Radioisotope and Radiation Applications
EXERCISES
Week 1b

Problem 6:
Radiation energy spectra can be categorized into two main groups: those that consist of one or more discrete energies (line spectra) and those that consist of a broad distribution of energies (continuous spectra). For each of the radiation sources listed below, indicate whether "line" or "continuous" is a better description:

a) Alpha particles

b) Beta particles

c) Gamma rays

d) Characteristic X-rays

e) Conversion electrons

f) Auger electrons

g) Fission fragments

h) Bremsstrahlung

i) Annihilation radiation

Problem 7:
Which has the higher energy: a conversion electron from the L shell or from the M shell, if both arise from the same nuclear excitation energy?

Problem 8:
By simultaneously conserving energy and momentum, find the alpha-particle energy emitted in the decay of a nucleus with mass number 210 if the Q-value of the decay is 5.50 MeV.

Problem 9:
What is the lowest wavelength limit of the X-rays emitted by a tube operating at a potential of 195 kV?

Problem 10:
Calculate the specific activity of pure tritium (^{3}H) with a half-life of 12.26 years.

Problem 11:
What is the highest energy to which doubly ionized helium atoms (alpha particles) can be accelerated in a direct current accelerator with 3 MV maximum voltage?