

## Investigations of a membrane distillation pilot plant with a capillary module

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## ABSTRACT

The effectiveness of work of a 2-inch capillary module, with membrane area equal to 0.71 m<sup>2</sup>, in a pilot plant for direct contact membrane distillation was investigated. The module was designed with application of polypropylene membranes Accurel PP S6/2 with diameter of 1.8/2.6 mm and effective length of 1.05 m. Membranes placed inside the tubular shell were assembled in a form of braids, using three capillaries in each braid, obtaining the packing density coefficient of 31%. This configuration ensured good conditions of stream mixing on the shell side, and as a result, the effectiveness of module operation was close to results obtained for smaller capillary modules in the laboratory tests. The permeate flux at the used parameters of membrane distillation ( $T_r$  = 355 K) was above 25 L m<sup>-2</sup> h<sup>-1</sup>, and the energy consumption was at a level of 23.4 kW m<sup>-2</sup> of membranes (936 kWh m<sup>-3</sup> of distillate), while the thermal efficiency of process amounted to 70%–80%.

Keywords: Membrane distillation; Module design; Thermal efficiency; Desalination

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