

The Optimisation of Salt Impregnated Matrices as Potential Thermochemical Storage Materials

Authors : Robert J. Sutton, Jon Elvins, Sean Casey, Eifion Jewell, Justin R. Searle

Abstract : Thermochemical storage utilises chemical salts which store and release energy a fully reversible endo/exothermic chemical reaction. Highly porous vermiculite impregnated with CaCl_2 , LiNO_3 and MgSO_4 (SIMs - Salt In Matrices) are proposed as potential materials for long-term thermochemical storage. The behavior of these materials during typical hydration and dehydration cycles is investigated. A simple moisture experiment represents the hydration, whilst thermogravimetric analysis (TGA) represents the dehydration. Further experiments to approximate the energy density and to determine the peak output temperatures of the SIMs are conducted. The CaCl_2 SIM is deemed the best performing SIM across most experiments, whilst the results of MgSO_4 SIM indicate difficulty associated with energy recovery.

Keywords : hydrated states, inter-seasonal heat storage, moisture sorption, salt in matrix

Conference Title : ICNTREE 2015 : 17th International Conference on Nuclear, Thermal and Renewable Energy Engineering

Conference Location : Prague, Czech Republic

Conference Dates : July 09-10, 2015