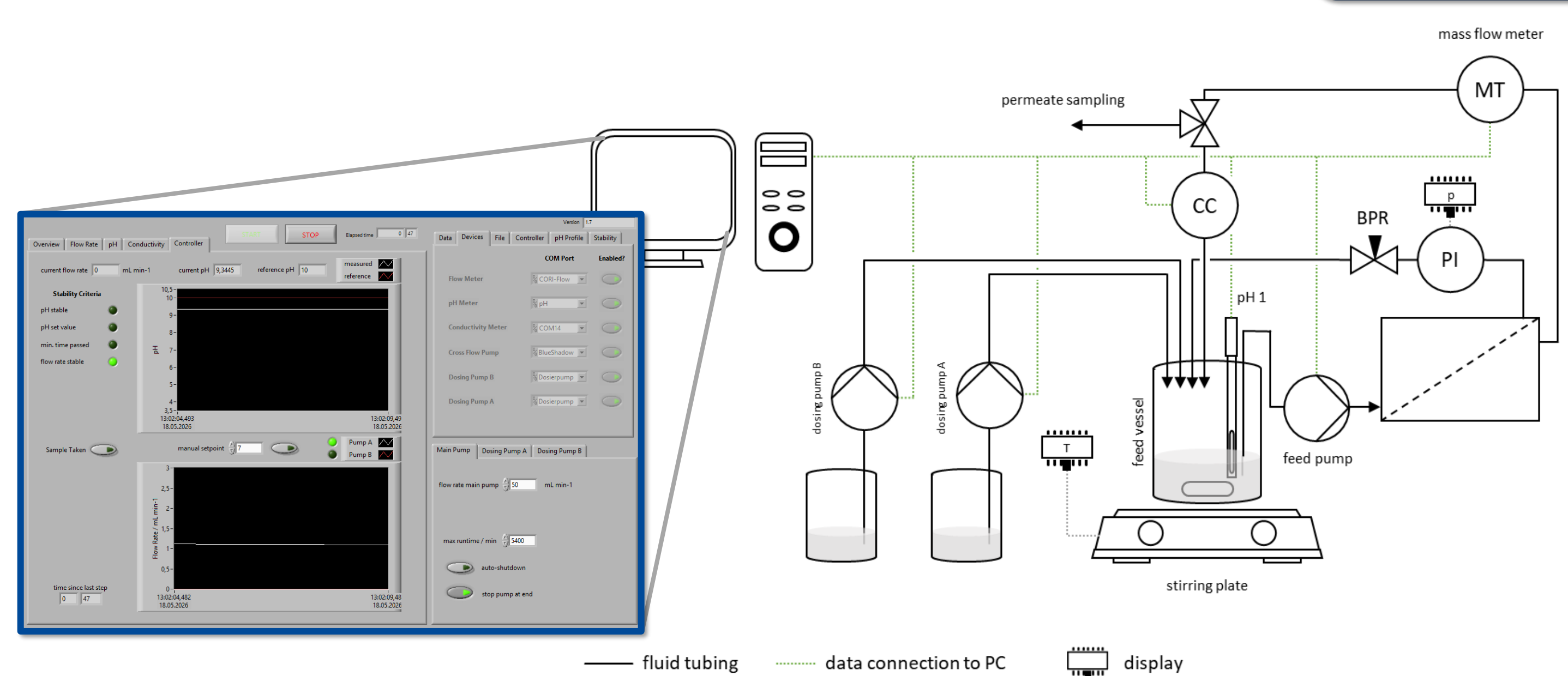


Advancing the Application of Nanofiltration in the Separation of Reaction Mixtures through Automated Screening

