

Energy Saving in Handling the Air-Conditioning Latent-Load Using a Liquid Desiccant Air Conditioner: Parametric Experimental Analysis

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Abstract : Reasonable energy saving for dehumidification is feasible with the use of desiccants. Desiccants are able to lower the humidity content in the air irrespective of the dew point temperature. In this paper, a tube bundle liquid desiccant air conditioner was experimentally designed and evaluated using lithium chloride as a desiccant. Several experiments were conducted to evaluate the influence of the inlet parameters on the dehumidifier performance. The results show a reduction in the relative humidity in the range of 17 to 46%, and the change in the humidity ratio was between 1.5 to 4.7 g/kg, depending on the inlet conditions. A water removal rate in the range between 0.54 and 1.67 kg/h was observed. The effects of air relative humidity and the desiccant flow rate on the dehumidifier's performance were investigated. It was found that the moisture removal rate remarkably increased with increasing desiccant flow rate and air inlet humidity ratio. The dehumidifier effectiveness increased sharply with increasing desiccant flow rate. Also, it was found that the dehumidifier effectiveness slightly decreased with air humidity ratio.

Keywords : air conditioning, dehumidification, desiccant, lithium chloride, tube bundle

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