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ARTIC – A New Family of Humidity Buffers for Libraries and Archives

Abstract

In this communication we present a family of novel composite materials, which serve as water buffers for maintaining a desirable relative humidity (*RH*) in libraries and archives. For this aim, we suggest to use a gas-solid chemical reaction $S+nH_2O \leftrightarrow S \cdot nH_2O$ between an inorganic salt *S* and water vapour with the formation of the salt crystalline hydrate $S \cdot nH_2O$. The requirements to hydration/dehydration reactions and salt hydrates, which are optimal for passive hydrostats with a constant level of *RH* from the view point of safe exposition, conservation and transportation of ancient manuscripts, books and archival documents, have been formulated. A great number of various salts and their crystalline hydrates provide an actual chance to select the proper reaction, which keeps the *RH*-value required for safe conservation in a particular case.

A set of new nanocomposite materials for maintaining the *RH* between 15 and 75 % have been synthesized and studied. The examination of a novel water buffer ARTIC-1 in laboratory and real prototypes of showcases has confirmed its feasibility for efficient smoothing of daily and seasonal variations of the relative humidity and has demonstrated that the buffering ability of ARTIC-1 is superior to commercial silicas and Art-sorb®. Other new buffers have been tested in a laboratory prototype of the showcase with controlled air exchange and demonstrated quite promising properties.