Poster

Additive assisted mechanochemical control of caffeine:anthranilic acid co-crystal polymorphs

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Many of the compounds in the solid state can exist in a form of different polymorphs, which differ by the arrangement of the molecules or ions in the crystal structure. As polymorphs are different phases, they differ in various properties such as melting point, solubility, stability, etc. Polymorphs can exist both in single-component as well as in multi-component systems, including co-crystals [1, 2].

Co-crystals can be obtained by crystallization from solvent and using solvent-free methods. Lately special attention is paid to co-crystal synthesis using mechanochemical approach by grinding and milling, which are recognized as more environmentally friendly, simpler and faster methods [2, 3].

In this study we employed mechanochemical synthesis of co-crystals, by exploring the possibility to control the obtained crystal form of the caffeine : anthranilic acid (Figure 1) co-crystal.

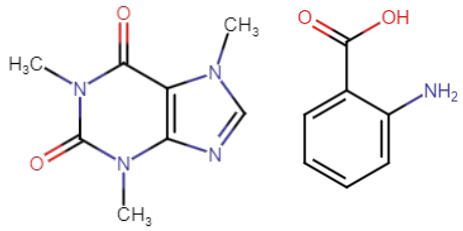

Figure 1. Molecular structure of caffeine (on the left) and anthranilic acid (on the right)

We observed that the polymorphic form of caffeine : anthranilic acid co-crystal can be controlled by using additives (liquid additives and their specific volumes or mass, or together with solids with a specific mass), whereas by milling caffeine and anthranilic acid without additives the co-crystal could not be obtained. Such polymorph control approach correspond to the direction of green chemistry and has a possibility to significantly reduce the volumes of solvent used, thus, creating a smaller impact on the environment, and facilitate and speed-up the preparation of the desired polymorph. In general, understanding the factors allowing mechanochemical polymorph control would be especially useful for the pharmaceutical industry, as it would save financial resources and allow optimization of the drug manufacturing process.

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