

Prof. Dr. rer. nat. et Ing. habil.

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Osmotic Pressure through the Polymer-surfactant membrane

Master theses / Diploma theses / Compulsory Internship

Here we study the interactions of oppositely charged polymer and surfactant pairs. A solution of anionic biopolymer of xanthan gum is placed in direct contact with a C_n TAB surfactant solution ($n=10, 12, 14$ and 16). Thereby, a membrane spontaneously forms between the two solutions due to the precipitation of polymer-surfactant complexes. The membrane grows afterwards in direction of the polymer solution (figure 1 - left). We can also use the membranes to make capsules simply by dripping the polymer solution in the surfactant solution (figure 1 - right). The concentration difference between the two sides of the membrane exerts an osmotic pressure, which results into shrinkage of the capsules with time.



Figure 1. Left) polymer-surfactant membrane. Right) capsule shrinkage with time.

Here, we place the two xanthan gum and C_n TAB solutions in contact in the ODBA device and measure the dynamic pressure changes through the membrane. In addition, we track the size changes in the capsules by taking consecutive images and performing image analysis.

We aim to investigate:

- The osmotic pressure through the membrane
- The shrinkage rate of the capsules with time

Experimental methods:

- Oscillating drop and bubble apparatus (ODBA)
- Image analysis to measure capsules sizes with time

Requirements:

- Study in process engineering (or comparative field of study)
- Interest in this field of research, experimental experience

Conditions:

- duration 3-6 month, start: earliest from 1st November 2021, workplace: TU Dresden

