Speed of Sound Measurements of Ethanol and Benzene in the Temperature Range from 253 K to 353 K at Pressures up to 30 MPa

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Speed of sound measurements of ethanol and benzene have been carried out in a temperature range from 253 K to 353 K at pressures up to 30 MPa using a speed of sound apparatus with a dual path length cell. The sound waves are propagated by a piezo transducer operated at high frequency, which is used both as emitter and receiver. A modified pulse-echo method is employed, whereby the cancellation of pulses is used to determine the time of flight. For both fluids the expanded uncertainty (k = 2) in the speed of sound is 0.015 % within the entire temperature and pressure range. The first set of measurements during the present project showed that the water content of the chosen sample has a major influence on the measurement of the speed of sound of alcohols. Against this background the selection and the preparation of the sample fluids are very important aspects which will be discussed in this work. Dried alcohols were chosen for the presented measurements, and a special sample preparation procedure has been established to prevent the sample from moistening. Comprehensive measurement results will be reported, which are supposed to provide an input for development and improvement of accurate equations of state.