Chemistry 485

Spring, 2o1o
Distributed: Wed., 17 Feb. 2o1o
(10 points)

Problem Set #5
Due: Mon., 22 Feb. 2o1o

1. Calculate the ratio of the wavelength of the 1.332 MeV photon to the *diameter* of the emitting ^{60}Ni nucleus formed by the beta decay of ^{60}Co.

2. The ^{134}Cs nucleus decays 70% of the time by a β- decay (4+, $T_{1/2}$=2.06 yr) to an excited state (4+) in the daughter nucleus ^{134}Ba at 1.4006 MeV. This state can decay to three lower lying states by gamma ray emission: (1) to a 2+ state at 1.168 MeV, (2) to a different 2+ state at 0.6047 MeV, or (3) to the 0+ ground state at 0.0 MeV.

   (a) What is the lowest multipolarity and character of the photon that would be emitted in a transition from the 4+ excited state to each of the three possible lower energy states?

   (b) Calculate the three rate constants for photon emission (λ in s^{-1}) from the 4+ excited state to each of the three possible lower energy states using the Weisskopf estimates.