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Background on Membrane Filtration

Biological systems must produce a variety of substances in order to survive; as such, biological products are rarely found in a pure form. To enable usage of biomaterials, they must be separated from each other through the process of bioseparations. Materials can be separated based on phase, size, charge, and reactivity to other substances, among other methods. Typically, solid particles are first sorted, removing the largest first before separating even smaller particles and then purifying the desired material (Doran, 1995). Membrane filtration is one step of bioseparations which enables liquids to pass through the pores of a filter while solid particles dissolved in the liquid larger than the filter pores are separated from the mixture (Doran, 1995). Depending on the size of the pores, the filter may separate particles from the macro particle range (particle filtration) all the way down to the ionic range (hyperfiltration or reverse osmosis) (Giwa, 2012). Ultrafiltration, which has a pore size between ten and 1000 nanometers, must be used to separate xanthan gum from solution, assuming that other, larger particles have already been separated via other methods (Giwa, 2012).

Importance of Flux on Membrane Performance

The volumetric flux is the rate at which particles pass through the membrane. A higher flux means that theoretically materials can be separated more quickly (Lo, et. al., 1996). However, to separate smaller particles, a smaller membrane pore size must be used, which causes the speed of particles passing through to decrease. While a more accurate filtration will be performed, the flux will theoretically decrease.

Xanthan separation

The 500 kDa size of the filter will exclude the macromolecular size of xanthan, leading the xanthan gum to be found in the retentate reservoir, which will theoretically have a higher concentration of xanthan gum than the feed (Lo, et. al., 1996).

References

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