

Fouling behaviour for different module formats in membrane filtration applications for surface water treatment

Graeme K. Pearce

Membrane Consultancy Associates, PO Box 4006, Pangbourne, RG8 7WB, UK

Tel. +44 118 984 3106; Fax +44 118 984 5957; email: gpearce@membraneconsultancy.com

Received 28 October 2008; Accepted 2 July 2009

ABSTRACT

Design of a membrane filtration plant requires a careful selection of flux. A low flux will make the plant expensive in terms of capital cost (capex), since the membrane area requirement will increase. A high flux will lead to high operating costs (opex), since fouling rates increase exponentially with flux, and necessitate the use of high driving pressures and frequent chemical cleaning. The design therefore reflects a compromise between capex and opex. Membrane filtration applications in water treatment use one of three formats, either pressure driven (PD) or submerged, with inside or outside feed configurations. The different formats have different advantages and disadvantages, with all three concepts competitive in most applications. This paper looks at fouling behaviour for two of the module formats, namely PD inside feed and submerged. The data suggest that at a given flux, fouling rates are similar for the same type of feed using either format, though the optimum design flux will vary due to differences in module characteristics. The paper then introduces a method for monitoring plant performance, and quantifying the stability of operation based on two simple indices, evaluated from permeability measurements. The method can be applied to any membrane filtration plant.

Keywords: Membrane filtration; Ultrafiltration; Module format; Fouling rate; Permeability; Monitoring indices
