



## Effect of bubble diameter and bubble count on overall mass transfer coefficient using ImageJ analysis in a down flow jet loop sparged reactor

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Received 26 April 2022; Accepted 18 March 2023

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### ABSTRACT

Bubble size and bubble count play a vital role while determining the overall mass transfer coefficient of a jet loop reactor. A self-designed down flow jet loop sparged reactor with an air–water system was investigated for bubble size and bubble count. The influence of parameters such as liquid flow rate ( $Q_L$ ), gas flow rate ( $Q_G$ ), number of sparger openings, and sparger diameter was studied in detail. Among the various operating conditions, the maximum overall mass transfer coefficient was found to be at a 27 cm projection depth of the ejector with 4 sparger openings and a diameter of 2 mm. The bubble pictures were taken in a good quality digital single-lens reflex with 50× zoom. The captured images were analyzed using ImageJ analysis. The results showed that the bubble count increased with increasing flow rates of gas and liquid whereas the bubble diameter decreased with increasing gas and liquid flow rates.

**Keywords:** Jet loop reactor; Down flow; Overall mass transfer coefficient; Bubble diameter; