

Application of nuclear instrumentation methods for characterization of diffusion membranes

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Membranes are widely used in chemistry separation, in hydro-geological studies, in biotechnology processes and innovative energetic. In this study the effective diffusion through polymer and ceramic membrane is characterized with the radon gas. Advantage of the use of radon is that it gives response not only for the process itself but it can also be used for the parameterization of the membranes. Radon is an inert gas that decays quickly, producing particles (isotopes) of lead and polonium.

By using standard gamma spectroscopy we obtain reliable results for the quantity of captured in the membrane particles, as they are radioactive. From other side the diffusion process is measured with quasi-alpha spectroscopy device. We obtain in real time signal of the diffusion not only of the gas radon but of its decay products too. The results are surprising. Normally under the radioactivity decay law should be expected equilibrium between radon and its products. Due to capture of the decay products in the pore of the membrane we obtain this equilibrium between the 18th and the 23rd hour after start of the experiment.

All these methods allow us to parameterize how the different factors, related with the membrane as active surface, thickness, structure influence the process of diffusion. Further measurements with scanning microscope and autoradiography to detail the points of interaction between these particles and membrane will be performed.