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ДОСЛІДЖЕННЯ РОЗПАДУ НАДВАЖКИХ ЯДЕР З Z = 127 – 132 З ВИПРОМІНЮВАННЯМ 1-N І 2-N ГАЛО-ЯДЕР

Проникність бар'єрів, константа розпаду та період напіврозпаду для 1-n гало-ядер ^{11}Be, ^{15,17,19}C, ^{22}N, ^{23}O, ^{24,26}F, ^{29,31}Ne, ^{34,37}Na, ^{35,37}Mg і ^{55}Ca; і 2-n гало ядер ^{22}C, ^{27,29}F, ^{34}Ne, ^{36}Na і ^{46}P і материнських ядер з Z = 127 – 132 були розраховані в рамках моделі з Кулонівським потенціалом та потенціалом близькості при отриманні значень Q в краплинній моделі. Було проведено порівняння між періодами напіврозпаду при розгляді гало-кандидатів як нормальних кластерів і як деформованих утворень із відповідним середньоквадратичним радіусом. Закриття нейтронної оболонки на значеннях 190, 196, 198, 200, 204 і 208 було визначено з графіка періодів напіврозпаду залежно від числа нейтронів дочірніх ядер (N_P). Розрахунки періоду напіврозпаду для альфа-розпаду і спонтанного розпаду показали, що більшість материнських ядер розпадається більш імовірно через альфа-випромінювання. Графіки Гейгера - Неттолла $\log_{10}T_{1/2}$ залежно від $Q^{-1/2}$ та універсальні графіки $\log_{10}T_{1/2}$ залежно від $-\ln P$ для випромінювання всіх 1-n і 2-n гало-ядер з материнських ядер, що розглядається тут, є лінійними, що показує справедливість закону Гейгера - Неттола для емісії гало-ядер з надважких елементів.

Ключові слова: кластерна радіоактивність, гало-ядра, надважкі елементи.

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STUDY ON THE DECAY OF *Z* = 127 – 132 SUPERHEAVY NUCLEI VIA EMISSION OF 1-N AND 2-N HALO NUCLEI

The barrier penetrability, decay constant and decay half-life of 1-n halo nuclei ^{11}Be, ^{15,17,19}C, ^{22}N, ^{23}O, ^{24,26}F, ^{29,31}Ne, ^{34,37}Na, ^{35,37}Mg, and ^{55}Ca; and 2-n halo nuclei ^{22}C, ^{27,29}F, ^{34}Ne, ^{36}Na, and ^{46}P from Z = 127 – 132 parents were calculated within the framework of the Coulomb and proximity potential model by calculating the Q-values using the finite-range droplet model. A comparison between the decay half-lives is made by considering the halo candidates as a normal cluster and as a deformed structure with a rms radius. Neutron shell closure at 190, 196, 198, 200, 204, and 208 are identified from the plot of decay half-lives versus the neutron number of daughter nuclei (N_P). The calculation of alpha decay half-life and spontaneous decay half-life showed that the majority of the parent nuclei survive spontaneous fission and decay through alpha emission. The Geiger - Nuttall plots of $\log_{10} T_{1/2}$ versus $Q^{-1/2}$ and universal plots of $\log_{10} T_{1/2}$ versus $-\ln P$ for the emission of all 1-n and 2-n halo nuclei from the parents considered here are linear and show the validity of Geiger - Nuttall law in the case of decay of halo nuclei from superheavy elements.

Keywords: cluster radioactivity, halo nuclei, superheavy elements.

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