

## Measurement of thermo-physical material data (density, speed of sound, impedance) of gas mixtures in high-pressure regimes

As a result of the Energy Transition and resulting high fractions of biogases in energy networks, the composition of modern natural gas can fluctuate drastically. This in turn has led to the common gas analytical methods of mass spectrometry and gas chromatography being too slow and therefore unpractical. An alternate approach is the determination of composition by correlation of thermo-physical material data. Properties such as density, speed of sound and impedance can be measured continuously and are thus adapted to such processes. The goal of this module is to analyze and quantify an unknown, natural gas like mixture of methane, carbon monoxide and nitrogen using the above-mentioned data and high-precision gas mixture equations of state. For this purpose, an apparatus for gas mixture generation and sensor calibration is available. An introduction to gas analytics will be given, as well as a tour of the laboratories and especially the measuring system. Afterward the analysis takes place, followed by the data processing and evaluation of the results.