

During the production of biodiesel fuel, waste glycerol is being created. Apart from the glycerol, it also contains undesirable impurities, such as salts and methanol. In the most cases, waste glycerol has to be diluted before the purification, and concentrated after the purification in order to make it suitable for further use. The most frequently used methods of concentration are thermal ones, which consume much more energy than forward osmosis.

Forward osmosis is a relatively new membrane process (developed in the last two decades). The driving force is the osmotic pressure difference between solutions on the both sides of the membrane. The energy consumption is much lower than in other separation methods. The project intends to verify the applicability of forward osmosis for simultaneous concentration and dilution of glycerol solutions – see Fig. 1.

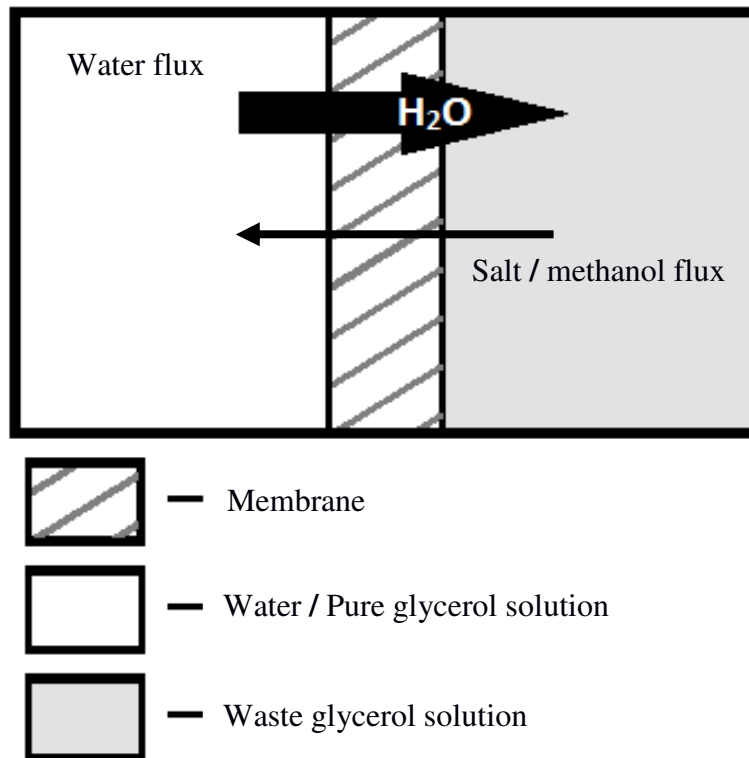


Fig. 1 Scheme of forward osmosis glycerol solutions.

In the first stage of the study, the osmotic pressure will be experimentally determined for the solutions of:

- Water-glycerol;
- Water-glycerol-salt;
- Water-glycerol-salt-methanol.

Next step will be the selection of membrane, based on the test results using a solution of glycerol as a draw solution and water as a feed. Flux, diffusion and retention coefficients of substances migrating through membrane will be determined. In the next stage, dependence between water flux, rejection, retention and flow rate of the draw solution, feed, and also applied pressure will be determined for selected membranes. This research will be conducted in a bench scale module using water as a feed and glycerol solution as a draw solution. Final stage of the project will be the application of forward osmosis for simultaneous dilution and concentration of the glycerol solution. Dependence of flux, retention, rejection and pressure difference between feed and draw solution will be examined.