

NETZSCH-GEFTA AWARD

LOW TEMPERATURE CALORIMETRY: A PARTICULAR BRANCH
OF THERMAL ANALYSIS

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Low temperature calorimetry (LTC) is an important and direct way to determine thermodynamic parameters and to grasp strong entropy-contributions. However, this technique is unfortunately still a domain of specialized laboratories. Is there a chance in the future to change this situation?

In this contribution the history and fundamentals of LTC are outlined; the particular aspects and basic difficulties of calorimetric measurements below 120 K are discussed and a survey of recent progress in this field is given /1,2/:

- i) development of highly sophisticated arrangements dedicated to singular experiments,
- ii) automatization of the measurements,
- iii) need for better resolution and possibilities to measure small samples (milli-gramms),
- iv) an intensified trend to construct highly flexible, more simple calorimeters.

Following these trends in recent years we have given emphasis to positions ii) to iv):

- The essential features of a flexible adiabatic calorimeter are reviewed; its reliability and advantages as well as the importance and necessity to collect low temperature thermal data are demonstrated by the presentation of examples of our recent calorimetric investigations.

In order to fulfill pos. iii) and the experience with our earlier calorimeters led us to the development of a "low temperature differential relaxation time calorimeter" - (LT)DRC -. The basic principles of this instrument, which is easy to handle, simple and fully automatized will be presented for the first time. This calorimeter has been designed for very small masses (mg) and for wide-range-application by scientists being not familiar with cryogenic techniques.

Consequently, there is hope that in the near future every calorimetrist can more easily extend his investigations to much lower temperatures, for example - 269 °C.

References

1. E. Gmelin, Thermochim. Acta 29 (1979) 1
2. E. Gmelin, K. Ripka, Cryogenics 21 (1981) 117

Proceedings of ICTA 85, Bratislava