

Research in Drug Delivery

Experimental Nanochemistry

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Description: Optimization of potency and selectivity of drug molecules are often obtained at the expense of other physical chemical properties of the compound, such as aqueous solubility, which are required for successful development of a formulation with acceptable *in-vivo* performance. Formulation and analytical challenges in pharmaceutical research and development are extensive for these compounds. One option to address poorly water soluble drugs is to reduce the particle size below the 1 μm level to obtain nanoparticles. Research was initiated in 2010 to train students in the preparation and characterization of pharmaceutical nanosuspensions. Using Naproxen as a model compound, the drug was transformed into nanocrystals using a milling process with the addition of stabilizing agents to aid in the processing and prevention of crystal growth over time. Various analytical techniques were used to characterize the nanosized drug suspensions to evaluate the effectiveness of the stabilizing agents in the production and maintenance of nanocrystalline material.

Typical Instrumentation Used in Characterization of Naproxen Nanosuspensions:

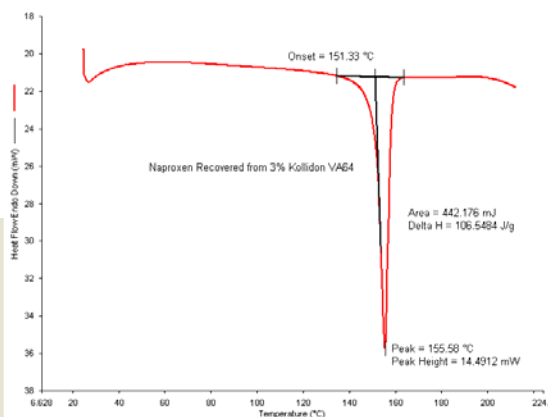
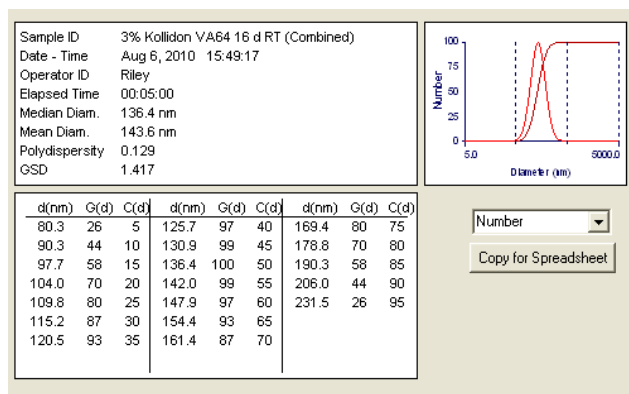
Differential Scanning Calorimetry

Thermogravimetric Analysis

X-Ray Powder Diffraction

Nanoparticle Size Analyzer

Zeta Potential Analyzer



The next phase of the project will be to further probe the molecular interaction of the stabilizer at the nanocrystal surface using zeta potential measurements and other instrumentation available within the Center for Innovation and Entrepreneurship such as atomic force microscopy and scanning electron microscopy in an attempt to rationalize the stability of the various nanosuspensions.

➤ **Student Researcher:** Erin Grimm, Spring 2010