# 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 K$\alpha_1$ and K$\alpha_2$ are .1540562 and .1544398 nm, respectively.

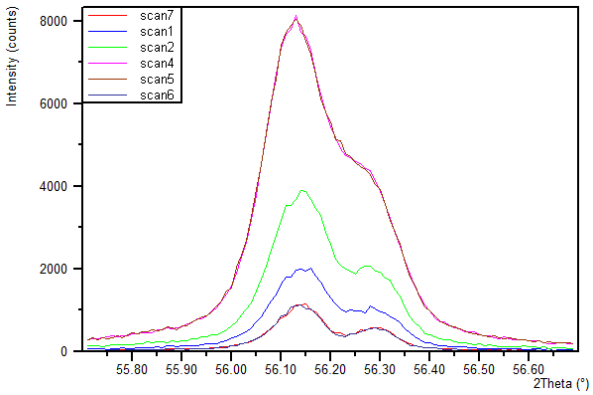


Figure 1: Si sample with Cu target: K$\alpha_1$ and K$\alpha_2$ peaks

# 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. Different scales such as square root or log scales are good for differentiating peaks in some cases or seeing peaks which are much larger or smaller than one another on the same graph. In our case, linear is fine because the intensity of peaks is not too different.

# 4 Answers to Multiple Choice Questions

(i) d

(ii) c

(iii) c

(iv) b