Experimental Measurement of Saturation Pressure of H2O/KCOOH (Potassium Formate) Solution at High Concentration

Giovanni A. Longo ^c Department of Management and Engineering, University of Padova, Vicenza, Italy tony@gest.unipd.it

Laura Fedele^s and Mauro Scattolini

Istituto per le Tecnologie della Costruzione, Consiglio Nazionale delle Ricerche, Padova, Italy

The sorption dehumidification of air by desiccant is an interesting alternative to the traditional dehumidification process of cooling the air below the dew point. Desiccants include liquids, such as hygroscopic salts or glycol solutions, and solids, such as silica gel, zeolites or activated alumina. The hygroscopic salt solutions currently used as desiccant are H2O/LiCl (lithium chloride) and H2O/LiBr (lithium bromide) which ensure very effective dehumidification performance, although they are corrosive and very expensive. The new hygroscopic salt solution H2O/KCOOH is cheap, non-corrosive, biodegradable, and it exhibits a very high solubility (up to 80 % at ambient temperature) which ensures a consistent humidity reduction, therefore it seems to be very promising as "desiccant of the future". In the open literature, it is possible to find saturation pressure data only for the traditional desiccants, H2O/LiCl and H2O/LiBr, whereas as no saturation pressure data are available for H2O/KCOOH desiccant. Therefore, there is a specific need for a sound amount of experimental data on saturation pressure of H2O/KCOOH solution in the typical concentration and temperature range for desiccant application. The aim of this paper is to measure the saturation pressure of H2O/KCOOH desiccant with a concentration in salt from 60 to 80 % in the temperature range from 5 to 75 °C typical for desiccant application. The experimental measurements were performed in a VLE apparatus instrumented with a Rosemount pressure gauge having a maximum uncertainty (k= 2) within 35 Pa and a platinum resistance thermometer having a maximum uncertainty (k= 2) within 0.05 K. A set of 45 experimental data points on H2O/KCOOH saturation pressure was fully reported and a correlation for predicting the saturation pressure of H2O/KCOOH desiccant was also presented.