

Physics 475: Assignment #1

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Due: Jan. 18, 2011

1. Foot 1-2. (10 points)
2. Foot 1.5 (10 points) The K-absorption edge (a photon energy) is represented by the energy difference from the $n = 1$ to $n = \infty$ states. So if you look at the energy diagram in Fig. 1.3 the K-absorption edge for tungsten is just under 70 keV. If you want to check your answers I have left my copy of the CRC Handbook on the shelf outside my office. It has measurements for all of the different levels. (but for some weird reason a few pages before this when it talks of X-rays wavelengths it is missing the page with the Mn and Fe K-absorption edges?)
3. Foot 1.7 (5 points) My description of the relativistic correction was for $Z = 1$. You need to consider how Z effects the v/c ratio (and also E itself but I think that is included in the formula in the X-ray section). When you calculate the shielding factor for the M-shell you should probably treat all of the electrons that are in the K and L shells as being “inside” the M-shell.
4. Foot 1.8 (10 points)
5. Foot 1.10 (5 points)
6. Foot 2.4 (10 points)