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