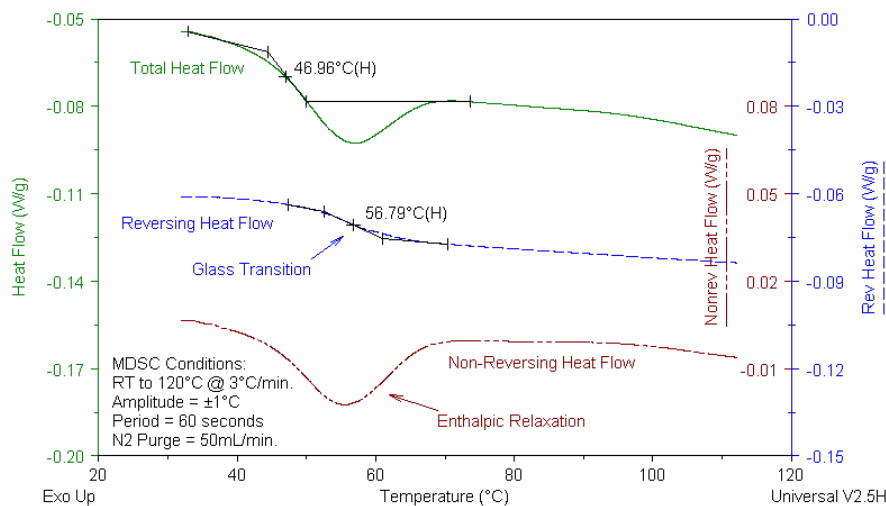


## THERMAL SOLUTIONS

### *Characterization of the Glass Transition Temperature of Petroleum Pitch 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 whereby 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.

Solid petroleum pitch is usually shipped in bulk rail cars where elevated temperature may cause the product to flow and fuse together. Characterization of the glass transition temperature can be a useful technique in determining the

feasibility of shipping this product in a solid form. The above plot shows MDSC data for a solid petroleum pitch product. Analysis of the glass transition temperature using the total heat flow signal (conventional DSC) is difficult because of the overlapping enthalpic relaxation. The MDSC data shows the glass transition temperature and overlapping enthalpic relaxation events clearly separated into the reversing and non-reversing heat flow signals, respectively. This data suggests that the shipping temperature should be kept below the reported glass transition temperature (57°C) in order to prevent the solid product from fusing together during shipment. This example clearly shows how material properties characterized by MDSC can be used to define the proper shipping environment for finished product.