Post-Lecture #6: Statistics of Radioactive Decay II

1. Determine the specific activity of a radioactive sample that has an activity of 42.0 mCi and a TOTAL elemental mass of 113 grams. The sample is 18% radioactive isotope and 72% carrier, what is the carrier-free specific activity? Assume that the difference in mass between the radioactive isotopes and the carrier is negligible. Given what you learned from our example in class, do you think this sample is more suited for injections or external use?

2. Draw the equilibrium plots for all "three" types of equilibrium. Label and/or color the parent and daughter curves. Recite the conditions for each type of equilibrium to occur.

3. For the following decay chains, identify the time at which the daughter reaches its maximum activity. Identify the equilibrium type for each decay chain.

   (a) Ra-226 –> Rn-222 –> Po-218 ($T_{1/2}$ = 1602 y, 3.8 d)

   (b) Mo-99 –> Tc-99m –> Tc-99 ($T_{1/2}$ = 66.7 h, 6.03 h)

   (c) Po-214 –> Pb-210 –> Bi-210 ($T_{1/2}$ = 0.16 ms, 22 y)