

Combined CFD- and Heat-Transfer-Modelling of an Adiabatic Storage Calorimeter

The adiabatic storage test (AST) is an adiabatic calorimetric method that can be used to gather safety relevant data of chemical processes. This data include activation energies of the main and side reaction, pressure behavior or decomposition temperatures. In this study a new high-pressure-AST-calorimeter was modelled with an combined CFD (computational fluid dynamic) and heat transfer approach in COMSOL Multiphysics® in order to understand and subsequently improve the heat transfer properties and heat transport paths in the actual calorimeter. The model is capable to simulate the heat up process as well as simple calorimetric experiments with small deviation compared to the experimental data. It also enables an analysis of the temperature- and flow-fields inside the calorimeter during such processes, which can open new ways to improve the device.