Introductory Nuclear Physics
308351
Assignment (3)

Due: Monday, 22/11/2004

Please answer the following questions

1. The radioactive isotope ^{57}Co is a β^- emitter with a half-life of 272 days.
a) Find the decay constant and the mean lifetime.
b) If you have a radiation source containing ^{57}Co with activity 1μCi, how many radioactive nuclei does it contain?
c) What will be the activity of your source after one year?

2. A sample of the isotope ^{131}I, which has a half-life of 8.04 days, has an activity of 5mCi at the time of shipment. Upon receipt in a medical laboratory, the activity is 4.2mCi. How much time has elapsed between the two measurements?

3. A radioactive sample contains 3.5μg of pure ^{11}C, which has a half-life of 20.4 min.
a) Determine the number of nuclei in the sample at t=0
b) What is the activity of the sample initially and after 8.00 h?
c) Calculate the number of radioactive nuclei remaining after 8 hours.

4. A sample of radioactive silver-l05 was observed to decay in the following manner.

Time elapsed, days	Counts/min	Time elapsed, days	Counts/min
0	100,210	50	28,651
10	77,880	60	22,313
20	60,653	70	17,377
30	47,237	80	13,534
40	36,788	90	10,540

a) Calculate the half-life, decay constant and mean life.
b) What will be the activity of this sample after three months?
c) Find the number of undecayed radioactive atoms in the sample after three months.