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## **Methods for Oxygenation of Continuous Cultures of Brewer's Yeast, *Saccharomyces cerevisiae***

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### **Abstract:**

Maintaining steady-state, aerobic cultures of yeast in a bioreactor depends on the configuration of the bioreactor system as well as the growth medium used. In this paper, we compare several conventional aeration methods with newer filter methods using a novel optical sensor array to monitor dissolved oxygen, pH, and biomass. With conventional methods, only a continuously stirred tank reactor configuration gave high aeration rates for cultures in yeast extract peptone dextrose (YPD) medium. For filters technologies, only a polydimethylsiloxan filter provided sufficient aeration of yeast cultures. Further, using the polydimethylsiloxan filter, the YPD medium gave inferior oxygenation rates of yeast compared to superior results with Synthetic Complete medium. It was found that the YPD medium itself, not the yeast cells, interfered with the filter giving the low oxygen transfer rates based on the volumetric transfer coefficient ( $K_La$ ). The results are discussed for implications of miniaturized bioreactors in low-gravity environments.

Keywords: yeast, continuous cultures, bioreactor, hollow-fiber filters,  $k_La$ , oxygen uptake