531  | 0.0028  | 0.2561  | 0.0112  | 0.0353  | 0.0005  | 0.0117  | 0.0004  |  | 332  | 123  | 232  | 9  | 224  | 3  |
| 5 | 138  | 250  | 0.55  | 0.0508  | 0.0025  | 0.2508  | 0.0115  | 0.0365  | 0.0005  | 0.0117  | 0.0003  |  | 232  | 110  | 227  | 9  | 231  | 3  |
| 6 | 133  | 217  | 0.61  | 0.0557  | 0.0024  | 0.2741  | 0.0110  | 0.0359  | 0.0004  | 0.0124  | 0.0003  |  | 439  | 96  | 246  | 9  | 228  | 3  |
| 7 | 1195  | 1933  | 0.62  | 0.0500  | 0.0013  | 0.2421  | 0.0062  | 0.0350  | 0.0003  | 0.0117  | 0.0002  |  | 195  | 27  | 220  | 5  | 222  | 2  |
| 8 | 155  | 379  | 0.41  | 0.0499  | 0.0015  | 0.2546  | 0.0082  | 0.0370  | 0.0004  | 0.0122  | 0.0003  |  | 187  | 68  | 230  | 7  | 234  | 3  |
| 9 | 176  | 277  | 0.63  | 0.0484  | 0.0020  | 0.2432  | 0.0098  | 0.0364  | 0.0004  | 0.0117  | 0.0003  |  | 120  | 96  | 221  | 8  | 231  | 3  |
| 10 | 72  | 719  | 0.10  | 0.0689  | 0.0013  | 1.2719  | 0.0251  | 0.1334  | 0.0011  | 0.0419  | 0.0009  |  | 898  | 40  | 833  | 11  | 807  | 6  |
| 11 | 59  | 1170  | 0.05  | 0.0686  | 0.0013  | 1.2093  | 0.0260  | 0.1273  | 0.0015  | 0.0419  | 0.0009  |  | 887  | 36  | 805  | 12  | 772  | 9  |
| 12 | 134  | 281  | 0.48  | 0.0545  | 0.0025  | 0.2677  | 0.0113  | 0.0360  | 0.0004  | 0.0126  | 0.0003  |  | 391  | 106  | 241  | 9  | 228  | 2  |
| 13 | 3441  | 3660  | 0.94  | 0.0482  | 0.0033  | 0.1782  | 0.0124  | 0.0261  | 0.0002  | 0.0083  | 0.0003  |  | 109  | 152  | 167  | 11  | 166  | 1  |
| 14 | 126  | 346  | 0.37  | 0.0518  | 0.0020  | 0.2518  | 0.0094  | 0.0355  | 0.0004  | 0.0119  | 0.0003  |  | 276  | 89  | 228  | 8  | 225  | 3  |
| 15 | 280  | 400  | 0.70  | 0.0556  | 0.0016  | 0.2783  | 0.0086  | 0.0363  | 0.0004  | 0.0121  | 0.0002  |  | 435  | 67  | 249  | 7  | 230  | 2  |
| 16 | 4573  | 5797  | 0.79  | 0.0568  | 0.0010  | 0.2644  | 0.0045  | 0.0337  | 0.0002  | 0.0118  | 0.0002  |  | 483  | 32  | 238  | 4  | 214  | 1  |
| 17 | 615  | 753  | 0.82  | 0.0555  | 0.0016  | 0.2792  | 0.0078  | 0.0366  | 0.0003  | 0.0121  | 0.0002  |  | 432  | 65  | 250  | 6  | 232  | 2  |
| 18 | 105  | 221  | 0.48  | 0.0526  | 0.0021  | 0.2663  | 0.0105  | 0.0370  | 0.0005  | 0.0117  | 0.0003  |  | 309  | 91  | 240  | 8  | 234  | 3  |
| 19 | 115  | 1511  | 0.08  | 0.0706  | 0.0011  | 1.5264  | 0.0263  | 0.1563  | 0.0015  | 0.0469  | 0.0008  |  | 946  | 30  | 941  | 11  | 936  | 8  |
| 20 | 110  | 245  | 0.45  | 0.0475  | 0.0018  | 0.2370  | 0.0091  | 0.0362  | 0.0004  | 0.0115  | 0.0003  |  | 72  | 89  | 216  | 7  | 229  | 2  |
| 21 | 261  | 387  | 0.68  | 0.0522  | 0.0020  | 0.2900  | 0.0119  | 0.0404  | 0.0006  | 0.0132  | 0.0003  |  | 300  | 89  | 259  | 9  | 255  | 4  |
| 22 | 125  | 321  | 0.39  | 0.0733  | 0.0014  | 1.7303  | 0.0361  | 0.1707  | 0.0019  | 0.0567  | 0.0010  |  | 1033  | 38  | 1020  | 13  | 1016  | 10  |

