DSC Q2000 (TA Instruments)

Differential scanning calorimetry (DSC) is a thermal analysis technique that measures the temperatures and heat flows associated with transitions in materials as a function of time and temperature. Such measurements provide qualitative and quantitative information about physical and chemical changes that involve endothermic or exothermic processes or changes in heat capacity.

In a "heat flux" DSC, the sample material, encapsulated in a pan, and an empty reference pan sit on a thermoelectric disk surrounded by a furnace. As the temperature of the furnace is changed (usually by heating at a linear rate), heat is transferred to the sample and reference through the thermoelectric disk. The differential heat flow to the sample and reference is measured by area thermocouples using the thermal equivalent of Ohm's Law.

$$q = \frac{\Delta T}{R}$$

Where, q is sample heat flow, ΔT is temperature difference between sample and reference and R is resistance of thermoelectric disk.

This simple relationship, however, does not take into account extraneous heat flow within the sensor or between the sensor and sample pan. The TA Instruments Q Series™ DSC's are specifically designed to account for those latter heat flows.

System specifications:

- Temperature Range: -90 to 725 °C
- Temperature accuracy: ∓0.1 %
- Sample size: 5-50 mg
- Heating rate: 0.1 to 40 °C/min
- Baseline curvature: 10 µW
- Sample pans: aluminum (should be purchased from NCF), Ceramic (should be purchased from DSC Consumables Co.)
- Controlled Atmosphere: Nitrogen, (Ar, O_2 can be requested if needed)
- Users can purchase the consumable DSC sample pan/lid from NCF website. Super users can purchase the batches of 100 pan/lid from “DSC consumables” or “TA instruments”.

Safety notes:

- **Never open the furnace when the temperature is higher than 40 °C or lower than 20 °C! It can cause serious damage to the furnace.**
- **It is suggested to perform a TGA experiment prior to DSC on unknown samples.**