



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
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Technical Specifications:

A. Technical Specifications for the Differential Scanning Calorimeter (DSC):

1. The instrument must be capable of working in the temperature range of atleast - 170°C-700°C with suitable cooling accessory.
2. Measurements should be based on the principle of Heat flux
3. With the suitable cooling accessory, the instrument should be capable of attaining scanning rates atleast in the range of 0.02-100°C/min
4. Calorimetric Dynamic Range: $\pm 175\text{mW}$ or higher
5. Temperature
 - Accuracy: Atleast $\pm 0.2\text{ }^\circ\text{C}$
 - Precision: Atleast $\pm 0.02\text{ }^\circ\text{C}$
6. Calorimetric/Enthalpy
 - Precision: 0.1% or better
 - Accuracy: 0.2% or better
7. DSC Resolution: $0.04\text{ }\mu\text{W}$ or better
8. DSC RMS Noise: $\leq 0.2\text{ }\mu\text{W}$
9. With the right cooling accessory, the instrument should be able to provide the baseline
 - Flatness / Curvature: $\leq 100\text{ }\mu\text{W}$
 - Repeatability: $\pm 40\text{ }\mu\text{W}$ or better
10. The instrument should have the provision for an inert gas/oxidative measurement atmosphere.
11. The system shall be provided with an integrated mass flow controller or gas flow meter based on rotameter for convenient gas control and switching and operatable through software to record the gas flow.
12. Appropriate technical software for data acquisition/processing with different modes of analysis. It should be able to provide all the features like calibration routines, method parameter entry, peak area, onset, heating and cooling rates, cyclic heating/ cooling, data smoothening, baseline correction, peak temperature, glass transition temperature, melting temperature, crystallization temperature, heat enthalpy, second and higher

derivative, normalization, X-axis w.r.t time, temperature along with simultaneous real-time analysis. Options for choosing different baseline, e.g., line, tangential, horizontal, spline, Integral tangential, polygon line, *etc.*, for correct evaluation/integration of peaks should be provided. The software should also facilitate the storage of both raw DSC data. Output data collection in the form of ASCII files, word/Excel format compatibility, Pdf formats.

13. Accessories to be provided:

- i. DSC Universal Crimper press kit
- ii. Aluminum pans and lids for
 1. for crimping all types of solid powders and liquid samples (at least 150 no.)
 2. for hermetically sealed crimping (at least 150 no.)
 3. capable of measuring edible oils and fats (at least 150 no.)
- iii. Standard Calibration materials for temperature calibrations in the entire range as well as heat flow calibrations in the entire range
- iv. Other essentials including regulators, adapters, gas cylinders and connection requirements

14. Branded computer with the latest generation intel core processor (Core i7 or better), atleast 16GB RAM, 1TB HD, atleast 24 inches LED Monitor that meets the specifications as required by the technical software mentioned in the line item A [Compatible keyboard and mouse along with the PC]

B. Suitable cooling accessory compatible with line item A and with the following specifications:

1. Temperature Range: at least -40 to 400°C
2. Controlled Heating Rate:
 - Minimum : 0.02°C/min or lower
 - Maximum: 100°C/min or higher
3. Controlled Cooling Rate:
 - Minimum: 0.02°C/min or lower
 - Maximum: 50°C/min or higher
4. The cooling medium and required driers should be included.