表2 亚干地区花岗岩类主量元素和微量元素分析结果

Table 2 Major and trace element compositions of the granitoids in Yagan area

| 样号 | 19AX-04 | 19AX-05 | 19AX-06 | 19AX-07 | 　 | 18AX-01 | 18AX-03 | 18AX-04 | 18AX-09 | 18AX-10 | 　 | 18AX-25 | 18AX-26 | 18AX-27 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 岩性 | 黑云母二长花岗岩 | 　 | 花岗闪长岩 | 　 | 糜棱岩化花岗岩 |
| SiO2 | 72.75 | 73.73 | 76.44 | 73.88 |  | 74.22  | 72.46  | 72.68  | 72.65  | 74.97  |  | 67.06  | 68.42  | 69.29  |
| TiO2 | 0.34 | 0.28 | 0.21 | 0.31 |  | 0.19  | 0.25  | 0.25  | 0.24  | 0.19  |  | 1.03  | 0.64  | 0.86  |
| Al2O3 | 13.41 | 13.24 | 11.90 | 12.93 |  | 14.37  | 14.59  | 14.31  | 13.97  | 13.95  |  | 14.97  | 14.95  | 14.72  |
| Fe2O3(T) | 3.21 | 2.73 | 2.12 | 2.86 |  | 1.28  | 1.47  | 1.46  | 1.45  | 1.27  |  | 4.72  | 3.38  | 3.50  |
| MnO | 0.06 | 0.06 | 0.05 | 0.05 |  | 0.03  | 0.04  | 0.04  | 0.04  | 0.04  |  | 0.08  | 0.05  | 0.06  |
| MgO | 0.33 | 0.29 | 0.27 | 0.31 |  | 0.36  | 0.53  | 0.54  | 0.54  | 0.40  |  | 1.39  | 1.05  | 1.20  |
| CaO | 1.12 | 1.13 | 0.53 | 1.22 |  | 1.18  | 1.42  | 1.88  | 1.61  | 0.64  |  | 3.17  | 2.47  | 2.73  |
| Na2O | 3.58 | 3.37 | 3.28 | 3.30 |  | 4.78  | 5.51  | 5.26  | 5.87  | 6.04  |  | 4.10  | 3.72  | 3.91  |
| K2O | 4.69 | 4.77 | 4.67 | 4.51 |  | 3.17  | 2.18  | 1.72  | 1.63  | 1.66  |  | 2.98  | 4.11  | 3.33  |
| P2O5 | 0.08 | 0.06 | 0.04 | 0.07 |  | 0.05  | 0.05  | 0.06  | 0.06  | 0.05  |  | 0.21  | 0.18  | 0.18  |
| LOI | 0.73 | 0.73 | 0.67 | 0.78 |  | 0.67  | 1.54  | 2.04  | 1.86  | 1.05  |  | 0.44  | 0.76  | 0.59  |
| total | 100.29 | 100.39 | 100.17 | 100.22 |  | 100.29  | 100.03  | 100.21  | 99.90  | 100.26  |  | 100.15  | 99.74  | 100.37  |
| Mg♯ | 18.38  | 19.06  | 22.19  | 19.14  | 　 | 38.56  | 44.28  | 44.87  | 45.28  | 41.09  | 　 | 39.38  | 40.62  | 43.03  |
| Na2O/K2O | 0.76  | 0.71  | 0.70  | 0.73  | 　 | 1.51  | 2.53  | 3.07  | 3.61  | 3.64  | 　 | 1.37  | 0.90  | 1.17  |
| A/CNK | 1.03  | 1.04  | 1.04  | 1.03  | 　 | 1.07  | 1.04  | 1.03  | 0.97  | 1.08  | 　 | 0.95  | 0.99  | 0.98  |
