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Authors: Margarethe Richter, Eva-Maria Habermann, Eleonore Siebecke, Marc Linder



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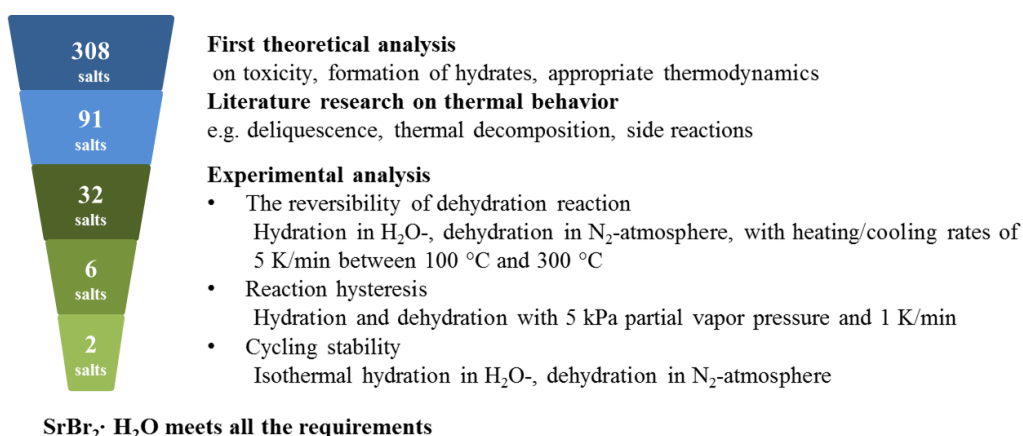
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A systematic screening of salt hydrates as materials for a thermochemical heat transformer

Margarethe Richter, Eva-Maria Habermann, Eleonore Siebecke, Marc Linder

German Aerospace Center (DLR) Institute of Engineering Thermodynamics Pfaffenwaldring 38-40
70569 Stuttgart, Germany

Graphical abstract



Abstract

The selection of suitable reaction systems for thermochemical processes, e.g. thermal storage, chemical heat pumps or heat transformers, is challenging. Not only harmlessness of chemicals, theoretical energy storage density and thermodynamics play an important role, but also reversibility, reaction kinetics and cycling stability need to be considered. In this paper a systematic methodology for screening salt hydrates as thermochemical reaction material is suggested and applied to 308 different inorganic salts. It consists of a theoretical analysis of thermodynamic data as well as an extensive experimental analysis of the reversibility, reaction hysteresis and cycling stability. The target application is the heat transformation and reintegration of process waste heat up to 300 °C. SrBr₂ meets all requirements for this application and is a promising material.

Keywords

Material screening, thermochemical storage, heat transformer, chemical heat pump, salt hydrates, reaction hysteresis

Nomenclature

Symbols:

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