POLYMORPHISM OF GLYCINE: THERMODYNAMIC AND STRUCTURAL ASPECTS

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One of the important problems of modern solid state chemistry, materials science, pharmaceutical science is the problem of polymorphism. The problem has several aspects: 1) to find experimentally and/or to predict theoretically all the possible polymorphs of a given compound; 2) to range the experimentally known and/or the predicted polymorphs with respect to their thermodynamic stability, their free energies of formation, etc.; 3) to find experimentally and/or to predict, which of the polymorphs will be formed under particular experimental conditions, and to control the formation of the desired polymorph.

The three aspects are closely interrelated, but the relative stability of the polymorphs and the preferable growth of a particular polymorph in real experiments do not necessarily correlate directly. This is a reason, why much confusion and contradictory statements can be found in the literature even for seemingly simple and repeatedly studied systems. Glycine, NH_2CH_2COOH, can provide one of such examples.

The contribution summarizes the results of a systematic study of the three glycine polymorphs (α, β, γ – forms), including: i) the controlled crystallization of a desirable form, ii) a comparative calorimetric study of the three forms in the temperature range between 5 K and the sublimation temperatures (≈500 K), iii) the study of the transformations of one polymorph into another, including the effect of various gasses on the transformation.

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