

Why Use References in Isothermal Calorimetry?

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Isothermal (heat conducting) calorimeters are always built as twin-instruments, i.e., with a sample heat flow sensor and a reference heat flow sensor. The measured signal is the difference between the signal from these two sensors. The reference side should ideally be charged with an inert (not producing any heat) sample with the same heat conduction characteristics as the sample to yield an optimal result.

There are many reasons to use a well-balanced reference. The main one is that short-term noise is reduced as disturbances will influence the sample and the reference sensor in similar ways, but that these two signals will cancel out as the signals from the two sensors are subtracted. Another reason for the differential arrangement is that when the temperature of the heat sink changes (because of produced heat in the sample), heat will flow from the heat sink into the reference and decrease the effect of the non-perfect heat sink.

These and other aspects of the use of references will be discussed in the paper with the help of experimental examples.