

Influence of hygroscopicity on thermal properties of NaKZn-chloride storage material

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The high temperature stability of a chloride mixture, NaCl-KCl-ZnCl₂ (NaKZn-chloride), is investigated to evaluate its potential as a thermal storage material. The experimental results show that the NaKZn-chloride is stable only up to 450 °C, which is inconsistent with the data in the literature. We firstly assumed that the thermal property was changed by the moisture absorbed by the heat storage material. The effect of hygroscopicity on the thermal properties of the chlorinated material is then measured with a thermal analyzer. As a result, it was confirmed that the melting point and the stability limit temperature remain the same regardless of the amount of moisture absorbed. From the following experiment investigating the high temperature stability of each consisting compound, we can infer that the stability limit temperature of NaKZn-chloride is determined by that of ZnCl₂. The results from this work will contribute to understanding the properties of thermal storage media for high-efficiency energy systems.