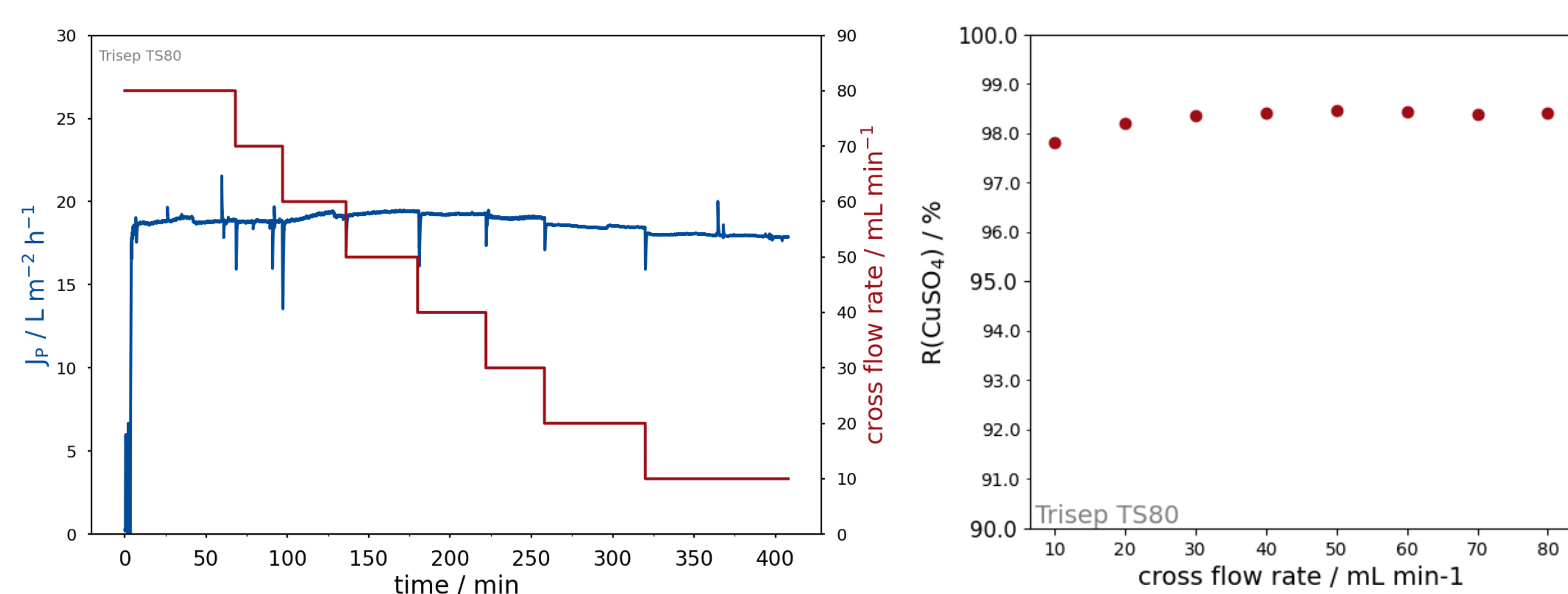
Henrik Schröter¹, Udo Kragl¹

¹University of Rostock, Institute of Chemistry, Albert-Einstein-Straße 3a, 18059 Rostock

Experimental Setup



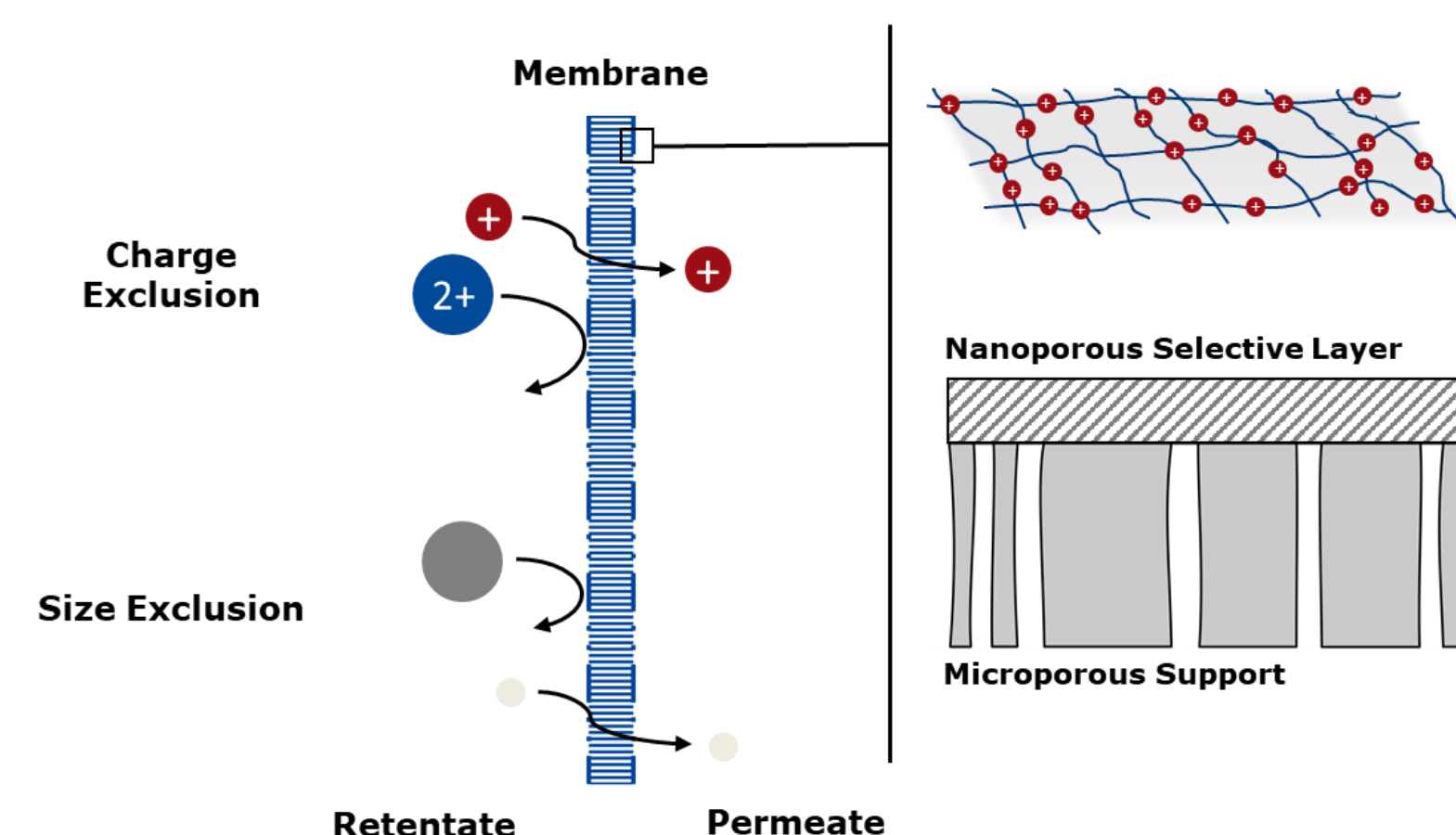
- highly integrated and flexible setup, supporting various methods of automated screening
- filtration performance can be determined based on permeate flux and conductivity
- automated logging of data and metadata
- quick identification of optimal conditions and operating windows



Conditions: Trisep TS80, 5 mM CuSO₄, 10 bar, 25 °C. Retention of CuSO₄ was determined by in-line conductivity measurements.

