Adopted Levels

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, M. S. Basunia, Murray Martin et al. ,	NDS 160, 405 (2019)	30-Oct-2019

Q(β^-)=4859 *27*; S(n)=3590 *30*; S(p)=6310 *SY*; Q(α)=4330 *SY* 2017Wa10

Estimated uncertainties (2017Wa10): 300 for S(p), 200 for Q(α).

S(2n)=8801 *29*, S(2p)=16080 *300* (syst) (2017Wa10).

Additional information 1.

1998Pf02: ^{218}Bi nuclide produced and identified in ^{9}Be(^{238}U,X) reaction at E(^{238}U)=1 GeV/nucleon.

2004De16, 2004Fr14 (also 2004DeZV thesis): ^{218}Bi nuclide produced in spallation reaction with a 1.4-GeV proton beam on a uranium carbide target at ISOLDE facility.

2010Al24 (also 2009Al32): ^{218}Bi nuclide identified in ^{9}Be(^{238}U,X),E=1 GeV/nucleon, beam produced by the SIS synchrotron at GSI facility. The fragment residues were analyzed with the high resolving power magnetic spectrometer Fragment separator (FRS).

2012Be28: ^{218}Bi was produced in projectile fragmentation of ^{238}U at 1 GeV/nucleon beam provided by the UNILAC-SIS accelerator at GSI with an intensity of 1.5×10^9 ions/spill (a repetition of 3 s and an extraction time of 1 s), bombarding a ^{9}Be target. Reaction products were separated and identified in the magnetic spectrometer Fragment Separator (FRS), and implanted in a composite DSSSD detector system comprising three layers, each with three DSSSD pads with 16x16 pixels. The DSSSD detectors were surrounded by the RISING γ-ray spectrometer array of 105 Ge crystals arranged in 15 clusters. Measured γ, $\beta\gamma$(t) in coincidence with implanted recoils. A total of 6678 implanted ^{218}Bi ions were detected.

2014Mo02, 2014Mo15: ^{218}Bi was produced in projectile fragmentation of 1 GeV/nucleon ^{238}U beam from UNILAC-SIS accelerator at GSI, bombarding a ^{9}Be target. The reaction products were separated and identified in the magnetic spectrometer Fragment Separator (FRS), based on Bρ-ΔE-Bρ scheme.

2017Ca12, 2016Ca25 (also 2014Ca23): ^{218}Bi produced in fragmentation of 1 GeV/nucleon ^{238}U beam from SIS-18 synchrotron at GSI on a ^{9}Be target of 1.6 g/cm^2 thickness. Reaction products were separated and identified by GSI Fragment Separator (FRS) using Bρ-ΔE-Bρ technique. The FRS tracking detectors were four time-projection chambers (TPCs), two ionization chambers, and thin plastic scintillators for tof measurement. Mass-over-charge (A/Q) ratios were measured for ions analyzed on an event-by-event basis. Finally selected ions of interest were implanted into a stack of double-sided silicon strip detectors SIMBA, which also detected β-decay events. Comparison with theoretical calculations using FRDM+QRPA, DF3+cQRPA KTUY and RHB+RQRPA models. (cQRPA=continuum quasi-random-phase approximation; FRDM=finite−range droplet model; DF3=density functional theory; RHB=relativistic Hartree-Bogoliubov; RQRPA=relativistic QRPA; KTUV=Koura−Tachibana−Uno−Yamada model).

Mass measurement: 2012Ch19 (also 2008ChZI thesis).

Theory references: consult NSR database (www.nndc.bnl.gov/nsr/) for six primary references for calculations of half-lives of radioactive decays.

^{218}Bi Levels

E(level)	J$^\pi$	T$_{1/2}$	Comments
0	(6$^-$,7$^-$,8$^-$)	33 s *1*	%β^-=100 T$_{1/2}$: from time scaling measurement of γ rays (2004De16). Others: 36 s *14* (2012Be28, $\beta\gamma$-coin decay curve by summing time spectra for 262-, 385- and 425-keV transitions); 38.5 s *216* (2017Ca12, rounded to 38 s *22* in 2016Ca25; (ion)β correlated decay curve and analyzed by maximum-likelihood method). E(level): the 33-s activity is assumed as the ground state, probably with J≥6 since it possibly feeds (4$^+$), (6$^+$) and (8$^+$) states in ^{218}Po. 2004De16 state that there is no evidence for a low-spin isomeric state. J$^\pi$: from the observed direct β-feedings to the (6$^+$) and (8$^+$) levels of ^{218}Po, and expected coupling of πh$_{9/2}$ orbital with νg$_{9/2}$ and/or other positive-parity neutron orbitals . Shell-model calculation by 2004De16, with the consideration of πh$_{9/2}$, νg$_{9/2}$, and νi$_{11/2}$ multiplets, predicted 8$^-$ as the ground state, with the 7$^-$ and 6$^-$ states lying only ≈40 keV above the g.s. For Z=83 isotopes, g.s J^π values are 9/2$^-$ or (9/2$^-$) for odd-A from A=209 to 217, suggesting h$_{9/2}$ proton orbital in the g.s. configuration for ^{218}Bi. For N=13 isotones, g.s. J^π=(9/2$^+$) for ^{219}Po, 7/2$^+$ for ^{221}Rn, 3/2$^+$ for ^{223}Ra and (3/2$^+$) for ^{225}Th do not suggest a single neutron orbital for g.s. of ^{218}Bi.