

## **Thermal Behavior of Caffeine, the Most Widely Consumed Pharmacological Active Substance**

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Depending on its preparation as well as the type of coffee beans, a cup of coffee contains between approx. 50 mg and 150 mg of caffeine. Caffeine is a central nervous system stimulant. Its consumption usually leads to a feeling of reduced tiredness and sometimes also to general warmth.

In addition, it is used as an ingredient in pain-relieving drugs, for example, in combination with ibuprofen, which is available as over-the-counter product since recently in Germany.

But what are the thermal properties of caffeine and can they be monitored by using DSC?

Anhydrous caffeine can exist in two crystalline polymorphic modifications, the low-temperature form II and the high-temperature form I. The melting point of the form I is at about 236°C. In commercial caffeine, a polymorphic transition from form II into form I becomes visible during heating.

According to literature, the opposite process (structural change from form I into form II) can take place during mechanical treatment.

In the above mentioned drug products, caffeine is also mixed with additional excipients. DSC is a useful tool to determine interactions between the various mixture components.