**X-ray Diffraction**

(1) Make plot of intensity vs. angle for your NaCl x-ray diffraction measurement.

(2) Fit your x-ray diffraction peaks using Gaussians:



where the first 2 terms represent a function that fits the background,  is the amplitude,  is the angular position, and  is the half-width of the Gaussian. Just fit six peaks (thus this will be a 21 parameter fit). You could reduce this to a 16 parameter fit if you were to explicitly write the relation for  in terms of the single parameter , but it would be advisable to divide your spectra into 3 groups of 2 pairs of diffraction peaks to succeed in fitting the data.

Note:  can be determined through the Bragg relation:

 where  is the lattice spacing for cubic crystals.

The value  is the lattice constant.

 (plank's constant multiplied by the speed of light)

 are the Millar indices for the crystal planes giving rise to diffraction.

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| --- | --- |
| Bravais Lattice | Allowed Reflections |
| Primitive Cubic | Any h,k,l |
| Body Centered Cubic | h+k+l = even # |
| Face Centered Cubic | h,k,l all odd or all even |

NaCl is a face-centered cubic crystal, so the allowed reflections must have Millier indices where  are all odd or all even.

(3) Extract the lattice constant, , and its uncertainty from your fit. Compare with the value given in the literature.