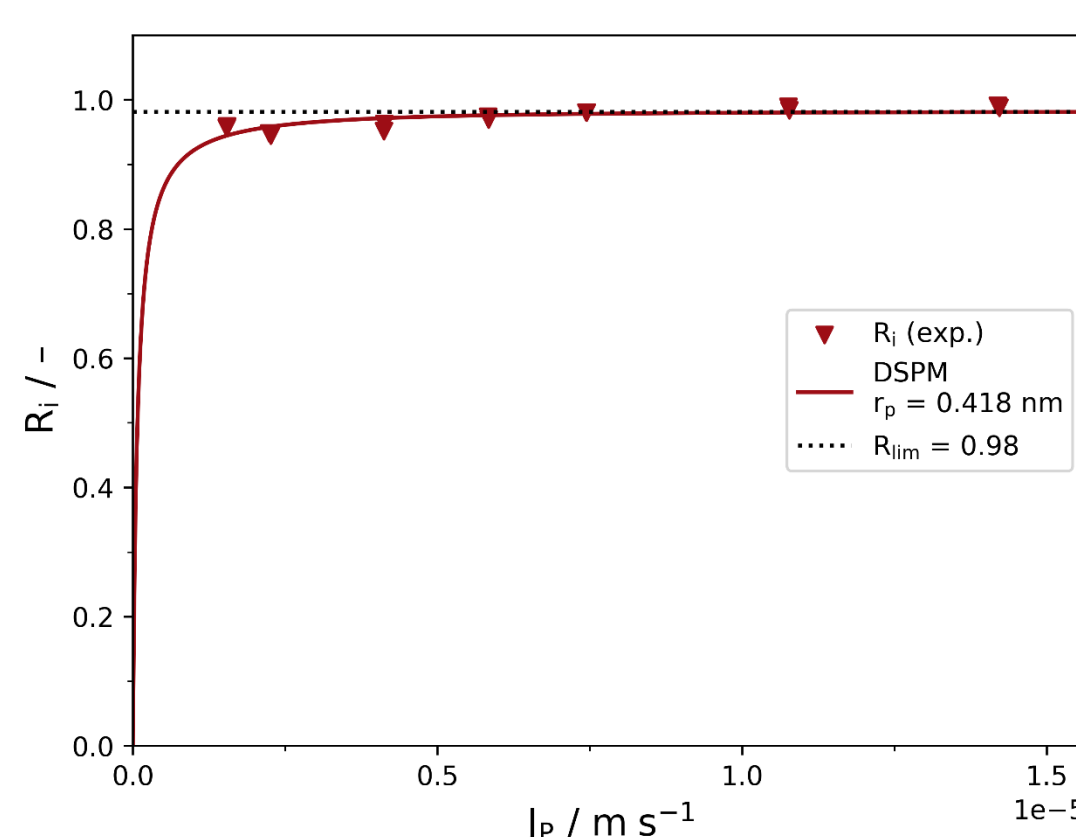
Methodology

Membrane Characterization



Pore Size

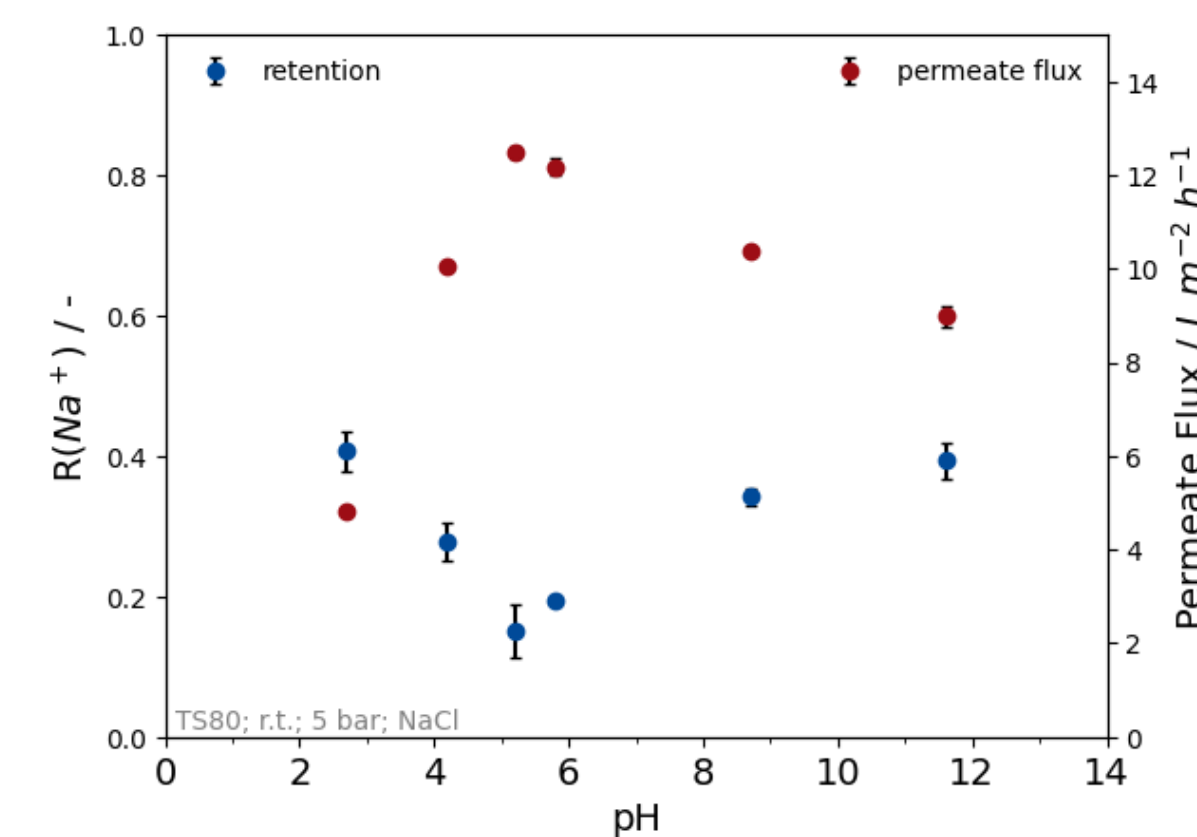
Neutral Solute Filtration



Conditions: Trisep TS80, 0.2 g L⁻¹ glucose, 1-20 bar, 25 mL min⁻¹ cross flow rate. Glucose was determined by HPLC.

