***In situ* determination of vapor-liquid-equilibria via Raman-Spectroscopy in a microcapillary setup**

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**Highlights**

* *In situ* analysis of VLE under high temperature and high pressure

**1. Introduction**

Due to the invasiveness of most of the analytical methods, the determination of vapor-liquid-equilibria under high temperature and high pressure is a challenging task. Another aspect is the danger that high pressure reactors might present if ignitable mixtures are analyzed. With the microcapillary setup that is presented here, real time VLE measurements are safely and easily feasible using *in situ* Raman-Spectroscopy. Thereby data such as *T-x-* and *p-x-*diagrams are obtained, that are scarce in literature for ignitable mixtures under high temperature and high pressure.

**2. Setup and measurements**

The setup consists of an optically accessible microcapillary, in which pressure and temperature are adjusted and controlled by a heating system and syringe pumps. The investigated mixture components with a global composition inside the two-phase region are unified in a T-junction, leading to a phase-separation and a flow of alternating liquid and vapor segments, depending on pressure and temperature. Light barrier technology is applied, using the difference in optical density of the vapor and liquid phases, to obtain an oscilloscope signal that is directly matching to the segmented flow. A piezoelectric system can be triggered to this oscillation, passing phase selectively only Raman signal of the investigated phase to the spectrometer.

**3. Conclusions**

We aim to contribute with our past and future research to the scarce data of VLE under high pressure and temperature.

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