

# Measurement of droplet coalescence in a mixing tank

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## Abstract

It is in urgent requirement to directly measure the droplet coalescence frequency for the application of the population balance model. In this study, a method was firstly developed to directly measure the droplet coalescence frequency in turbulent flow field by using a specially designed mixing tank and a high-speed camera. The effects of the rotating speed and holdup fraction on the droplet coalescence frequency was quantitatively investigated. The increasing of rotation speed promotes first and then inhibits the coalescence, while the holdup fraction has little influence on the coalescence frequency function. The droplet collision frequency was also counted and the coalescence efficiency was calculated. The models in literature were tested with our experimental data and were found failing to predict the coalescence frequency in the stirring tank. Empirical correlations were finally proposed and good agreement was found between the prediction results and the experimental data.

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