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Advantages of a Cu vs. Co X-ray Diffraction Source

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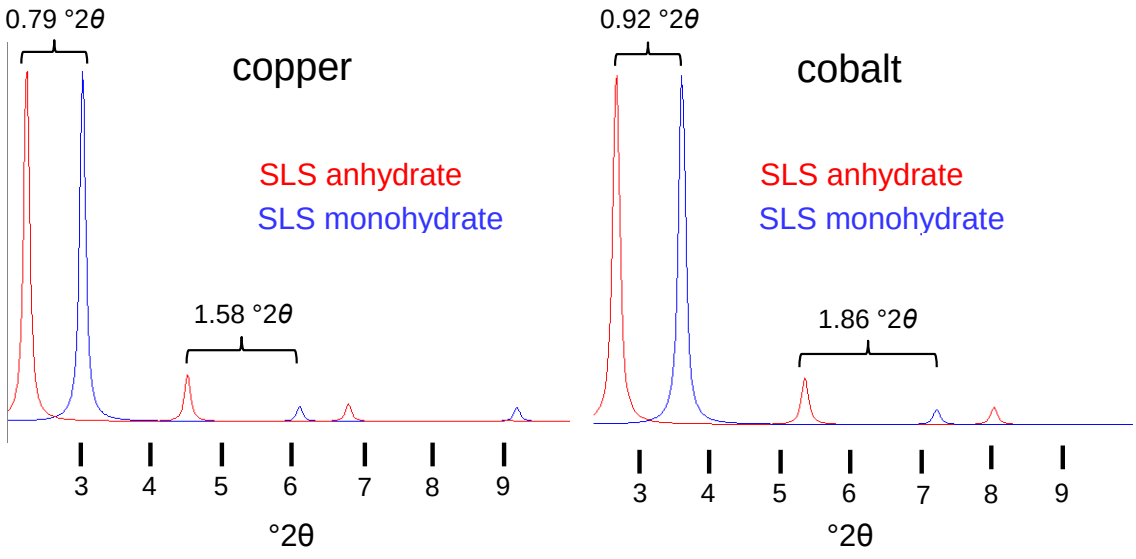
In x-ray powder diffraction, the °2*θ* positions of diffraction peaks are directly proportional to the wavelength of the incoming x-rays (*λ*) according to the Bragg equation: $n\lambda = 2dsin\theta$. Longer x-ray wavelengths result in greater °2*θ* positions which allows for observation of low-angle peaks that are not observable using shorter wavelength x-rays and provides better peak separation. Triclinic Lab's Rigaku Smart-Lab X-ray Powder Diffraction system is typically configured with a copper source, providing x-rays with a wavelength of 1.54 Å. However, for some analyses a cobalt source, providing x-rays with a wavelength of 1.79 Å, is used.

The figures below show the overlaid diffraction patterns of sodium lauryl sulfate anhydrate (red) and sodium lauryl sulfate monohydrate (blue) at both the copper wavelength (left) and the cobalt wavelength (right). Note the higher diffraction angles and peak spreads from the cobalt source. These features allow for differentiation of the two forms. Similarly, polymorphs and other solid forms with indistinguishable features at higher wavelengths using a Cu source may be distinguishable using the Co source.



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