

Assignment 11
Modern Physics

1. Radioactive iodine (^{131}I) has a half-life of 8 days. Iodine is absorbed especially strongly by the thyroid gland. Hence, radioactive iodine can cause thyroid cancer. How long does it take for the amount of ^{131}I to be reduced by a factor of 100?
2. A metal has a work function of 3.5 eV.
 - a) What is the longest wavelength photon that can generate photoelectrons?
 - b) Is this photon in the visible, infrared or ultraviolet portion of the spectrum?
3. Compute the de Broglie wavelength of the following.
 - a) A human walking briskly
 - b) A proton traveling at 3×10^5 m/sec
 - c) An alpha particle traveling at 3×10^5 m/sec
4. What is the value of the principal quantum number for a hydrogen atom to have a size of one micron?
5. Determine an expression for the speed of an electron in the ground (lowest energy) state of hydrogen.