Isoelectric Point

Charged Solute Filtration



Conditions: Trisep TS80, 0.1 mol L⁻¹ NaCl, 5 bar, 10 mL min⁻¹ cross flow rate, pH was adjusted using NaOH and HCl. Na⁺ was determined by ion chromatography.

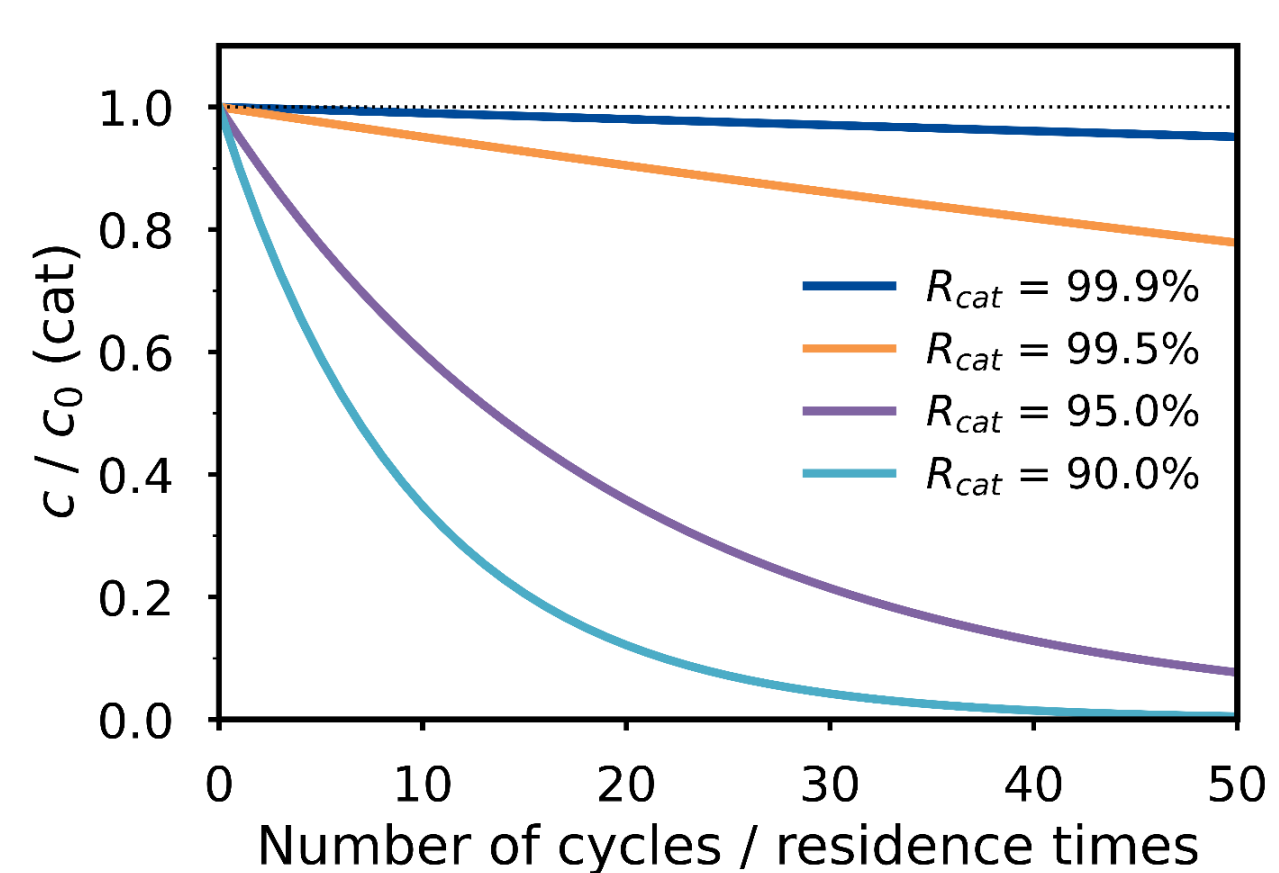
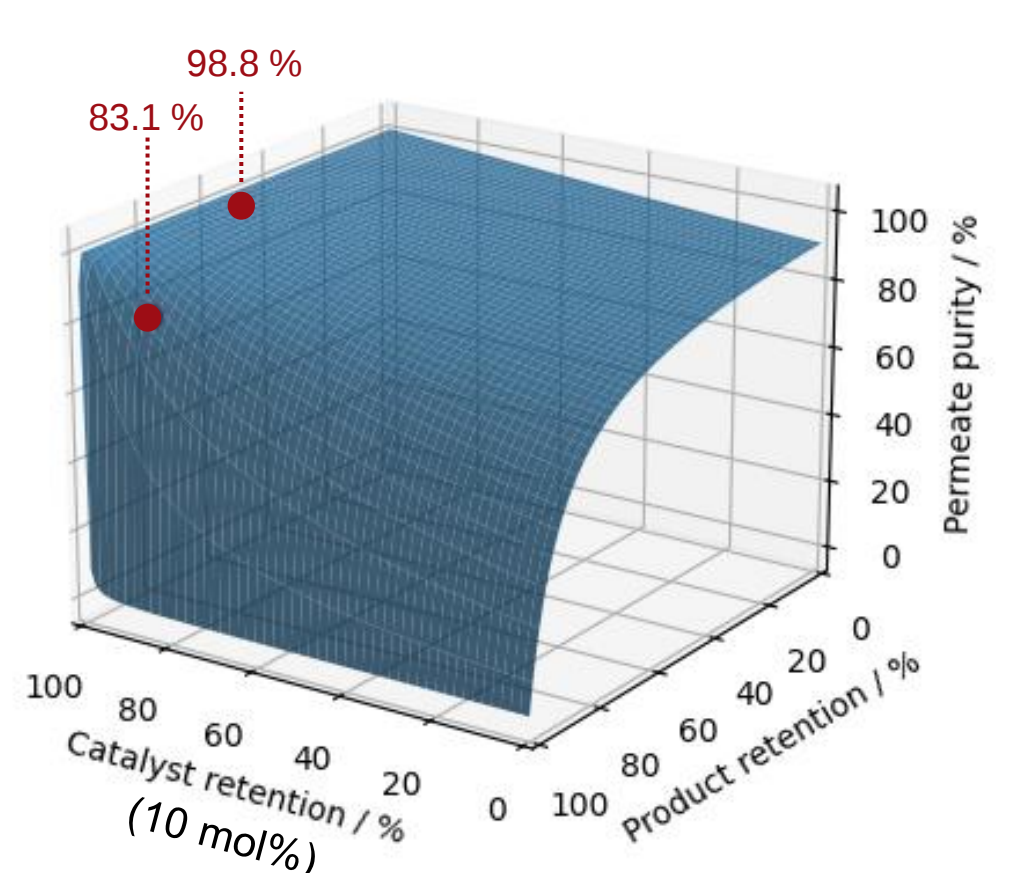
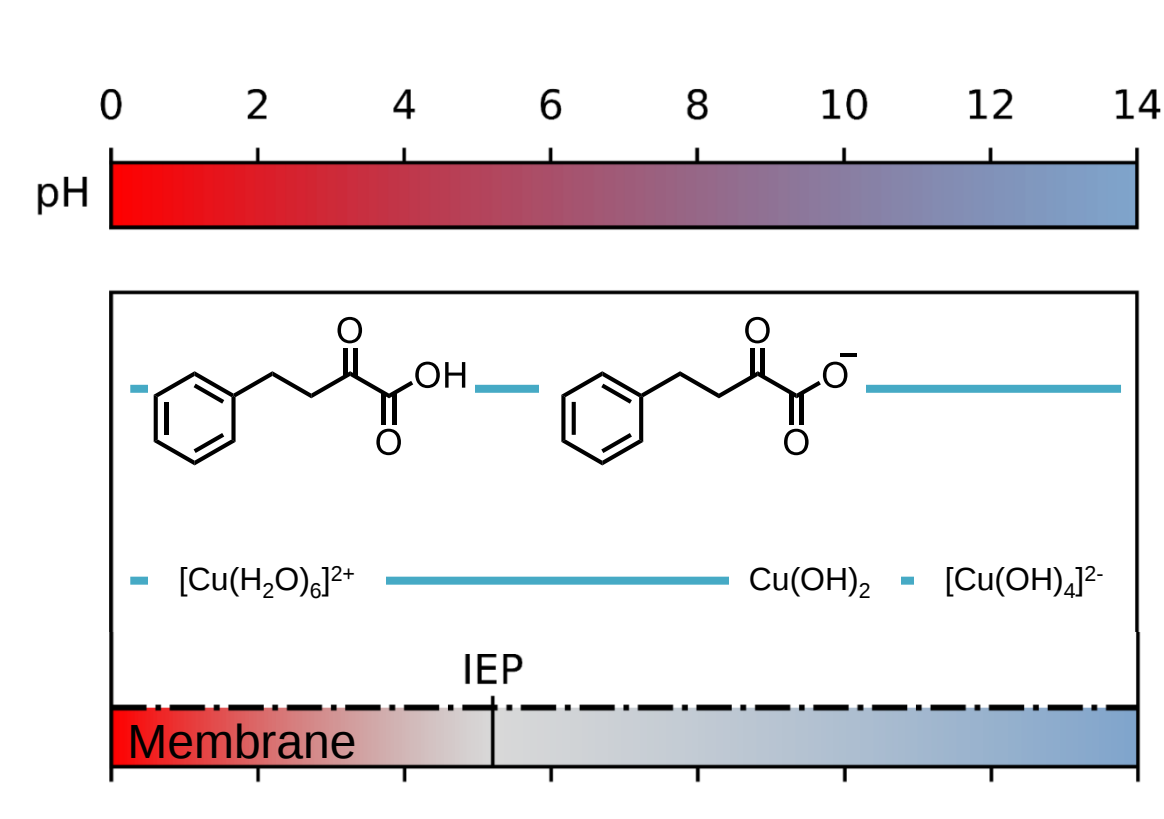
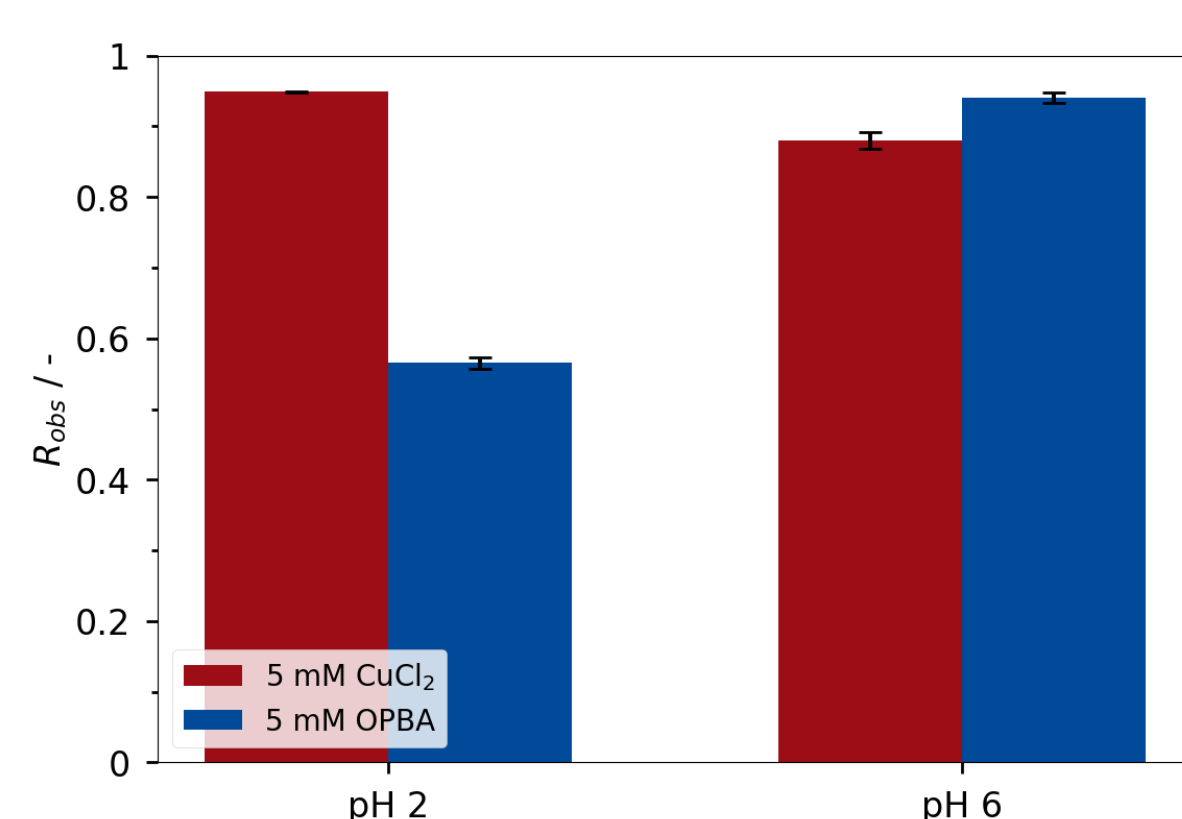