| A/NK | 1.22  | 1.24  | 1.14  | 1.25  | 　 | 1.27  | 1.28  | 1.36  | 1.22  | 1.19  | 　 | 1.50  | 1.41  | 1.47  |
| TZr(℃) | 840 | 833 | 818 | 836 |  | 765 | 787 | 775 | 778 | 756 |  | 864 | 878 | 868 |
| *REE(ppm)* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| La | 41.36  | 48.50  | 43.89  | 69.66  |  | 20.02  | 19.71  | 18.58  | 22.77  | 23.96  |  | 56.92  | 39.47  | 56.21  |
| Ce | 90.00  | 98.45  | 88.74  | 132.45  |  | 37.70  | 36.65  | 35.19  | 41.90  | 41.91  |  | 125.37  | 84.24  | 118.84  |
| Pr | 11.30  | 11.72  | 9.51  | 16.22  |  | 3.62  | 3.69  | 3.50  | 4.47  | 4.51  |  | 14.85  | 9.88  | 13.38  |
| Nd | 46.15  | 45.42  | 33.91  | 61.12  |  | 12.02  | 12.84  | 11.97  | 15.35  | 15.82  |  | 58.32  | 39.18  | 50.88  |
| Sm | 10.88  | 10.13  | 6.32  | 12.89  |  | 2.06  | 2.41  | 2.09  | 3.28  | 3.35  |  | 13.33  | 8.49  | 10.98  |
| Eu | 1.51  | 1.37  | 1.38  | 1.44  |  | 0.50  | 0.47  | 0.47  | 0.56  | 0.63  |  | 2.13  | 1.50  | 1.84  |
| Gd | 11.27  | 10.32  | 5.78  | 12.60  |  | 1.56  | 1.94  | 1.69  | 2.82  | 2.75  |  | 11.00  | 6.63  | 8.61  |
| Tb | 1.99  | 1.78  | 0.95  | 2.11  |  | 0.24  | 0.32  | 0.28  | 0.48  | 0.50  |  | 1.80  | 1.06  | 1.33  |
| Dy | 12.28  | 10.66  | 5.64  | 12.58  |  | 1.54  | 2.05  | 1.83  | 3.15  | 3.13  |  | 10.30  | 6.27  | 8.10  |
| Ho | 2.62  | 2.21  | 1.19  | 2.59  |  | 0.31  | 0.43  | 0.37  | 0.61  | 0.64  |  | 1.96  | 1.17  | 1.51  |
| Er | 7.28  | 5.96  | 3.33  | 6.77  |  | 0.95  | 1.32  | 1.15  | 1.87  | 1.82  |  | 5.35  | 3.22  | 4.15  |
| Tm | 1.14  | 0.89  | 0.53  | 0.99  |  | 0.16  | 0.22  | 0.21  | 0.33  | 0.29  |  | 0.78  | 0.46  | 0.64  |
| Yb | 7.09  | 5.29  | 3.38  | 5.77  |  | 1.21  | 1.69  | 1.40  | 2.24  | 1.98  |  | 4.98  | 2.93  | 4.12  |
| Lu | 1.01  | 0.76  | 0.52  | 0.83  |  | 0.20  | 0.28  | 0.23  | 0.38  | 0.28  |  | 0.75  | 0.45  | 0.63  |
| Y | 72.91  | 60.31  | 33.85  | 69.23  |  | 9.44  | 13.75  | 11.40  | 20.45  | 21.74  |  | 57.49  | 35.56  | 45.19  |
