



New Method of Water Purification with Track Membranes Filters

M.I. Sotov, G.S. Zhdanov, V.P. Timokhovitch

For the first time the track membrane (TM) have been applied for water purification in the device named as “Kriskaia rosinka”, which is known now as “NEROX” filter. The diffusion of water due to capillary effect without an additional pressure provides the filtration process in this device. The yield of pure water is $(1.5-2.3)10^{-3}$ l/h from square centimeter of the TM.

Our recent investigation demonstrated that it is possible use the TM in pressure filters applied for water purification. The TM with pore diameter $0.4\mu\text{m}$ may provide:

- water yield 0.1 l/h/cm^2 for pressure 0.2MPa ;
- operation resource of TM is 70 l/cm^2 with the regeneration after each 0.5 l/cm^2 .

The operation resource depends on the method and regeneration interval of its surface. The tangent cleaning of the surface is more effective process that should be repeated after 50% reduction of the water yield.

The beginning yield is rather high. For example, for the TM with pore diameter $1\mu\text{m}$ it is $\sim 60 \text{ m}^3/\text{h/m}^2/\text{ata}$. However, the yield reduces very much to the quasistationary level $\sim 5 \text{ m}^3/\text{h/m}^2/\text{ata}$ which is the same for pore diameter $1\mu\text{m}$ and $2\mu\text{m}$.

The effectiveness of the TM for pressure filtration is demonstrated for “NEROX” filter element (FE). The standard “NEROX” FE may produce ~ 15 l/day of pure water. The same FE with pressure filtration with proper regeneration gives ~ 55 l/h.

The several pilot samples for wide application have been developed. They may provide low water yield $(0.01-0.1) \text{ m}^3/\text{h}$, middle water yield $(0.1-1) \text{ m}^3/\text{h}$ and high yield $(1-10) \text{ m}^3/\text{h}$.

The component price for low yield FE are:

- vessel - 4 USD (100 units);
- TM - 30 USD/m^2 (~ 11 USD per FE, Dubna production);
- production (handle operation of FE) - 3 USD.

The total cost ~ 18 USD.

However, it is possible to reduce the cost.

- vessel ~ 2 USD (>1000 units);
- TM - 8 USD/m^2 (~ 2.5 USD per FE, IPPE production);
- production ~ 1 USD (less of handle operation).

The total cost ~ 5.5 USD.

The cost of another FE types may be estimated in the same way.