

Stirring As Foam Disruption (SAFD)

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Description

In the fermentation industry, the formation of foam during the fermentation process can lead to blockage of the outlets and reduce the productive volume. Foam can be broken mechanically, through the installation of a foam disrupter, but the installation and operation of such a system can be costly. Another much used method is the addition of anti-foam, which however leads to a reduction in oxygen transfer capacity. In this project, a novel approach is studied; the use of the upper impeller of a set of impellers for the elimination of foam: SAFD (Stirring As Foam Disruption). Since the process of foam formation is a dynamic one, the aim of SAFD is to use agitation to enhance foam disruption mechanisms. This technique is tested and modelled at small scale. The mechanistic model for SAFD defines a fictitious liquid velocity generated by the (upper) impeller near the dispersion surface, which is correlated with complete foam disruption. This model proves to be scalable, enabling scaling up to pilot and production scale using Rushton turbines and an up-pumping hydrofoil impeller, the Scaba 3SHP1. The dominating mechanism behind SAFD—foam entrainment—is demonstrated at 'pilot' scale (12 m³). The results are used for the design of a 30 m³ bioreactor, in which almost foamless *Escherichia coli* fermentations are realised.

Publications from the project

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