

Speed of sound measurements in binary mixtures of hydrogen with pentane and hydrogen with iso-pentane using a clamp-on ultrasonic flow meter

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New thermodynamic models are requested for supporting the adoption of hydrogen as an energy vector since the available standard formulations do not allow to predict the properties of mixtures, with the necessary accuracy, when the content of hydrogen is higher than 10 %. For supporting the implementation of updated equations of state, measurements of speed of sound have been performed in a mixture of hydrogen and pentane, and a mixture of hydrogen and iso-pentane both at concentrations of the second components of 1 %, 2 % and 5 %. The clamp-on ultrasonic flow meter has been calibrated in the temperature range of (250 and 330) K and pressure up to 5 MPa, using helium as reference fluids.

The choice of using a clamp-on flow meter represents a preliminary step in the path for the adoption of transfer standards of speed of sound for the *in-situ* verification and calibration of ultrasonic flow meters. The outcome of the experiments will be used to characterize hydrogen-enriched gases by their thermodynamic properties as part of the EURAMET project “Metrology for decarbonizing the gas grid” (Decarb).