

Deutsches Zentrum für Luft- und Raumfahrt – DLR e.V.

Institut für Technische Thermodynamik / Thermische Prozesstechnik / Thermochemische Systeme

# Experimental investigation of the thermal charging process using calcium chloride dihydrate in an open thermochemical system

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**Master thesis**

in

Chemical- Process Engineering

Presented by

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## **Abstract**

Thermal energy storage (TES) is an advanced technology for storing thermal energy that can mitigate environmental impacts and facilitate more efficient and clean energy systems. Thermo-chemical energy storage (TCS) is an emerging method with the potential for high energy density storage. Where space is limited, therefore, TCS system has the highest potential to achieve the required compact TES. Experimental investigation and analyses are applied to assess and compare the behavior of the reactor in the open charging process using calcium chloride dihydrate at different charging temperature and varying the air flow rate. Examples using experimental data are presented to illustrate the analyses. Some important factors related to design concepts of thermo-chemical energy storage systems are considered and the existing design conditions for them are investigated. Therefore, a parametric studies are carried out for the thermo-chemical energy storage system to investigate the effects of selected parameters on the efficiency and behavior of the reactor.

## **Keywords**

Thermal Energy Storage; Thermo-chemical Energy Storage; Energy Efficiency; Experimental Analysis