| ΣREE | 245.87  | 253.46  | 205.07  | 338.02  | 　 | 82.10  | 84.03  | 78.96  | 100.20  | 101.54  | 　 | 307.84  | 204.96  | 281.23  |
| LREE/HREE | 4.50  | 5.69  | 8.62  | 6.64  | 　 | 12.29  | 9.18  | 10.03  | 7.44  | 7.92  | 　 | 7.34  | 8.24  | 8.67  |
| δEu | 0.41  | 0.40  | 0.68  | 0.34  | 　 | 0.82  | 0.64  | 0.74  | 0.54  | 0.61  | 　 | 0.52  | 0.59  | 0.56  |
| (La/Yb)N | 4.19  | 6.58  | 9.32  | 8.66  | 　 | 11.89  | 8.34  | 9.49  | 7.28  | 8.68  | 　 | 8.20  | 9.66  | 9.79  |
| Sr/Y | 1.0  | 1.2  | 1.5 | 1.0  | 　 | 21.2  | 14.5  | 12.9 | 8.9 | 6.8  | 　 | 4.7  | 7.9 | 5.8 |
| *Trace Elements(ppm)* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| V | 12.3 | 9.9 | 7.4 | 10.7 |  | 15.1 | 19.9  | 19.5  | 16.8  | 14.7  |  | 79.4  | 51.5  | 60.1 |
| Cr | 2.9 | 2.2 | 1.7 | 2.4 |  | 1.0  | 2.7 | 1.5  | 1.5  | 2.7 |  | 12.4  | 7.6 | 7.8 |
| Co | 2.63 | 2.07 | 1.67 | 2.45  |  | 1.05  | 2.39  | 2.39  | 1.26  | 2.23  |  | 6.92  | 5.29  | 5.38  |
| Ni | 1.07 | 0.83 | 0.59 | 0.97 |  | 1.45  | 2.19  | 2.24  | 1.50  | 1.23  |  | 5.13  | 3.90  | 4.11  |
| Rb | 227 | 152 | 153 | 148 |  | 93  | 72 | 58 | 57  | 53  |  | 235  | 167  | 311  |
| Sr | 76 | 73 | 50 | 70 |  | 200 | 199  | 147 | 181  | 148  |  | 272  | 280  | 261 |
| Zr | 290 | 270 | 230 | 280 |  | 121  | 155  | 136  | 141  | 109 |  | 370  | 428 | 388  |
| Nb | 13.12 | 9.53 | 6.24 | 10.90 |  | 7.41  | 9.43  | 7.94  | 11.11  | 7.32  |  | 26.93  | 19.46  | 21.13  |
| Ta | 1.13 | 0.75 | 0.56 | 0.80 |  | 0.61  | 0.84  | 0.63  | 1.06  | 0.60  |  | 2.12  | 1.78  | 1.23  |
| Ba | 629 | 564 | 639 | 527 |  | 679  | 696  | 581  | 480  | 437 |  | 771 | 913  | 936  |
| Hf | 8.48 | 7.77 | 6.70 | 8.05 |  | 2.96  | 3.98  | 3.48  | 3.99  | 2.97  |  | 8.94  | 10.06  | 9.28  |
| Pb | 23.6 | 20.9 | 17.1 | 21.9 |  | 14.4 | 12.7 | 9.5 | 30.8  | 36.0 |  | 18.8  | 21.7 | 20.3 |
| Th | 16.75 | 12.74 | 12.77 | 17.14 |  | 8.57  | 10.71  | 10.89  | 10.93  | 7.60  |  | 10.03  | 14.07  | 10.45  |
| U | 2.51 | 1.96 | 1.65 | 1.89 |  | 1.55  | 1.13  | 1.11  | 1.31  | 1.12  |  | 3.15  | 2.54  | 2.93 |

