

Abstract

Static mixers, which improve gas-liquid mass transfer inside tubular photobioreactors and move the cells between the upper and lower parts of the tubes were designed. Each static mixer was equipped with an opening (v-cut slit) at the top (for gas dispersion) and an orifice at the lower part (for liquid circulation). When the static mixers were installed in the riser tube of an inclined tubular photobioreactor, vertical movement of the liquid was induced so that cells were moved between the surface and bottom part of the photobioreactor. The mass transfer rates in the tubular photobioreactor without static mixers decreased sharply when they were scaled up by increasing the tube diameters. However, by installation of static mixers, the mass transfer rates in 12.5-cm diameter tubes were almost as high as those of 3.8-cm tubes without static mixers. The effectiveness of the static mixers in improving the mass transfer characteristics of the tubular photobioreactors was higher in large than small diameter tubes. The ratio of the diameters of the static mixers to the diameter of the tube, the areas of the v-cut slits and the orifice were the important design parameters that affected the mass transfer characteristics. The gas hold up and kLa were higher when the areas of the slits (v-cut) and the orifice were reduced.

Do you want to **read the rest** of this article?

Request full-text

Design of static mixers for inclined tubular photobioreactors. Available from:

https://www.researchgate.net/publication/225895935_Design_of_static_mixers_for_inclined_tubular_photobioreactors