

Comparison of modified airlift reactor with conventional airlift reactor

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Abstract

Air supply is a crucial parameter for many aerobic processes. Specific growth rate (μ) was determined for both the reactors (conventional UT-ALF and modified CDT-ALF) under identical operating conditions. The conventional uniform tube external loop airlift fermenter (UT-ALF) was modified keeping the volume and height same. Only the riser part of the conventional external loop airlift fermenter was replaced by a irregular geometry in the form of converging-diverging tube. The modified system is thus named converging-diverging tube airlift fermenter (CDT-ALF), which possesses a novel geometry comprised of walls with sinusoidal waves that mimic baffles in an effort to promote mixing at low Reynold's number (Re). This geometry provides a unique hydrodynamic environment suitable also for the cultivation of mammalian cells and tissues.

The results from UT-ALF and CDT-ALF were compared. At any operating condition CDT-ALF showed higher μ_{max} (maximum specific growth rate) compared to UT-ALF. The highest (μ_{max}) was observed for CDT-ALF corresponding to an initial sugar concentration of 50 kg/m³ and air flow rate of 1.0 vvm. This was 29 % higher compared to UT-ALF under identical operating conditions. So, operating cost may be minimized to a great extent if commercialized.

Keywords: Airlift bioreactor, Aeration, Aerobic process, Animal cell Culture, Specific , growth rate.

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