

EVALUATION OF CaCl₂-SILICA GEL SORBENT FOR WATER SORPTION COOLING SYSTEMS

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Abstract

Hygroscopic salts supported by a mesoporous matrix for improved mass transport are promising sorbents for water-based sorption cycles that operate at low pressure. In this study, loose grain composites of CaCl₂ supported by mesoporous silica gels with four distinct pore size distributions were prepared and compared with AQSOA FAM-Z02, a silicoaluminophosphate zeolite desiccant. A salt silica sorbent consolidated with graphite flakes and binder was also analyzed. The sorbents were evaluated with a volumetric nitrogen physisorption porosimeter and thermogravimetric water vapor sorption analyzer. The hygroscopic salt filled 56–60 % of the open pore volume of the mesoporous silica gel supports. Water uptake capacity of the CaCl₂/silica gel sorbent was up to 0.33 g per gram of dry sorbent at 12 mbar and 35°C, and sample performance was consistent through 200 wetting-drying cycles.