

Anti-Thermodynamic Transitions of Sulphathiazole Polymorphs

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There are 5 accessible polymorphs of sulphathiazole. Polymorph I is the stable one from its melting point of 202°C down to 116.5°C.

Polymorph II is the stable form from 116.5°C to 94.5°C. Despite this, boiling a slurry of Polymorph II or of any polymorph mixture in n-propanol at 98°C, causes total conversion to Polymorph I, which is metastable at that temperature. Polymorph III is the stable form from 94.5°C down to at least 45°C. The form stable below this temperature appears to depend on the method of preparation. Sequences such as III-->IV-->III can sometimes be observed on heating aqueous slurries at constant temperature for periods of up to a year. Sulphathiazole polymorphs display astonishingly variable polymorphic stability and variable solubility. It is proposed that all these curiosities, as well as the erratic crystallisation behaviour of sulphathiazole relate to the predominating effects of crystal defects in the solid, together with the existence of structure in solution. Some of this behaviour can be understood also in terms of the peculiar relationships of the crystal structures of some of the polymorphs. The consequences for the determination of transition points by solvent slurry mediated transformation will be discussed.