Homework No. 7

Problem 1: X-ray fluorescence is performed on a Au-Ge alloy.

(24%) (a) What are the energies in keV of the AuKα₁, AuKα₂, AuKβ₁, AuLα₁, GeKα₁, GeKα₂, GeKβ₁, and GeLα₁ lines observed in the fluorescent spectrum?

(20%) (b) The fluorescent radiation is analyzed by using a wavelength-dispersive x-ray spectrometer, which has a germanium analyzing crystal in the (111) orientation. What is the 2θ angle required to observe the AuLα₁ line?

(12%) (c) Will the AuLα₁ fluorescent radiation excite GeKα₁?

(12%) (d) Will the AuLα₁ fluorescent radiation excite GeLα₁?

Problem 2 (32%)

To create an electron-hole pair in silicon at 77 K requires an average energy of 3.8 eV. How many pairs, on the average, are created by the absorption of a AuLα₁ quantum?