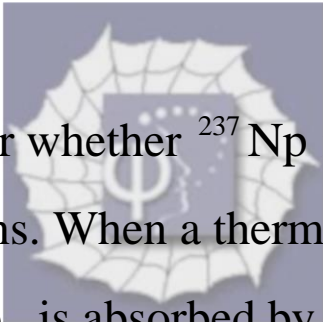


865.

Problem 55.14 (RHK)

^{238}Np has a barrier energy for fission of 4.2 MeV. To remove a neutron from this nuclide requires an energy expenditure of 5.0 MeV. We have to answer whether ^{237}Np is fissionable by thermal neutrons.

Solution:



We want to answer whether ^{237}Np nuclide is fissionable by thermal neutrons. When a thermal neutron, kinetic energy nearly zero, is absorbed by a ^{237}Np nuclide, the nuclide ^{238}Np is formed in an excited state. As the binding energy of a neutron, which is alternatively defined as the energy required to remove a neutron from ^{238}Np nuclide, is 5.0 MeV, when a thermal neutron is absorbed by a ^{237}Np nuclide the nuclide ^{238}Np will be in an excited state with excitation energy of 5.0 MeV. The barrier energy for fission of ^{238}Np nuclide is 4.2 MeV. Therefore, the energy of the ^{238}Np nuclide

formed on absorption of a thermal neutron is more than the barrier energy for fission. Therefore, ^{237}Np nuclide is fissionable by absorption of thermal neutrons.

