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Influence of the Joule-Thomson effect on the flow of a vapor through a micro-porous membrane THOMAS LOIMER, Vienna University of Technology — The flow of a fluid near saturation through a micro-porous membrane is considered. Upstream of the membrane, the fluid is in a state of saturated vapor. Downstreams, there is unsaturated vapor which is, due to the Joule-Thomson effect, cooler than at the upstream side. The flow is described taking into account the Joule-Thomson effect and the wetting properties between the fluid and the membrane material, i.e., the capillary pressure across a curved meniscus and capillary condensation. Different types of flow occur, depending on the permeability of the membrane, on the wetting properties between the fluid and the membrane and on the pressure difference. The fluid condenses either fully or partially at the front surface of the membrane, or a liquid film forms in front of the membrane. Liquid or a two-phase mixture flows through a part or all of the membrane and evaporates either within the membrane or at the downstream front of the membrane, or the fluid evaporates at the upstream front of the membrane and vapor flows through the entire membrane. The different types of flow are discussed and the conditions under which they occur are presented.

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