**β decay of 20Mg to 20Na Proton Emission [20Na(p)19Ne]**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Ei(keV)** | **Iβ (%)** | **Jπ** | **log(ft)** | **B(GT)** | **Ef(keV)** | **Ep(keV)** | **Ip(%)** |
| 984.25(0.10) | 69.72(1.2) | 1+ | 3.83(2) | 0.579(30) |  |  |  |
| 2645 | 0.1 | 1+ | ≥6.24 | ≤0.002 | 0 | e457(3) | e≤0.02 |
| 3001(2) | 11.5(14) | 1+ | 4.08(6) | 0.33(5) | 0 | 806(2) | 11.5(14) |
| e3075(15) | 0.5(1) |  |  |  | 0 | e885(15) | 0.5(1) |
| 3874(10) | 4.8 (6) | 1+ | 4.17(6) | 0.27(4) | 2380 | 1441(30)1679(15) | 4.8(6) |
| 4123(16) | 2.7 (3) | 1+ | 4.33(6) | 0.18(3) | 0 | 1928(16) | 1.1(2) |
| 4800 | 1.9 | 1+ | ≤4.23[3.95(6)] | ≥0.23[0.45(7)] | 1536238,2750 | 1056(30)2344(25)2559(45) | 0.7(1)0.3(1)+0.8(1) |
|  |  |  |  |  |  | d2256(18) | d0.3(1) |
| 5600 | 1.5 | 1+ | ≤3.97[3.70(6)] | ≥0.42[0.79(10)] |  |  |  |
| b5836(13) | b0.56(7) | b1+ | b4.34(3) |  |  |  |  |
| 6266(30) | 1.2(1) | 1+ | 3.72(6) | 0.77(11) | 238,2750 | 3837(35)4071(30) | 0.2(1)+0.1(1)0.7(1) |
| 6521(30) | 3.3 | 0+ | 3.13(6) | 4.57(68) | 238,2750c1615.29 (30) | 4071(30)4326(30)c2700(23) | 0.59(1)+0.32(1)1.8(3)c0.212(7) |
| 6770 | 0.03(8) | 1+ | ≤5.01 | ≥0.04 |  |  |  |
| 6920 | 0.01 | 1+ | ≤5.39 | ≥0.03 |  |  |  |
| b7183(16) | b0.08 | b1+ |  |  |  |  |  |
| 7440 | 0.01 | 1+ | ≤4.99 | ≥0.04 | c4034.7(16) | c$1210\_{-0.22}^{+0.25}$ | c0.0149(35) |

**d**Half life of 20Mg =90±0.6 ms

(All unmarked values are taken from reference a)

Proton Separation energy(20Na)= 2190 keV

**a Piechaczek et al./Nuclear Physics A 584 (1995)**

**b Lund et al. Eur. Phys. J. A (2016) 52: 304**

**c Glassman et al. PHYSICAL REVIEW C 99, 065801 (2019)**

**d Sun et al. PHYSICAL REVIEW C 95, 014314 (2017)**

**e Wallace et al. Physics Letters B 712 (2012) 59–62**

**Gamma ray transition (19Ne)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ei****(MeV)** | **Ef****(MeV)** | **Eγ****(MeV)** | **Iγ** | **B.R(%)** |
| 0.238(10) | 0 | 0.238(10) | (3*.*80 ± 0*.*07stat ± 0*.*08sys ) × 10−2 | 100 |
| 0.275(10) | 0 | 0.275(10) | (3*.*59 ± 0*.*06stat ± 0*.*08sys ) × 10−2 | 100 |
| 1.51(25) | 0.2750.238 | 1.232(22)1.269(24)1.51 | (2*.*36 ± 0*.*04stat ± 0*.*05sys ) × 10−3 (4*.*18 ± 0*.*12stat ± 0*.*09sys ) × 10−4 | 84.915.1 |
| 1.535(24) | 0.2750.2380 | 1.261(24) 1.297 (22)1.535(24) | (6*.*75 ± 0*.*15stat ± 0*.*15sys ) × 10−4 (1*.*539 ± 0*.*027stat ± 0*.*033sys ) × 10−2(5*.*68 ± 0*.*44stat ± 0*.*17sys ) × 10−4  | 4.05 92.53 3.42 |
| 1.61(30) | 0.2750.2380 | 1.340(25)1.377(3)1.61(30) | (1*.*57 ± 0*.*03stat ± 0*.*03sys ) × 10−3(1*.*82 ± 0*.*41stat ± 0*.*04sys ) × 10−4 (3*.*68 ± 0*.*18stat ± 0*.*08sys ) × 10−4  |  74.0 8.6 17.49 |
| b2.795 | b0.238 | b2.557 |  | 100 |
| 4.03(16) | 0b1.535b0.28 | 4.03(16)b2.499b3.75 | (1*.*19 ± 0*.*12stat ± 0*.*12sys ) × 10−4  | 80(15)b5±5b15±5 |
| b 4.14 | b1.51 | b2.635 |  | b 100 |
| b 4.20 | b 0.238b 1.51 | b 3.962b 2.69 |  | b 20±5b 80±5 |
| b 4.38 | b 0.238b 0.279 | b 4.142b 4.101 |  | b 85±4b 15±4 |
| b 4.55 | b 0 b 0.275 | b 4.55b 4.275 |  | b 35±25b 65±25 |
| b 4.60 | b 0.238b 1.54 | b 4.362b 3.06 |  | b 90±5b 10±5 |
| b 4.64 | b 2.79 | b 1.85 |  | b 100 |

