

Experimental densities of hydrogen-isobutane mixtures with three different compositions

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To target the gas grid decarbonisation and carbon capture and storage, accurate thermophysical properties models are the tools able to ensure the efficiency of the involved processes. This is the framework of goals of the project EMPIR Metrology for Decarbonising the Gas Grid (20IND10 Decarb). In the work here presented, the results of accurate experimental densities of hydrogen and isobutane ($H_2 + iC_4H_{10}$) are discussed. The measurements are carried out by means of a vibrating tube densimeter, in the temperature range of (270 and 330) K and at pressure up to 4 MPa. The mixtures are measured with three different compositions, with 5 %, 10 % and 15 % of iC_4H_{10} respectively. The vibrating tube densimeter has been preliminary characterized by using nitrogen and vacuum as reference fluids.

All terms contributing to the uncertainty in determining the density are considered in order to obtain a final relative uncertainty of the mixture density better than 0.1 %.

The measurements presented will be adopted for reviewing the standard equation of states for custody transfer today unable to model mixtures with an hydrogen content higher than 10 %.