

## Pore Size Distribution of NF/RO Composite Membranes by Positron Annihilation Lifetime Spectroscopy

V. Dananić<sup>1</sup>, K. Košutić<sup>1</sup>, B. Kunst<sup>1</sup>, D. Bosnar<sup>2</sup>

<sup>1</sup>*Faculty of Chemical Engineering and Technology, University of Zagreb,  
Marulićev trg 19, Zagreb, Croatia*

<sup>2</sup>*Department of Physics, Faculty of Science, University of Zagreb,  
Bijenička 32, Zagreb, Croatia  
e-mail: vdanan@fkit.hr*

The nanofiltration/reverse osmosis (NF/RO) composite membranes have widespread use in the processes of removal of water pollutants and desalinization. These devices usually operate under significant mechanical pressure (0.8–4 MPa) during long time. The membrane's pores are thus exposed to significant mechanical stresses and chemical interactions with solvent/solute. Basically there are three retention mechanisms: size exclusion, charge exclusion (NF charged membranes) and physicochemical interactions between membrane and solvent/solute. Which of these mechanisms is a dominant one it depends on a variety of requirements and environmental settings. Whenever the first mechanism - size exclusion - is a dominant one, it is vitally important to describe and understand the pore size distribution within the membrane [1]. The aim and purpose of this work is to experimentally probe for membrane's free volume by positron annihilation lifetime technique and subsequently reveal the pore size distribution from the distribution of positron lifetime [2].

The relevant theoretical models which presuppose the pore size distribution to be unimodal or bimodal are briefly discussed.

[1] K. Košutić, D. Dolar, B. Kunst, *J. Memb. Sci.* 282 (2006) 109-114.

[2] D. Bosnar, Zs. Kajcsos, L. Liskay, L. Lohonyai, P. Major, S. Bosnar, C. Kosanović, B. Subotić, *Nucl. Instr. and Meth. A* 581 (2007) 91-93.