

# MEMBRANE SYSTEMS DEVELOPED FOR THE SEPARATION OF PHARMACEUTICAL RESIDUES FROM WATER

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## ABSTRACT

The aim of the present study is to examine the applicability of solid and liquid membranes for the removal of drug residues in water treatment and analytical chemistry. Residues of pharmaceuticals, their active compounds and metabolites, can be found in all aquatic environments. There is an urgent need to reduce and monitor the drug input into surface and groundwater. In this study, *ibuprofen*, *diclofenac*, *carbamazepine* and *sulfamethoxazol* were chosen as representative compounds.

*Solid-flat – membranes* based on animals intestines were mounted in a cell, with the membrane from a cattle appendix performing the best. The influence of stirring rate, temperature, pH-value, salt concentration and the presence of different surfactants and humic substances was studied. These membranes retard most of the humic substances and combined with additional liquid or solid phase extraction techniques the depletion can be significantly increased.

*Bulk liquid and supported liquid membranes* efficiently separate pharmaceuticals from water by using different extraction and transport processes. The three-phase bulk liquid membrane consisted of an aqueous feed solution containing each drug, an organic solvent with or without a dissolved solute as a bulk liquid membrane and an aqueous stripping solution. The transport of the drugs show some differences, which can be attributed to their acid/base-behaviour and partition coefficients,  $\log K_{ow}$ . A pH-gradient between feed and strip solution increases the transport efficiency. Chosen three-phase compositions were successfully tested in *supported liquid membranes*.