

A Modulated Quasi-Adiabatic Calorimeter for Specific Heat Capacity Measurement of Fluids

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A modulated quasi-adiabatic calorimeter has been realized for measuring specific heat capacity of fluids in a wide temperature range. The core of the thermostat consists of a 3 kg copper block set in a vacuum bell and thermally linked to a heat exchanger. System temperature is kept stable by a two stages control allowing to reach a temperature stability of about 0.5 mK. The measurement cell, equipped with an heater and a NTC-thermistor, is placed inside the core. The electric heater is excited by a millihertz modulated sinusoidal signal capable to induce a temperature oscillation of approximately 10 mK with an empty cell. The measurement of the amplitude of the oscillations is obtained by means of a lock-in amplifier in the case of evacuated cell, then with a reference fluid and finally with the sample. Measurements obtained using pure water, ethanol and toluene have showed a repeatability better than 10 part per million and an uncertainty typically better than 0.5%. Perspectives to use the instrument even for high pressure measurements and for measuring fluids thermal conductivity are illustrated.