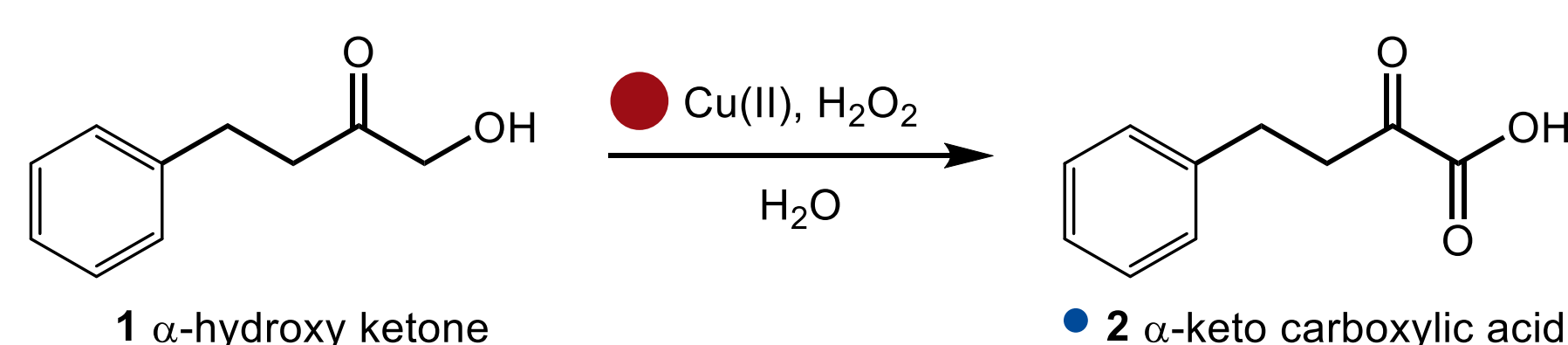
- acquisition of general membrane descriptors to allow for rational selection of membranes and operating conditions for emerging separation problems

