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Effect of Rotational Speeds and Impeller Combinations on the Growth of *Arthrospira Platensis* in Stirred Tank Bioreactor

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Abstract—*Arthrospira platensis microalgae has been proven as a potential microorganism among others for food, pharmaceutical and biofuel industries. Bottleneck lies in the lower biomass production with high energy input. Therefore, it is essential to optimize the operating parameters such as agitation, aeration and nutrient concentration that governs the hydrodynamics and growth of cells in the reactor. Present study is focused on analyzing the effects of various rotational speeds of different impeller combinations in stirred tank bioreactor on the growth of Arthrospira platensis. It was first cultivated in a conventional stirredtank bioreactor that was equipped with two Rushton impellers that moves in radial motion at various range of RPM i.e. 50, 75, 100, 125, 150, 175, 200 and 225. Other selected combination was Rushton-marine impellers. This combination of radial and axial motion prevented settling of cells at varied RPMs.Both the combinations of impellers were compared based on biomass production of A. platensis at varied RPMs. Combination of Rushton-marine impellers generated a four-way flow regime that enhanced the cell exposure to illumination and nutrients by preventing settling of cells and hence exhibited high biomass concentration at all RPMs compared to that of Rushton-Rushton combination. The maximum biomass concentration was achieved at 100RPM in case of both combinations. Rushton-marine impellers exhibited 34.46% higher biomass production utilizing lesser power input due to better hydrodynamics in terms of shear stress and mixing time in the stirred tank bioreactor.*