analytical method.

# CHARACTERIZATION OF POLYCARBONATE NUCLEAR TRACK-ETCHED MEMBRANES BY GAS PERMEATION METHOD

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Despite existing available several methods to estimate pore size in the ultrafiltration range in membranes these methods generally involve very small membrane areas, some analysis ambiguity and/or require sample modifications. The measurement of gas permeability as a function of the mean pressure across the membrane has been proposed as an excellent tool to characterize several types of microporous membranes. In this work, the gas permeation technique has been applied to analyse the commercial flat polycarbonate nuclear track-etched membranes (TEM's) Nuclepore, with pore size

of 15nm, 30nm and 50 nm, in order to verify if this method is appropriate to characterize the TEM's which are being developed at IPEN. The production of these membranes is being developed using the IEA-R1 research reactor (2MW) and the fission track registration technique in Makrofol KG (8$\mu$m thickness). The trend of the flux versus transmembrane pressure measured for various gases ($N_2$, Ar, He, Ne, $O_2$, $CO_2$), at a constant temperature (293K), was perfectly linear indicating therefore a constant permeability for the commercial membranes. Furthermore, the permeability showed a tendency of increasing when the molecular weight of the gases decreased. The inverse of the square root of the molecular weight of the gases versus the corresponding permeability was plotted and all gases showed a good linearity for the three membranes studied, following the Knudsen predictions.So, the results demonstrated that the permeation of gases through the Nuclepore track-etched membranes (TEM's) follows the Knudsen diffusion model at least for pore diameters in the interval from 50nm to 15nm. An estimation of the pore radius r(nm) for each membrane has been realized using the Knudsen equation and it was observed a large variation of permeability for different samples with the same pore size. The reason for such large variation among the same pore size membrane may be explained by the presence of multiple pores (clusters) in their surfaces. However for the lowest value of permeability, the pore diameter estimated in this work presented a good agreement with those obtained by SEM technique and with the values listed in the Nuclepore catalogue.