\*\*\* Dataset underlying the publication: Biocatalytic PEI-PSS membranes through aqueous phase separation: influence of casting solution pH and operational temperature \*\*\*

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Department of Molecules & Materials, Department of Membrane Science and Technology, MESA+ Institute for Nanotechnology, University of Twente, Enschede, the NetherlandsCorresponding author: Saskia LindhoudContact information: s.lindhoud@utwente.nl\*\*\*General Introduction\*\*\*

The aim of this publication is to prepare polyelectrolyte complex membranes incorporated with lysozyme through a one-step and mild pH shift aqueous phase separation (APS) approach. The effects of lysozyme addition and casting solution pH on the membrane properties were studied. The biocatalytic membranes exhibited temperature dependent enzymatic activity. Moreover, the biocatalytic membranes demonstrate desirable enzymatic stability, maintaining 60% activity even after 60 days of storage. This study validates the potential of the water-based APS process as a straightforward approach for integrating enzymes into responsive biocatalytic membranes.

\*\*\* Description of data in the dataset \*\*\*

In this publication, membranes were prepared from different casting solution pH (11.4, 10.9 and 10.5) and with/without lysozyme. The obtained membranes are named as follows:

Membranes with lysozyme: M-L-pH11.4, M-L-pH10.9, M-L-pH10.5

Membranes without lysozyme: M-pH11.4, M-pH10.9, M-pH10.5

The dataset contains the data presented in the publication:

1. raw dynamic viscosity data of each casting solution;
2. top surface and cross section SEM images of each membrane;
3. raw and calculated pure water permeability data of each membrane;
4. enzymatic activity data (absorbance at 450 nm) of 5 mg/L lysozyme solution;
5. enzymatic activity data (absorbance at 450 nm) of each membrane at different temperature;
6. stability data of the enzymatic activity of each membrane at 45 oC;
7. enzymatic activity data of the 1-hour treated membrane and the remained substrate;
8. Lysozyme leakage data (absorbance at 281.5 nm) at 4 oC.