



Study of membrane technology for the treatment of liquid and gaseous streams

Fabio Bazzarelli

e-mail: f.bazzarelli@itm.cnr.it

Istituto per la Tecnologia delle Membrane, CNR-ITM, Via Pietro Bucci 17C c/o Unical, 87036 Rende (CS)

Introduction

Nowadays, it is well recognized that advanced clean technologies, able to work in mild conditions and with low energy input are necessary to face challenges in environmental protection, rational use of natural recourses and reducing waste generation. Membrane technology provides interesting options for designing, rationalizing and optimizing innovative processes that meet the principles of the green chemistry. In the present research, membrane processes have been studied for the treatment of liquid and gaseous streams. For the first case, the work focused on olive mill wastewaters (OMWWs) treatment with simultaneous recovery of biophenols and their valorization by an integrated membrane system. Regarding the gas treatment, the physical aging of PIM-1 membranes for gas separation such as CO₂ removal from flue gas was investigated.



MF (microfiltration), NF (nanofiltration), OD (osmotic distillation) and ME (membrane emulsification)



F. Bazzarelli, E. Piacentini, L. Giorno. Journal of Membrane Science, 541 (2017) 587-594.

A renewed alcohol treatment of the aged membrane determined a rejuvenation of the membrane. Furthermore, thermal treatment accelerates the aging phenomena and stabilizes the membrane on the time.

Gas transport parameters from CO₂ sorption analysis



Permeation and sorption analysis showed that aging mainly affects the diffusion coefficient of gases and hardly their solubility.

Figures reprinted from Bernardo et al. (2017), copyright (2017) with permission from Elsevier

P. Bernardo, F. Bazzarelli et al., Polymer, 113 (2017) 283-294.