[1] H. Schröter, U. Kragl, *Membranes* **2026**, 16(2), 60.

[2] H. Schröter, J. Behrens, A. Kienle, U. Kragl, *in preparation*.

Separation of Oxidation Catalysts

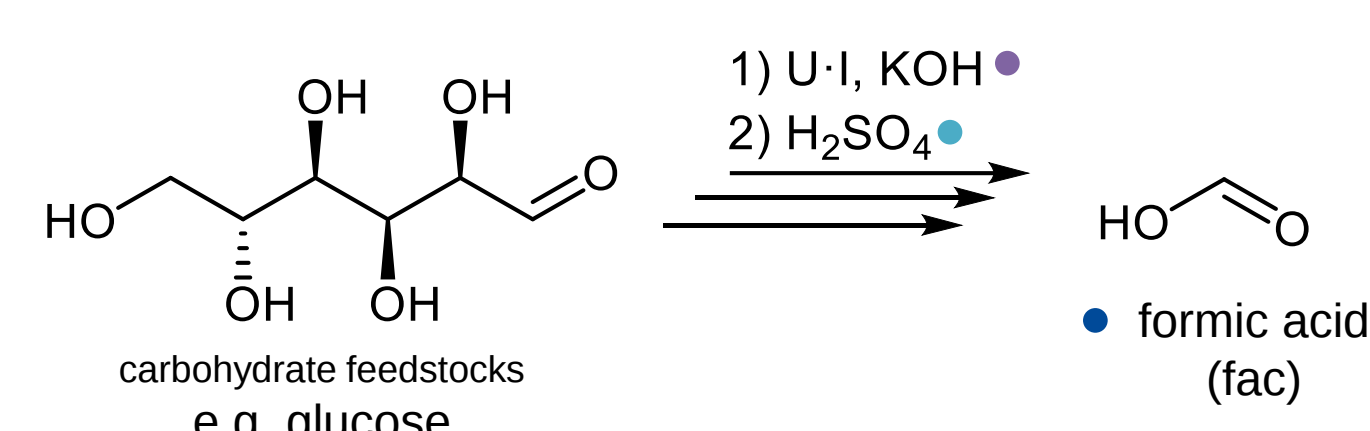
Prof. Nora Kulak, Isabell Prediger, University of Potsdam



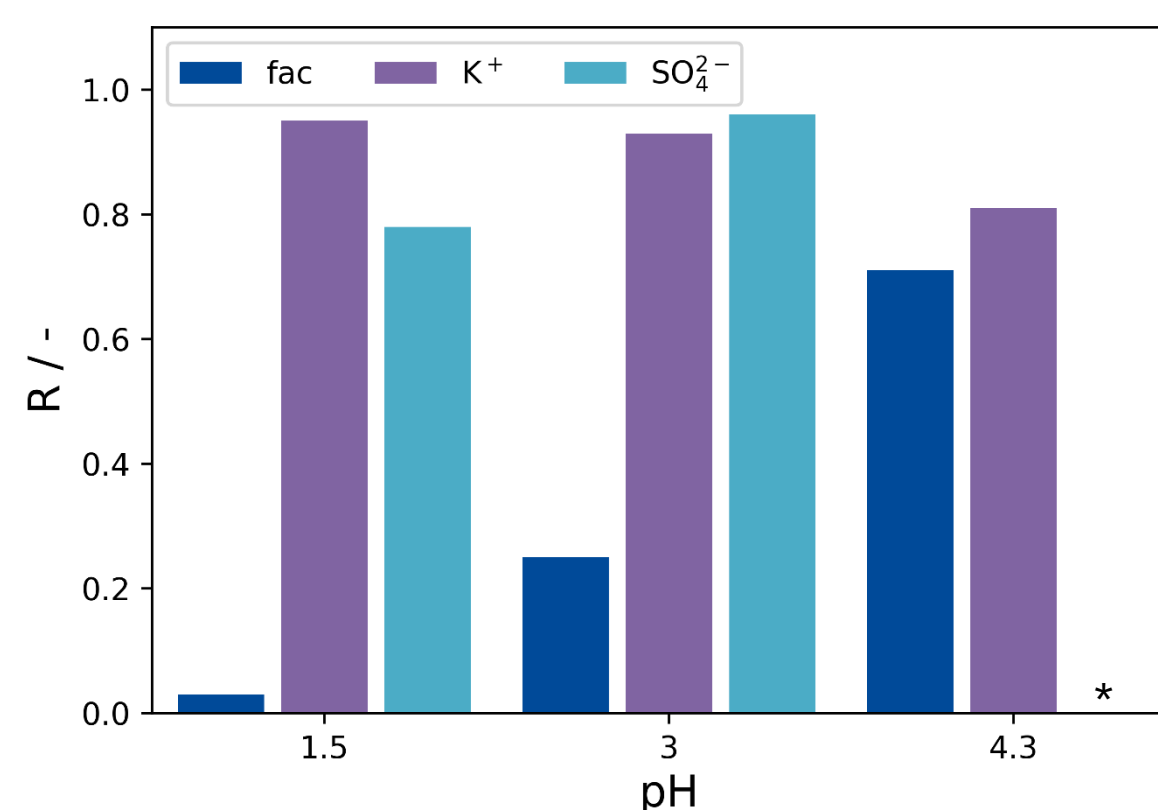
- adjustment of the feed pH modulates both the membrane surface charge and the solute speciation
- higher selectivity can be reached at a low pH

