

Effects of pressure and temperature on ultrafiltration hollow fiber membrane in mobile water treatment system

Abstract

In Sabah, Malaysia, there are still high probability of limited clean water access in rural area and disaster site. Few villages had been affected in Pitas due to improper road access, thus building a water treatment plant there might not be feasible. Recently, Kundasang area had been affected by earthquake that caused water disruption to its people due to the damage in the underground pipes and water tanks. It has been known that membrane technology brought ease in making mobile water treatment system that can be transported to rural or disaster area. In this study, hollow fiber membrane used in a mobile water treatment system due to compact and ease setup. Hollow fiber membrane was fabricated into small module at 15 and 30 fibers to suit the mobile water treatment system for potable water production of at least 80 L/day per operation. The effects of transmembrane pressure (TMP) and feed water temperature were investigated. It was found that permeate flux increases by more than 96% for both 15 and 30 fiber bundles with increasing pressure in the range of 0.25 to 3.0 bar but dropped when the pressure reached maximum. Lower temperature of 17 to 18°C increase the water viscosity by 15% from normal temperature of water at 24°C, making the permeate flux decreases. The fabricated modules effectively removed 96% turbidity of the surface water sample tested.