

FORMULATION ANALYSES OF OFF THE SHELF PHARMACEUTICALS

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Formulation analyses of off-the-shelf pharmaceuticals by x-ray diffraction phase identification can be extremely challenging due to several factors that include the complexity of the formulation, typical mixtures of inorganic, polymeric and organic materials, preferred orientation, and the degree of crystallinity of the constituent phases. If these problems weren't sufficient the analyst was also confronted, until recently, by the low number of available reference standards and the ability to data mine the existing data.

Despite these problems, x-ray analyses are often the method of choice due to their inherent ability to distinguish between polymorphs, hydrates, solvates, salt mixtures and reaction products that are often the keys to unraveling problems associated with tablet stability, shelf-life and drug bioavailability. Preferred orientation and crystallinity can be measured, analyzed and quantitated turning this liability into an advantage and the recent release of the PDF-4/Organics database provides users with an enormous increase in the coverage of reference materials and their ability to rapidly deconvolute complex formulations.

In this study several high volume (decongestants, antacids) off the shelf pharmaceutical tablets were analyzed. Using Release 2004 PDF-4/Organics database the formulations were analyzed via an automated PCSIWIN interface that compared d, I files to the database of > 218,000 references. As shown by the results, the addition of a small subfile of inorganic and polymeric excipients was critical in successful phase analysis. The excipients were frequently major bulk phases that needed to be identified in order to identify smaller concentrations of active pharmaceuticals and reaction products. Phase analyses typically identified 3-5 phase mixtures which were then compared to the listed ingredients. The analyses highlight how the PDF-4 digital patterns simulation accounted for poorly crystalline or micronized phases. The analyses also identified reaction products not found in the listed ingredients.