Tutorial 1
X Ray Diffraction

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1 Objective

To get to know the diffractometer and X'Pert Data Collector

2 Results and Conclusions

Increasing the width of the slits generally increases the intensity because more photons can get through. If you decrease the size of the anti-scatter slit you reduce the background signal so the peaks get smoother but also less intense. The accepted wavelengths for Kα_1 and Kα_2 are .1540562 and .1544398 nm, respectively.

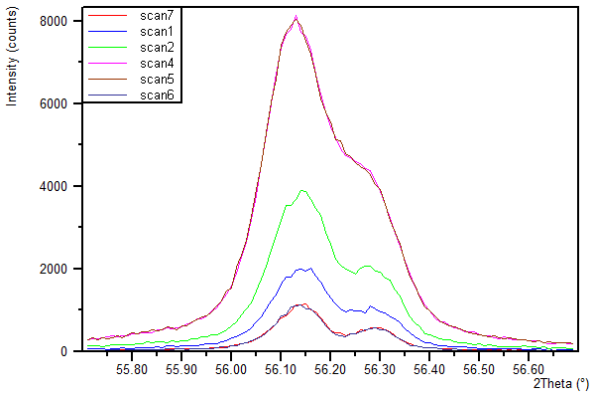

Figure 1: Si sample with Cu target: Kα_1 and Kα_2 peaks

3 Discussion

$CuK_\alpha 1$ is about twice the intensity of $CuK_\alpha 2$ (see Cullity, pg 9). The transition that leads to the $CuK_\alpha 1$ peak is from an electron dropping two orbitals, while the transition that causes $CuK_\alpha 2$ only drops one orbital levels. This means that the energy is greater for $CuK_\alpha 1$, and therefore the wavelength is smaller, and it has higher intensity.

4 Answers to Definitions

a. The *atomic weight of an element* is the relative weight of one of its atoms compared to C-12 with a weight of 12.0000000..., hydrogen with a weight of 1.008, to oxygen with a weight of 16.00. Atomic weight is also the average weight of all the atoms of that element as they occur in nature.

b. The *units of atomic weight* are two-fold, with an identical numerical value. They are g/mole of atoms (or just g/mol) or amu/atom.

c. *Percentage discrepancy* between an accepted (literature) value and an experimental value is

$$\frac{\text{experimental result} - \text{accepted result}}{\text{accepted result}}$$