

# Solubility of hydrogen in liquid helium - development of a measurement apparatus

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The solubility of hydrogen in liquid helium seems to be unknown. One potential explanation for this could be the exceedingly low solubility limit, making this phenomenon irrelevant for the vast majority of applications. In cryogenics, however, this effect is crucial. Traces of hydrogen in liquid helium and in the liquid helium supply systems result in a malfunction of liquid helium flow cryostats and throttle devices.

The project HyLiqHe (granted by DFG) aims to quantify the solubility limits by measurement. Two specialized disciplines must come together for success. On the one hand, cryogenic expertise is required, as the solubility process takes place at liquid helium temperature. On the other hand, the hydrogen contents to be quantified range from hundreds to tens of ppb (parts per billion). This stands for challenges in analytics.

An experimental setup is presented that allows the preparation, analysis, and condensation of helium/hydrogen mixtures. The saturation pressure is adjustable and the presence of precipitated hydrogen particles can be detected. The current status of work and preliminary investigations will be presented.

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