Effect of regeneration air temperature on desiccant wheel performance

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Abstrak

Desiccant wheels are used as an air dehumidifier in air-conditioning and industrial applications. Desiccant wheel performance determines the size and cost of the whole system. A good desiccant wheel is one that saves energy usage. This article presents an experimental investigation on the effects of varying the regeneration air temperature, viz., 50, 60 and 70oC, on desiccant wheel performance. Three performance criteria were considered, namely condition of process outlet air, dehumidifier efficiencies and dehumidification rate. Two kinds of efficiency of the desiccant wheel dehumidifier were examined, namely thermal and dehumidification efficiency. Results of the experiments show that increasing the regeneration air temperature increases the dry bulb temperature of the process outlet air. However the moisture content of the process outlet air is reduced. The dehumidification efficiency of the desiccant wheel decreases with increasing regeneration air temperature, i.e., 46.7, 45.8 and 45.3 % for 50, 60 and 70oC, respectively. In contrast, the dehumidification rate increases with an increase in the regeneration air temperature, namely 32.6, 37.1 and 40.2 g/h for 50, 60 and 70oC, respectively.