



THERMAL APPLICATIONS NOTE

Boiling Point and Vapor Pressure Measurement by Pressure DSC

Differential scanning calorimetry (DSC) measures heat flow into or out of a material with respect to temperature or time, and is an excellent technique for determining melting points, glass transitions, and other similar phenomena. One measurement where “traditional” DSC has some experimental limitations is the determination of the boiling points of liquids. The reason for these experimental limitations is the gradual vaporization of sample which occurs when using crimped DSC pans, resulting in broad endotherms that are difficult to evaluate accurately. These limitations can be remedied, however, by sealing the sample in a hermetic pan with a pinhole in the lid. The pinhole acts to create a more controlled diffusion path for the vaporization, preventing early vaporization and providing a sharper endotherm.

This pinhole technique can be further improved by using a pressure DSC cell. Since atmospheric pressure affects vaporization and the boiling point, careful experiments with a pressure DSC cell at a series of known pressures yields boiling point shifts which can be used in the Clapeyron-Clausius equation to obtain quantitative vapor pressure information. Obviously, one of the key experimental parameters for these pressure DSC vapor pressure measurements is having known, reproducible pinhole dimensions. TA Instruments supplies DSC alodined aluminum pan lids with a 75 μm (0.003 in) laser machined pinhole (PN 900790-902; pkg of 20 lids).

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