Study of Polymorphism in Structurally Related Pharmaceuticals

Víctor R. Vázquez Marrero, [1] and Vilmalí López-Mejías[2]

Department of Biology, [1] and Department of Chemistry[2]
University of Puerto Rico, Río Piedras Campus, Faculty of Natural Sciences

Polymorphism, a phenomenon that enables molecules to exhibit multiple crystalline phases, is one of the most scrutinized critical quality attributes during the manufacturing of solid formulations. Polymorphism is estimated to occur in over 80% of molecules that display a pharmaceutical application, affecting primarily their solubility, which correlates with their bioavailability. Therefore, inadvertent occurrence of polymorphism during a pharmaceutical manufacturing process might have an adverse effect on the drug product's properties. Here, we explore the crystallization behaviour of a series of structurally similar pharmaceutical compounds in order to explore the effect of structurally similar impurities in the crystallization outcomes (polymorphism, co-crystals and solvates). Particular attention will be placed on the solubility profile of each drug in the presence of a structurally similar impurity. The crystallization outcomes will be characterized utilizing Infrared and Raman Spectroscopy, powder X-ray diffraction, single crystal X-ray diffraction and thermal analysis.