**Measurement and Modeling of Thermodynamic Properties for Chemical Hydrogen Storage Mediums**

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To reduce fossil fuel use and to expand renewable energy use, the wide utilization of hydrogen as an energy carrier in society is possible. Hydrogen reforming is one of the essential technologies for stable storage and supply of hydrogen. Development and precise control in hydrogen reforming processes require new equations of state for the appropriate substance or mixture in practical temperature and pressure regions based on accurate thermodynamic property data. In this study, preliminary thermodynamic property models were developed for toluene, cis-decalin, and methylcyclohexane that are the main components in hydrogen reforming processes. Throughout the present modeling, we collected most of the available thermodynamic property data. Additional experimental data measured with a metal-bellows volumometer were used as input data for the modeling. The expanded uncertainties (k=2) in temperature, pressure, and density measurements of the apparatus have been estimated to be less than 3 mK, 1.5 kPa – 0.2 % ($p > 150$ MPa), and 0.10 %, respectively. The behavior of various derived properties, for example, the isobaric specific heat capacities, $C_P$, and Phase Identification Parameters, PIP, are examined throughout the fitting process to assure thermodynamic consistency over the entire fluid-phase region.