

IDENTIFICATION AND CRYSTAL STRUCTURE SOLUTION OF STABLE AND METASTABLE PHARMACEUTICAL COMPOUNDS USING X-RAY POWDER DIFFRACTION DATA

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X-ray powder diffraction has developed over the past several years into a powerful technique for the elucidation of crystal structures^[1]. Moderately complex structures can be solved from laboratory X-ray powder diffraction patterns; the most successful techniques involve the use of global optimisation methods such as simulated annealing where the degree of complexity is determined by the internal molecular flexibility and the number of independent molecules in the crystal structure. State-of-the-art analysis can successfully solve structures that represent some of the currently most challenging pharmaceutical compounds^[2]. A distinct but related challenge for powder diffraction is the determination of drug structures during synthesis with a view to determining metastable intermediates and transition pathways. This talk will outline recent work using high-throughput X-ray powder diffraction to determine the hydration and dehydration of familiar pharmaceutical compounds and establish a comprehensive structural description of the transformation processes involved.

[1] David, W.I.F., K. Shankland, L.B. McCusker and C. Baerlocher. (2002) *Structure determination from powder diffraction data*. IUCr Monographs on Crystallography 13, Oxford University Press

[2] "Crystal structure solution and refinement of a series of D₂/β₂ receptor agonists using laboratory x-ray powder diffraction data" K. Shankland et al. (this meeting)