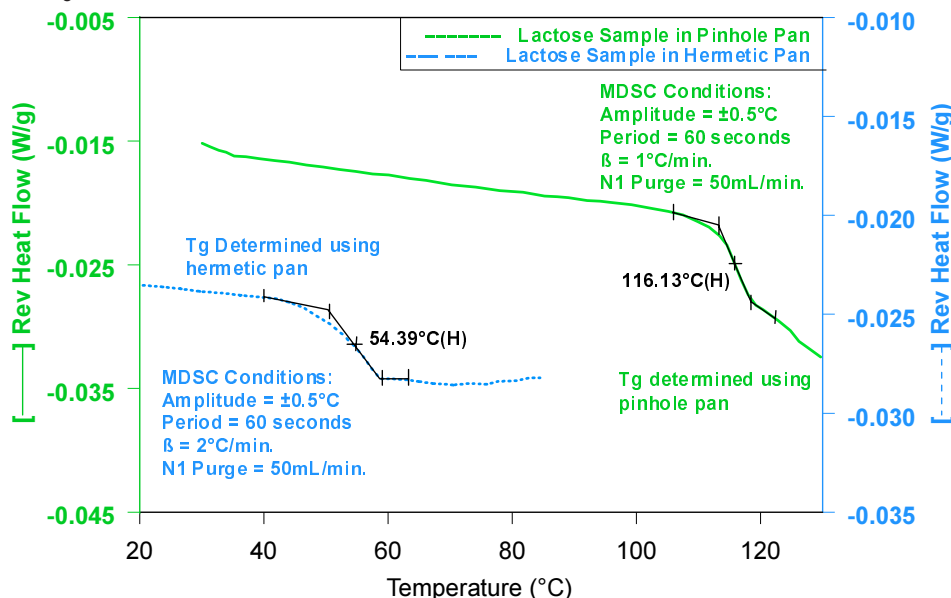


THERMAL SOLUTIONS

Characterization of the Effect of Water as a Plasticizer on Lactose 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 glass transition temperature of Lactose is affected by the amount of water present. Quantifying the effect of water as a plasticizer can be done by selecting the proper type of sample pan. The above plot shows two MDSC experiments on a sample of Lactose, one run in hermetic aluminum pans (with a pinhole in the lid), and the other in standard hermetic pans. The sample run in the pinhole pan allows for the evolution of water and shows a Tg at 116°C. By sealing the sample in hermetic pans, water is retained by the sample slowing the effect of water as a plasticizer. As expected, the Tg shifts to a lower temperature (54°C). Determining the effect of plasticizer on a sample can be readily accomplished by using MDSC in combination with the proper type of sample pan.

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