Triclinic Labs

Solid-State Expertise for Discovering, Developing, and Protecting Pharmaceutical Intellectual Property

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Maximum Data from X-ray Powder Diffraction

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XRPD data can be much more useful than just providing a phase fingerprint... to get the most from XRPD one needs an XRPD instrument, appropriate software, and technical expertise. The first two are readily available but the last is harder to come by.

Currently at Triclinic, we have a fully configurable- Scintag diffractometer, a state-of-the-art Rigaku SmartLab System, and a world-class, in-house technical expert. These capabilities allow us to extract much more information from an XRPD pattern than simply a finger-print identification. For example, we can index a powder pattern to determine the dimensions of the unit cell from XRPD data (vs. requiring synchrotron data). This requires accurate data, sophisticated software, and expert interpretation of the data. With the open design, configurable Scintag diffractometer it is possible to collect indexable powder patterns from small amounts of pharmaceutical materials (e.g. 10 mg of acetaminophen).

An indexed pattern can provide:

- Assurance of phase purity
- Identification of a phase as a probable hydrate or solvate based on unit cell void space
- Efficient pattern matching (in screening, for example) based on expected peak positions calculated from the unit cell
- Improved knowledge that can make up for poor-quality data resulting from small sample sizes Investigation of process-induced product changes leading to XRPD changes
- Understanding that a "new peak" showing up in the XRPD pattern of a material produced using a commercial process can be a symmetry-disallowed peak that arises because of defects rather than being a peak from a contaminant
- Excellent method to develop solid mixture quantitative analysis

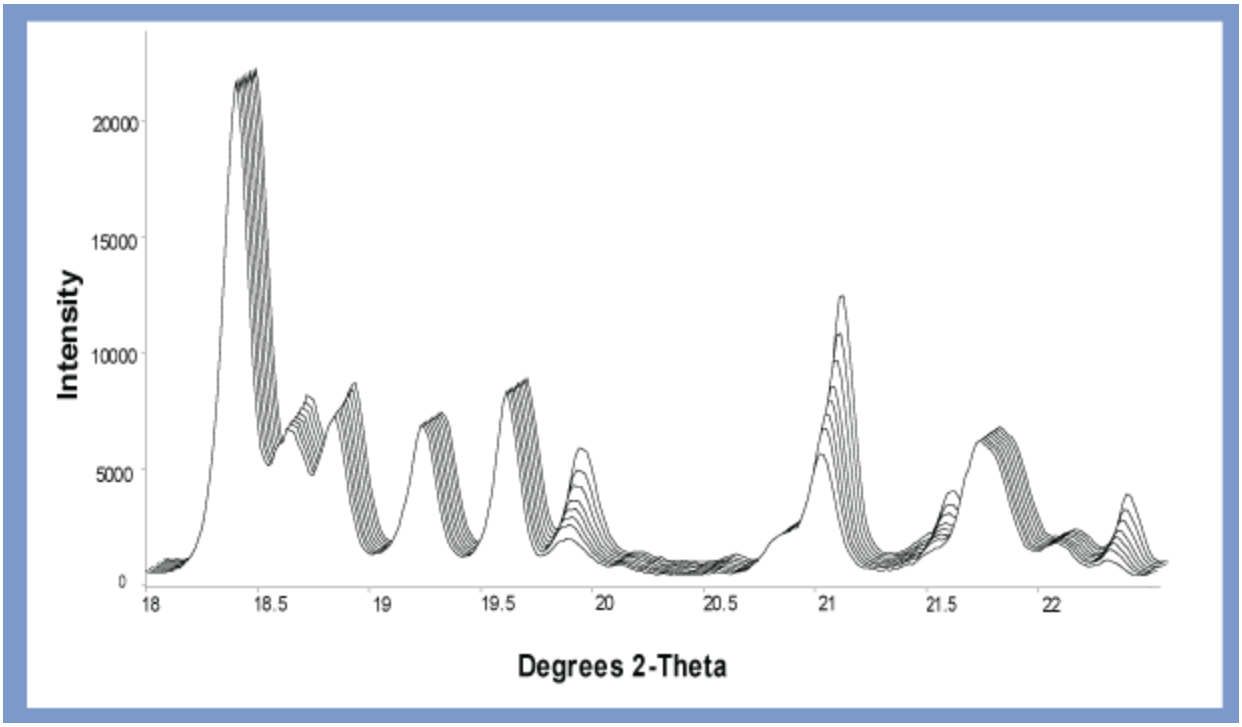

Figure 1. Use of XRPD for determination of polymorphic conversion: a waterfall plot of XRPD patterns is shown for an API which has been subjected to different environmental conditions (temperature, relative humidity, time). Variations in peak intensity are noted for peaks at 18.6, 18.8, 19.8, 21.2, 21.5, and 22.8 Degrees 2Theta¸. The variations in peak intensities indicate the creation of a new polymorphic form of the API under the specified environmental conditions. This approach is useful for time-course studies under normal and modified conditions (e.g. stability, scale-up, formulation) to determine if polymorphic change arises. Infringement determination cases and process control experiments benefit from this approach as well.

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