

## A humidification–dehumidification process for produced water purification

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### ABSTRACT

Deployment of humidification–dehumidification process for produced water purification was investigated in this study. The produced water from natural gas production has a total dissolved solid of  $1.98 \times 10^4$  mg/L and total organic carbon of 470.2 mg/L. The water purification was carried out in a lab-constructed humidification–dehumidification unit with an effective surface area of 1.2 m<sup>2</sup>. The feed water temperature and flow rate were varied to investigate their influence on purified water quality, productivity, and water recovery. Both salt and dissolvable organics in the produced water were removed efficiently by the humidification–dehumidification process: the total dissolved solid was reduced from  $1.98 \times 10^4$  to 76.75 mg/L while the total organic carbon declined from 470.2 to 17.83 mg/L. A built-in capillary bundle was deployed as dehumidifier for the enhancement of water productivity and heat efficiency. A water productivity of 0.31 kg/m<sup>2</sup>.h with water recovery of 20.7% was achieved at 80°C. The study suggested that both salt and dissolvable organics could be removed by a humidification–dehumidification process. The purified produced water is suitable for beneficial uses, such as agriculture irrigation and industry processing.

*Keywords:* Produced water; Purification; Humidification-dehumidification; Desalination; Organics removal

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