Radioactive Decay of Md Isotopes*

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The radioactive decay of the known Md isotopes has two general characteristics which can be related to their nuclear structure. First, all of the even neutron species have a relatively small alpha branching ratio (~10%) and decay primarily by electron capture. Secondly, there are several known isomer pairs, all in odd neutron species. ~~In this paper we will~~ attempt to determine the reasons for these empirical observations.

In Fig. 1[1] the proton level structure in the region of Z=101 is shown. The state $\frac{7}{2}$ - [514] is the ground state of the Z=101 species. In Fig. 2[2] the spectrum of the ^{250}Cf (α,t) ^{251}Es proton transfer reaction is shown. As we can see the $\frac{7}{2}$ + [633] and $\frac{3}{2}$ - [521] bands are the ground states for the Z=97 and Z=99 species. In the Md isotopes the B_2 deformation apparently has decreased, so that the $\frac{7}{2}$ - [514] band is the ground state. As one can see from Figs. 1 and 2, there is about a 300 KeV energy gap between the $\frac{7}{2}$ - band and the ground state bands of the even-neutron einsteinium isotopes. Therefore, the unhindered alpha decay of even-neutron Md isotopes will always be to a band 300 KeV in excitation, and will consequently have a relatively long half-life. On the other hand, the electron capture decay will not have that energy hindrance and will proceed normally. Therefore, it is not surprising that the alpha branching ratios are small for the even-neutron isotopes.