Adopted Levels

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Sukhjeet Singh	ENSDF	08-Mar-2022

Q(β^-)=2200 *SY*; S(n)=5240 *SY*; S(p)=9620 *SY*; Q(α)=3360 *SY* 2021Wa16

Estimated uncertainties in 2021Wa16: 200 for Q(β^-), 280 for S(n) 450 for S(p) and Q(α).

S(2n)=8720 *200* (syst,2021Wa16), S(2p)=17500 (2019Mo01,theory).

2010Al24: ^{224}Po nuclide identified in ^{9}Be(^{238}U,X) reaction with a beam energy of 1 GeV/nucleon produced by the SIS synchrotron at GSI facility. Target=2500 mg/cm^2. The fragment residues were analyzed with the high resolving power magnetic spectrometer Fragment Separator (FRS). The identification of nuclei was made on the basis of magnetic rigidity, velocity, time-of-flight, energy loss and atomic number of the fragments using two plastic scintillators and two multisampling ionization chambers. The FRS magnet was tuned to center on ^{210}Au, ^{216}Pb, ^{219}Pb, ^{227}At and ^{229}At nuclei along the central trajectory of FRS.

Unambiguous identification of nuclides required the separation of different charge states of the nuclei passing through the FRS. At 1 GeV/nucleon incident energy of ^{238}U, fraction of fully stripped ^{226}Po nuclei was about 89%. Through the measurement of difference in magnetic rigidity in the two sections of the FRS and the difference in energy loss in the two ionization chambers, the charge state of the transmitted nuclei was determined, especially, that of the singly charged (hydrogen-like) nuclei which preserved their charge in the current experimental setup. Measured production cross sections with statistical uncertainty<10% and systematic uncertainty≈20%.

Criterion established in 2010Al24 for acceptance of identification of a new nuclide: 1. number of events should be compatible with the corresponding mass and atomic number located in the expected range of positions at both image planes of the FRS spectrometer; 2. number of events should be compatible with >95% probability that at least one of the counts does not correspond to a charge-state contaminant. Comparisons of measured σ with model predictions using the computer codes COFRA and EPAX.

Additional information 1.

Theoretical calculations: two references extracted from the NSR database are listed in document records.

^{224}Po Levels

E(level)	J$^{\pi}$	Comments
0	0$^+$	%β^-=100 The β^- is the only decay modes expected, thus 100% β^- is assigned by inference. From A/Z plot (Fig. 1 in 2010Al24), ≈100 events are assigned to ^{224}Po. Production cross section measured in 2010Al24, values are given in figure 2, plot of σ versus mass number for Po isotopes. Statistical uncertainty<10%, and systematic uncertainty≈20% Production σ=5.97 nb (priv. comm. from H. Alvarez-Pol as e-mail reply of Oct 29, 2010 to B. Singh, which also stated that further analysis was in progress). See also D0607 dataset in the EXFOR database. The β^- decay is the only decay mode expected. $T_{1/2}$: >300 ns from time-of-flight as given in 2006Ca30 for a similar setup. Actual half-life is expected to be much larger as suggested by the theoretical value of 12.3 s for β decay and >10^{20} s for α decay (2019Mo01), and systematic value of 3 min for β decay (2021Ko07). From a decreasing trend of half-lives with increasing neutron number in neutron-rich nuclei, half-life of ^{224}Po is expected as <2 min from known $T_{1/2}$ values of 2.2 min for ^{221}Po, 10.3 min for ^{219}Bi, 3.1 min for ^{218}Bi and 1.53 s for ^{217}Bi; there seems to be a lack of decreasing trend of experimental half-lives with increasing neutron number in Po isotopes.