Application

Purification of Formic Acid

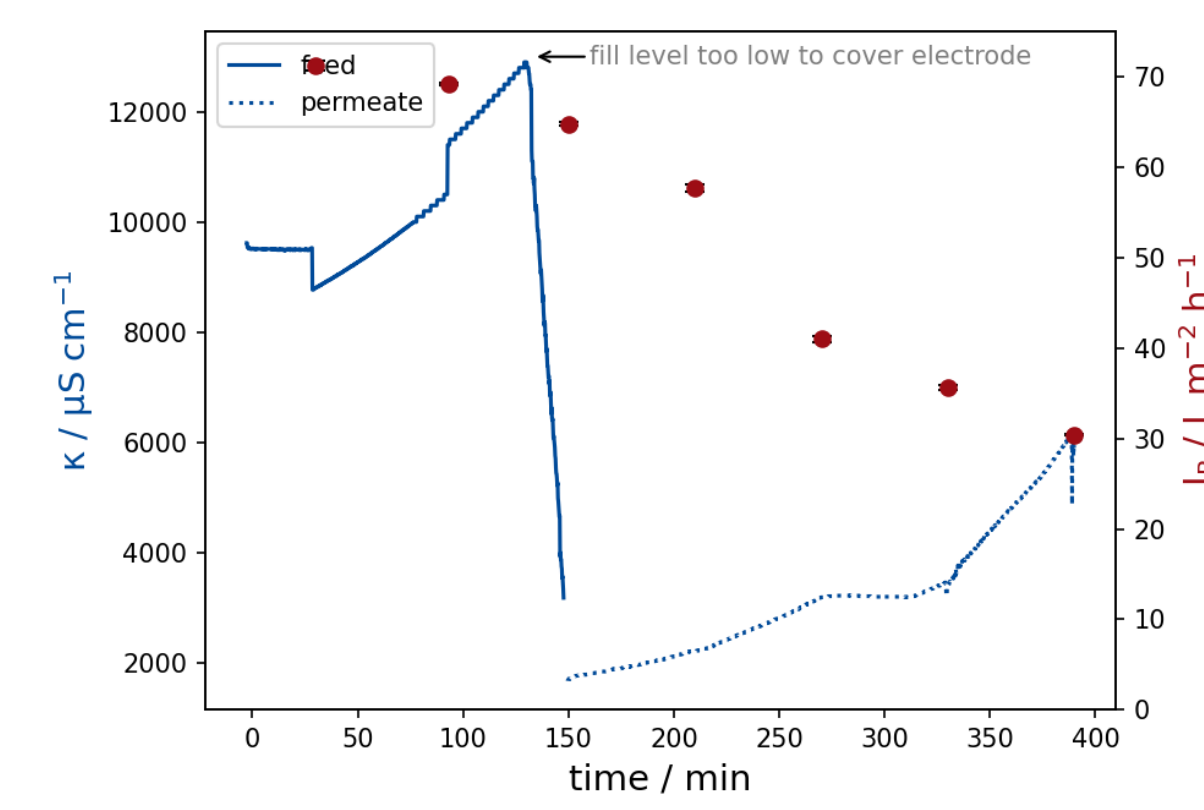


pH Screening



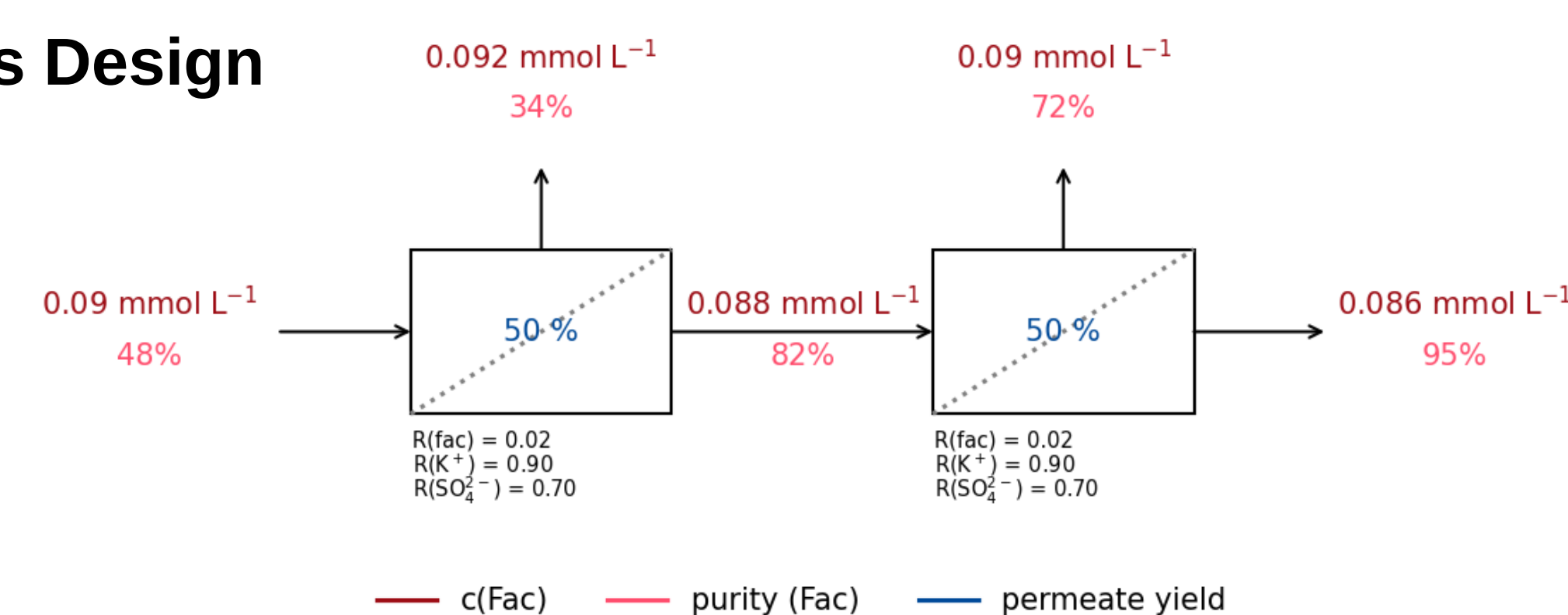
Conditions: 12.5 bar, 25 °C, 2.8 g L⁻¹ formic acid, 0.05 mol L⁻¹ K⁺, pH adjusted with H₂SO₄. *no H₂SO₄ was added to the feed.

Preparative Filtration



Conditions: 12.5 bar, 25 °C, pH 1.5, 2.8 g L⁻¹ formic acid, 0.05 mol L⁻¹ K⁺, pH adjusted with H₂SO₄.

Process Design



- speciation of formic acid is most relevant for the selectivity
- high purity can be reached after two filtration stages

[3] H. Schröter, I. Prediger, N. Kulak, U. Kragl, *Sep. Purif. Technol.* **2025**, 377, 134389.

[4] A. Erdmann, H. Schröter, D. Aschenbrenner, U. Kragl, *in preparation*.

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