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Biopolymer Purification By Means Of Electrofiltration

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Bioprocesses are essential for future production not only of pharmaceuticals and other high value products but also of medium-priced fine chemicals as we have to exchange from petroleum based products into sustainable ones.

The most cost-intensive part of a biotechnological production process is downstream processing. The costs of the different separation steps after the actual bioprocess can constitute up to 80 % of the total costs. Each step is not only a large cost factor, but is connected also with a certain product loss. Therefore it is necessary to reduce the downstream processing to fewer steps so that it takes place faster and better.

Biosuspensions and biopolymers can only be separated with traditional filtration methods to a limited extent as the filter cake tends to block the filter membrane. Biopolymers are however often charged due to the presence of amino or carboxyl groups. These electrical properties of the molecules/particles can be utilised to improve the separation behaviour of biological suspensions. In pressure electrofiltration, an electrical field is applied that makes the charged particles move away from the filter medium, thereby considerably reducing the thickness of the filter cake on the membrane. The principle of electrofiltration is that an electric field (DC) is superimposed on a traditional pressure filtration set-up, at which this field acts parallel to the flow direction of the filtrate. Due to the electrophoretic migration of the charged biopolymers away from the filter medium, the surface layer on the membrane is reduced and makes filtration of compressible biosuspensions possible.

This method also leads to an improvement in filtration kinetics. Experiments with xanthane have revealed final concentrations of 175 g/l in about only 2 % of the filtration time that is normally required in pressure filtration. Also for other biologically derived polysaccharides and proteins the electrofiltration proved to be excellently suited not only for concentration of the product but also for its purification.