466b Novel Bioreactor Design for the Culture of Suspended Mammalian Cells

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In this contribution, we study the mixing performance of a novel stirred tank design for culture of suspended mammalian cells. Mammalian cells are extremely sensitive to mechanical stress, and their rate of growth, biochemical behavior, and ultimately, their rate of survival may strongly depend on agitation conditions. The new design aims to guarantee adequate mixing conditions and decrease shear stress as compared to classical bioreactor configurations. Experimental evidence is provided that this can be achieve by means of locating the axis of agitation in an eccentric location, and replacing the impellers normally used for mammalian cell culture by a low shear impeller design. Using visualization techniques, we compare the performance of concentric and eccentric laminar stirred tank bioreactor configurations in terms of mixing patterns, mixing times, and degree of segregation. Results corresponding to different eccentricities (E=0, E=0.21, and E=0.42; where E=distance of rotation axis from the center of the tank/tank ratio), two impeller diameters, and Re values (in the range from 10-200) are reported and discussed.

Preliminary information on the growth rate and metabolic behavior of hybridoma cells cultured in such a system is presented. Eccentric configurations are shown to be potentially useful to favor more benign and still adequate mixing environments for mammalian cell culture operations.