Experimental investigations on phase separation for different heights of sodium acetate water mixtures under different conditions

Phase separation is a key problem when using sodium acetate trihydrate (SAT) as phase change heat storage material. The formation of phase separation is highly correlated to the composition of SAT based heat storage material, the material height, operation method and environmental condition. This study focuses on the phase separation investigation by means of measuring exact water proportions in different layers of SAT samples. The SAT samples were made with or without different amounts of excess water or thickening agents at different heights. Then the samples were tested in supercooled state under different environmental conditions such as short or long term supercooling periods, standing still or shaking from time to time during supercooling, repeated heating and activating and low ambient temperature. The solidification of supercooled samples was activated from top or bottom in order to verify the influence of activation methods. The water proportions in different layers of SAT samples were measured and summarized for comparison. It can be concluded from the experiments that suitable amounts of excess water or thickening agents and proper shaking are beneficial to reduce or avoid phase separation. On the other hand, SAT without any additives, repeated heating and activating and low ambient temperature are favourable to forming phase separation for supercooled SAT materials.

General information
Publication status: Published
Organisations: Department of Civil Engineering, Energy and Services, Innovation, Engineering Systems, Department of Technology, Management and Economics
Corresponding author: Fan, J.
Contributors: Kong, W., Dannemand, M., Berg, J. B., Fan, J., Engelmair, G., Dragsted, J., Furbo, S.
Pages: 796-805
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Applied Thermal Engineering
Volume: 148
ISSN (Print): 1359-4311
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
Original language: English
Keywords: Sodium acetate trihydrate, Phase separation, Water proportion, Phase change material, Heat storage
DOIs: 10.1016/j.applthermaleng.2018.10.017
Source: FindIt
Source-ID: 2439976989
Research output: Contribution to journal › Journal article – Annual report year: 2019 › Research › peer-review