Vacuum membrane distillation processes for aqueous solution treatment—A review

Abstract

The current applications of vacuum membrane distillation (VMD) process for various industrial aqueous solutions have been thoroughly reviewed. The applications of VMD can be grouped into three major processes: the single component transport process, the binary component transport process and the multicomponent transport process. The porous and hydrophobic membrane in the VMD system serves as a physical support for the liquid–gas interface and does not allow one of the phases to disperse into the other. The membrane provides an efficient separator for the phase-change process. The use of the correct membrane can offer a high production rate and a high separation factor at low temperatures. VMD, an alternative separation technology with applications in desalination, concentration, organic extraction and dissolved gas removal, can compete with conventional liquid–gas separation systems. The present paper critically reviewed VMD technology; the important components of the scope of this review included applications and processes, membrane modules, heat and mass transfer, model development, membrane, process conditions, fouling, energy consumption and production cost. Finally, the potential for future research as a requisite for VMD industrialisation was suggested.