Treatment of Fishery Washing Water by Ultrafiltration

N. Mameri,* D. Abdessemed, D. Belhocine, H. Lounici

Laboratory of Biotechnology Polytechnic School of Algiers, 10, Avenue Pasteur El-Harrach, Algiers, Algeria

C. Gavach, J. Sandeaux & R. Sandeaux

Laboratoire des Matériaux et Procédés Membranaires, CNRS 1919, Route de Mendes, BP 5051 34090 Montpellier Cedex, France

(Received 16 October 1995; revised version received 18 March 1996; accepted 10 April 1996)

Abstract: The recovery and concentration of proteins from the waste water of a fish plant was achieved by ultrafiltration. Two UF modules equipped with Ceraver and Patterson Candy International (PCI) membranes were tested. Despite different cut-off values, similar apparent rejection coefficients (70% and 80% respectively) were obtained. Optimum economic conditions were established, corresponding to average transmembrane pressures of $2{\cdot}2 \times 10^5$ and $3{\cdot}8 \times 10^5$ Pa and tangential flow rates of 6·0 and 0·47 m s^{-1} for Ceraver and PCI membranes, respectively. The protein concentration in the feed solution was increased from 5 to 35 g dm^{-3}. The study showed that the method could reduce pollution due to organic matter by decreasing the value of the Biological Oxygen Demand after 5 days (BOD_5) by about 80%.

Key words: ultrafiltration, fish protein, concentration, economic optimization, environment

NOTATION

A	Membrane area (m^2)
BOD_5	Biological oxygen demand after 5 days (mg O_2 dm^{-3})
C_o	Initial feed concentration (g dm^{-3})
C_p	Permeate concentration (g dm^{-3})
COD	Chemical oxygen demand (mg O_2 dm^{-3})
g	Gravity constant (m s^{-2})
J_v	Permeate flux (dm^3 h^{-1} m^{-2})
K	Global cost per time unit (\$ s^{-1})
K_{e1}	Coefficient of investment cost for PCI membrane (\$ m^{-2} s^{-1})
K_{e2}	Coefficient of investment cost for ceraver membrane (\$ m^{-2} s^{-1})
K_p	Coefficient of energy cost (\$ J^{-1})
NTK	Nitrogen, total Kjeldahl (g dm^{-3})
P_a	Average transmembrane pressure (Pa)
ΔP_f	Pressure drop (Pa)
R_o	Apparent rejection coefficient (%)
Q_v	Tangential flow (m^3 s^{-1})
Q_w	Permeate flow (m^3 s^{-1})
U	Tangential flow rate (m s^{-1})
UF	Ultrafiltration process
V_f	Final volume (dm^3)
V_i	Initial volume (dm^3)

* To whom correspondence should be addressed.

1 INTRODUCTION

In countries such as Algeria, the fish processing industry is amongst the most polluting. The organic matter contained in waste wash waters represents 25% of the total fish proteins. Treatment of these effluents is useful both for reducing pollution and for recovering proteins.

J. Chem. Tech. Biotechnol. 0268-2575/96/$09.00