TZr(℃)={129000[lnDZr(496000/熔体+0.85M+2.95)]}-273.15（Miller et al.,2003）；Mg#=Mg2+/(Mg2++TFe2+); A/CNK=mole[Al2O3/(CaO+Na2O+K2O)]; δEu=(Eu)N/[(Gd)N+(Sm)N]1/2;

表3 亚干地区花岗岩锆石Hf 同位素分析结果

Table 3 Analytical results of zircon Hf isotopes for the granitoids in Yagan area

| 点号 | 年龄(Ma) | 176Yb/177Hf | 176Lu/177Hf | 176Hf/177Hf | ±2σ | (176Hf/177Hf)i | εHf(0) | εHf(T) | TDM (Ma) | TCDM (Ma) | ƒLu/Hf |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 18AX04 亚东花岗闪长岩 |  |  |  |  |  |  |  |  |  |
| 18AX04-1 | 271 | 0.020250  | 0.000907  | 0.282696  | 0.000015  | 0.282692  | -2.7  | 3.1  | 785  | 1095  | -0.97  |
| 18AX04-2 | 271 | 0.039918  | 0.001736  | 0.282713  | 0.000016  | 0.282704  | -2.1  | 3.6  | 779  | 1066  | -0.95  |
| 18AX04-3 | 271 | 0.060476  | 0.002520  | 0.282671  | 0.000015  | 0.282659  | -3.6  | 1.9  | 857  | 1169  | -0.92  |
| 18AX04-4 | 271 | 0.040944  | 0.001757  | 0.282686  | 0.000015  | 0.282677  | -3.0  | 2.6  | 818  | 1128  | -0.95  |
| 18AX04-5 | 271 | 0.039837  | 0.001744  | 0.282670  | 0.000015  | 0.282661  | -3.6  | 2.0  | 841  | 1163  | -0.95  |
| 18AX04-6 | 271 | 0.045484  | 0.001966  | 0.282730  | 0.000018  | 0.282720  | -1.5  | 4.1  | 759  | 1031  | -0.94  |
| 18AX04-7 | 271 | 0.038034  | 0.001610  | 0.282715  | 0.000016  | 0.282707  | -2.0  | 3.6  | 774  | 1061  | -0.95  |
| 18AX04-8 | 271 | 0.054765  | 0.002324  | 0.282670  | 0.000016  | 0.282658  | -3.6  | 1.9  | 855  | 1171  | -0.93  |
| 18AX04-9 | 271 | 0.043866  | 0.001912  | 0.282683  | 0.000016  | 0.282673  | -3.2  | 2.5  | 826  | 1137  | -0.94  |
| 18AX04-10 | 271 | 0.048204  | 0.002062  | 0.282704  | 0.000016  | 0.282693  | -2.4  | 3.2  | 799  | 1091  | -0.94  |
| 18AX04-11 | 271 | 0.041579  | 0.001786  | 0.282680  | 0.000014  | 0.282671  | -3.3  | 2.4  | 827  | 1142  | -0.95  |
| 18AX04-12 | 271 | 0.056316  | 0.002399  | 0.282725  | 0.000016  | 0.282713  | -1.6  | 3.9  | 775  | 1046  | -0.93  |
| 18AX04-13 | 271 | 0.040746  | 0.001737  | 0.282735  | 0.000015  | 0.282726  | -1.3  | 4.3  | 748  | 1018  | -0.95  |
| 18AX04-14 | 271 | 0.038687  | 0.001657  | 0.282657  | 0.000016  | 0.282649  | -4.1  | 1.6  | 858  | 1192  | -0.95  |
| 18AX04-15 | 271 | 0.049081  | 0.002038  | 0.282654  | 0.000016  | 0.282643  | -4.2  | 1.4  | 871  | 1204  | -0.94  |
| 18AX24都热糜棱岩化花岗岩 |  |  |  |  |  |  |  |  |
| 18AX24-1 | 214 | 0.038645  | 0.001511  | 0.282839  | 0.000016  | 0.282833  | 2.4  | 6.9  | 593  | 812  | -0.95  |
| 18AX24-2 | 214 | 0.024096  | 0.000996  | 0.282840  | 0.000015  | 0.282836  | 2.4  | 7.0  | 584  | 806  | -0.97  |
| 18AX24-3 | 214 | 0.017242  | 0.000703  | 0.282800  | 0.000015  | 0.282798  | 1.0  | 5.6  | 635  | 892  | -0.98  |
| 18AX24-4 | 214 | 0.029615  | 0.001183  | 0.282864  | 0.000015  | 0.282860  | 3.3  | 7.8  | 552  | 752  | -0.96  |
| 18AX24-5 | 214 | 0.023445  | 0.000980  | 0.282847  | 0.000015  | 0.282843  | 2.7  | 7.2  | 574  | 789  | -0.97  |
| 18AX24-6 | 214 | 0.026582  | 0.001106  | 0.282818  | 0.000016  | 0.282813  | 1.6  | 6.2  | 617  | 857  | -0.97  |
| 18AX24-7 | 214 | 0.025073  | 0.001013  | 0.282837  | 0.000016  | 0.282833  | 2.3  | 6.9  | 588  | 811  | -0.97  |
