Adopted Levels

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and A. A. Sonzogni	ENSDF	12-Apr-2023

Q(β^-)=1830 *55*; S(n)=4605 *45*; S(p)=8120 *syst*; Q(α)=3802 *48* 2023Ni04,2021Wa16

Q(β^-) from measured mass excesses of 56182 keV *45* for ^{241}U and 54352 keV *31* for ^{241}Np (2023Ni04). Other: 1880 *220* (syst, 2021Wa16).

S(n) from measured mass excesses of 56182 keV *45* for ^{241}U (2023Ni04) and 52715.5 keV *26* for ^{240}U (2021Wa16). Other: 4590 *200* (syst, 2021Wa16).

S(p)=8120 *205* (syst) from measured mass excesses of 56182 keV *45* for ^{241}U (2023Ni04) and 57010 keV *200* for ^{240}Pa (syst, 2021Wa16). Other: 8100 *280* (syst, 2021Wa16).

Q(α) from measured mass excesses of 56182 keV *45* for ^{241}U (2023Ni04) and 49955 keV *16* for ^{237}Th (2021Wa16). Other: 3820 *200* (syst, 2021Wa16).

S(2n)=10533 *45* from measured mass excesses of 56182 keV *45* for ^{241}U (2023Ni04) and 50572.7 keV *15* for ^{239}U (2021Wa16). Other: 10520 *200* (syst, 2021Wa16).

S(2p)=14900 *400* (syst) from measured mass excesses of 56182 keV *45* for ^{241}U (2023Ni04) and 56500 keV *400* for ^{239}Th (syst, 2021Wa16). Other: 14880 *450* (syst, 2021Wa16).

2023Ni04: ^{241}U isotope was produced in multinucleon transfer (MNT) reaction ^{198}Pt(^{238}U,X),E(^{238}U)=10.75 MeV/nucleon, followed by ionization and identification in mass and charge of projectile-like fragments using two-color, two-step laser ionization technique with an appropriate choice of tunable wavelength. The separated ions were stopped in windowless gas cell-based ion cooler buncher (GCCB), and finally injected into the multireflection time-of-flight mass spectrograph (MRTOF-MS) for precise mass determination at the KEK Isotope Separation System (KISS) at RIKEN Ring cyclotron facility. ^{133}Cs ions were used as reference for mass measurements.

1960Di03: ^{241}U measured indirectly through the detection of ^{241}Pu ($T_{1/2}$=14.29 y) and ^{241}Am ($T_{1/2}$=432.6 y) in the debris of the first large-scale thermonuclear test (Ivy Mike) of November 1, 1952 in the Pacific Ocean. Airborne and condensed samples were collected, followed by chemical extraction and purification. The isotopic composition of Pu, Am and Cm fractions were determined by using mass spectrometers, while the abundances of all the transcurium elements were measured by the detection of radiations, primarily α particles. Mass abundance of A=239-255 uranium isotopes at zero time were deduced which varies from 1.0 for ^{239}U to 5.7×10^{-11} for ^{255}U. The heavy uranium isotopes are expected to be produced in an environment of unusually high neutron flux (time-integrated flux of ≈10^{24} n/cm^2) through successive neutron captures in ^{238}U, with neutron energies of 14-MeV from deuterium-tritium fusion, and few MeV from the fission of ^{235}U. The ^{241}Am fraction can be formed in ^{241}U –> ^{241}Np –> ^{241}Pu –> ^{241}Am β^- decay chain. See also related articles: 1956Fi11, 1967Ho20, 1966Rg01 and 1969In01.

Theoretical calculations:

2017Ro28: calculated binding energy, rotational energy, octupole and hexadecapole moments versus quadrupole moment, fission $T_{1/2}$ within HFB-EFA (HFB Equal Filling Approximation) using Gogny D1M EDF.

2016Pa06: calculated $T_{1/2}(\beta^-)$ using FFST (Finite Fermi Systems Theory) with masses from FRDM or ETFSI.

2010To07: calculated proton and neutron single-particle spectra, S(n), rms charge radius.

Additional information 1.

^{241}U Levels

E(level)	Comments
0	%β^-=100 Confirmed identification of ^{241}U nuclide from mass determination with measured mass excess=56182 keV *45* (2023Ni04). β^- is expected to be the dominant decay mode of ^{241}U, since the theoretical half-life for α decay is >10^{20} s (2019Mo01), thus 100% β^- decay is assigned by inference (evaluators). Through the detection of ^{241}Pu ($T_{1/2}$=14.29 y) and ^{241}Am ($T_{1/2}$=432.6 y) in the debries of the thermonuclear test, abundance of ^{241}U was deduced to be 0.039 *5* relative to 1.000 *4* for ^{239}U (1960Di03). J^π: 7/2$^+$ from systematics (2021Ko07) and from theoretical considerations (2019Mo01). $T_{1/2}$: half-life has not been measured. From mass measurement in 2023Ni04, the half-life is >250 ms (200 ms transit time through the isotope separation system KISS, and 50 ms through the mass measurement system, as communicated by emails of April 12, 2023 from Dr. T. Niwase). Actual half-life is expected to be much longer as suggested by

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{241}U Levels (continued)

E(level)	Comments
	systematics: 4 min in 2021Ko07; and by theoretical calculations: 4.9×10^5 s (2021Mi17), >100 s (theory, 2019Mo01), ≈6 s (2016Pa06). Note that the half-lives of neighboring neutron-rich isotopes are: 23.45 min for ^{239}U, 14.1 h for ^{240}U and 16.8 min for ^{242}U (from NuDat3 and ENSDF databases at NNDC, BNL).