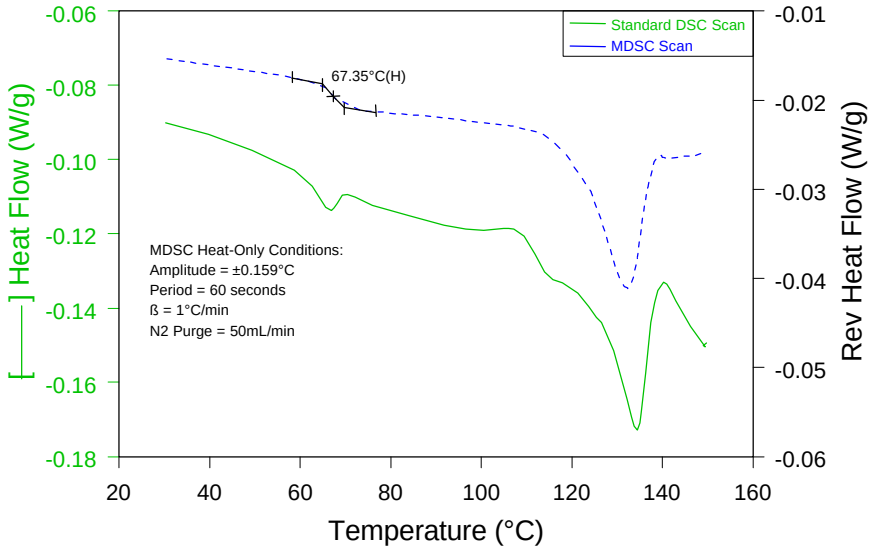
TA Instruments

Thermal Analysis & Rheology

THERMAL SOLUTIONS

Characterization of Semi-Crystalline Pharmaceutical Compounds by MDSC®



DSC measures the temperatures and heat flows associated with transitions in materials as a function of temperature or time in a controlled atmosphere. MDSC is an enhancement to conventional DSC in which the total heat flow is separated into reversing (heat capacity) and non-reversing (kinetic) components. The reversing signal contains heat capacity events such as the glass transition and melting. The non-reversing signal contains kinetic events such as crystallization, crystal perfection and reorganization, cure, and decomposition.

The above scan shows both DSC and MDSC experiments on a semi-crystalline pharmaceutical compound. The DSC total heat flow curve shows what appears to be two melting endotherms, one near 60°C and the other near 130°C. Using MDSC experimental conditions, the reversing heat flow curve clearly resolves the 60°C endotherm as a glass transition and the 130°C endotherm as a melting transition. Accurate characterization of the pharmaceutical material's morphology could only be ascertained by MDSC. Identification of a material's Tg is important because dramatic and rapid property changes in this region can affect product processing, storage, and use. This example clearly demonstrates the advantage MDSC has over standard DSC in characterizing material properties.

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