Half life of 19Ne=17.22 sec

α Separation energy(19Ne)= 3529 keV

**a Glassman et al. PHYSICAL REVIEW C 99, 065801 (2019)**

**b D.R. Til1ey et al./ Nuclear Physics A 595 (1995) 1-170**

(All unmarked values are taken from reference a)

20Na(β) 20Ne , 20Ne(α) 16O

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Nuclide | DecayMode | Eα (c.m.) | Iα(rel)% | Iα(abs)% | Eemitter(20Ne)b | Edaughter(16O) b |
| 20Na | βα | 0.893(4)a1.059(5) a1.525(30) a1.995(5) a2.6915(10) a | $0.028\_{-17}^{+44}$ a$0.0101\_{-30}^{+44}$a0.006(2) a0.0083(12) a100(15) a | $$0.0056\_{-34}^{+88}$$$$0.0020\_{-6}^{+90}$$0.0012(4)0.0066(10)20.1(3) | 5.6214(7) 05.7877(26) 06.725(5) 07.4219(12) 0 |  |
|  |  | 3.0996(21)3.324(7)4.463(25)4.749(3)5.540 | 3.65(43)0.074(6)0.39(4)1.51(27)17.31(9) | 0.73(9)0.015(1)0.078(8)0.303(7)3.47(5) | 7.8334(15) 08.054(7) c  09.192(25) c 09.467(5) 010.2732(19) 0 |  |
|  |  | 5.844(3)6.106(3)6.208(7)6.383(7)6.561(4)7.123(6) | 0.553(15)1.09(3)0.075(9)0.055(7)0.165(11)0.010(2) | 0.111(3)0.219(7)0.015(2)0.011(2)0.033(2)0.0020(4) | 10.584(5) 010.843(3) 010.940(9) 011.116(9) 011.291(4) c 011.885(7) 0 |  |

All values taken from ***[Nucl. Phys. A 493, 293 (1989)],*** except where noted.

Other β-α reference: ***[Nucl. Phys. Rev.35, 445 (2018***).]

a [2013La22].

bValues from adopted levels in ENSDF [***Nucl. Phys. A 636, 249 (1998)***], except where noted.

 cCalculated from α energies and Sα ( 20Ne) = 4729.84 keV [***Chin. Phys. C 41, 030003 (2017)***

**Branching in 19Ne(β+) 19F**

|  |  |  |  |
| --- | --- | --- | --- |
| **Decay to 19F (MeV)** | **Branching Ratio** | **Jπ** | **logftc** |
| 0 | 99.99 | $$\frac{1}{2}^{+}$$ | 3.237±0.002 |
| 0.11 | (1.2 ±0.2)x10-2 | $$\frac{1}{2}^{-}$$ | 7.061±0.072 |
| **c**1.55 | (2.2 ±0.21)x10-3**d** | $$\frac{3}{2}^{+}$$ | 5.7±0.041 |

a ***Phys. Rev. C 27 (1983) 2833*** and ***Phys. Rev. C 24(1981) 313 (***All values are taken from this ref.)

***b At. Data Nucl. Data Tables 33 (1985) 347***

c Eγ, for 19F\* (1.55 → 0.20) = 1356.924→0.15 keV (***Phys. Rev. C 13 (1976) 2593***), 1356.844→0.13 keV (***Phys. Rev. C 27 (1983) 2833***).

d From (***Phys. Rev. C 13 (1976) 2593***, ***Phys. Rev. C 27 (1983) 2833***).

**Branching in 20Na(β+) 20Ne**



***a*** [***Nuclear Physics A***](https://www.sciencedirect.com/science/journal/03759474)***,***[***493, 2***](https://www.sciencedirect.com/science/journal/03759474/493/2)***, (1989), 293-322*** (All values are taken from this ref)

**b** Allowed decays assumed