| 18AX24-8 | 214 | 0.028421  | 0.001170  | 0.282851  | 0.000018  | 0.282846  | 2.8  | 7.3  | 572  | 783  | -0.96  |
| 18AX24-9 | 214 | 0.020346  | 0.000834  | 0.282833  | 0.000017  | 0.282830  | 2.2  | 6.8  | 591  | 819  | -0.97  |
| 18AX24-10 | 214 | 0.036922  | 0.001461  | 0.282834  | 0.000016  | 0.282828  | 2.2  | 6.7  | 599  | 822  | -0.96  |
| 18AX24-11 | 214 | 0.038757  | 0.001528  | 0.282840  | 0.000016  | 0.282834  | 2.4  | 6.9  | 592  | 810  | -0.95  |
| 18AX24-12 | 214 | 0.020201  | 0.000828  | 0.282821  | 0.000017  | 0.282818  | 1.7  | 6.3  | 607  | 846  | -0.98  |
| 18AX24-13 | 214 | 0.031511  | 0.001238  | 0.282824  | 0.000018  | 0.282819  | 1.8  | 6.4  | 611  | 844  | -0.96  |
| 18AX24-14 | 214 | 0.045439  | 0.001773  | 0.282826  | 0.000017  | 0.282819  | 1.9  | 6.4  | 616  | 843  | -0.95  |
| 18AX24-15 | 214 | 0.020926  | 0.000865  | 0.282799  | 0.000016  | 0.282796  | 1.0  | 5.5  | 639  | 896  | -0.97  |
| 19AX03切刀黑云母二长花岗岩 |  |  |  |  |  |  |  |  |
| 19AX-03-1 | 380 | 0.054884  | 0.001518  | 0.282605  | 0.000018  | 0.282594  | -5.9  | 2.1  | 929  | 1246  | -0.95  |
| 19AX-03-2 | 380 | 0.029290  | 0.000840  | 0.282580  | 0.000020  | 0.282574  | -6.8  | 1.4  | 947  | 1290  | -0.97  |
| 19AX-03-3 | 380 | 0.038343  | 0.001107  | 0.282581  | 0.000021  | 0.282573  | -6.8  | 1.3  | 953  | 1293  | -0.97  |
| 19AX-03-4 | 380 | 0.032664  | 0.000964  | 0.282463  | 0.000023  | 0.282456  | -10.9  | -2.8  | 1115  | 1555  | -0.97  |
| 19AX-03-5 | 380 | 0.049859  | 0.001347  | 0.282619  | 0.000029  | 0.282610  | -5.4  | 2.6  | 904  | 1210  | -0.96  |
| 19AX-03-6 | 380 | 0.033285  | 0.000973  | 0.282615  | 0.000023  | 0.282608  | -5.6  | 2.6  | 901  | 1214  | -0.97  |
| 19AX-03-7 | 380 | 0.056111  | 0.001637  | 0.282654  | 0.000024  | 0.282643  | -4.2  | 3.8  | 861  | 1136  | -0.95  |
| 19AX-03-8 | 380 | 0.039052  | 0.001053  | 0.282619  | 0.000024  | 0.282612  | -5.4  | 2.7  | 897  | 1206  | -0.97  |
| 19AX-03-9 | 380 | 0.037174  | 0.001061  | 0.282574  | 0.000025  | 0.282566  | -7.0  | 1.1  | 961  | 1307  | -0.97  |
| 19AX-03-10 | 380 | 0.039138  | 0.001098  | 0.282603  | 0.000026  | 0.282595  | -6.0  | 2.1  | 921  | 1242  | -0.97  |
| 19AX-03-11 | 380 | 0.031881  | 0.000923  | 0.282584  | 0.000026  | 0.282577  | -6.7  | 1.5  | 944  | 1283  | -0.97  |
| 19AX-03-12 | 380 | 0.033688  | 0.000988  | 0.282617  | 0.000024  | 0.282610  | -5.5  | 2.6  | 898  | 1209  | -0.97  |
| 19AX-03-13 | 380 | 0.045395  | 0.001280  | 0.282573  | 0.000024  | 0.282564  | -7.0  | 1.0  | 968  | 1313  | -0.96  |
| 19AX-03-14 | 380 | 0.034733  | 0.001024  | 0.282576  | 0.000025  | 0.282569  | -6.9  | 1.2  | 957  | 1302  | -0.97  |

εHf(*t*)=10000×{[(176Hf/177Hf)S–(176Lu/177Hf)S×(eλ*t*–1)]/[(176Hf/177Hf)CHUR,0–(176Lu/177Hf)CHUR×(eλ*t*–1)]–1}; TDM=1/λ×ln{1+[(176Hf/177Hf)S(176Hf/177Hf)DM]/[(176Lu/177Hf)S–(176Lu/177Hf)DM]};

TDMC=*T*DM–(*T*DM–*t*)×[(*f*cc–*f*s)/(*f*cc–*f*DM)]; *f*Lu/Hf=(176Lu/177Hf)S/(176Lu/177Hf)CHUR-1

其中：λ=1.867×10-11/a(Söderlund et al., 2004); (176Lu/177Hf)S和(176Hf/177Hf)S为样品测量值;

(176Lu/177Hf)CHUR=0.033200, (176Hf/177Hf)CHUR,0=0.282772(Blichert-toft *et al*., 1998); *t*为锆石结晶年龄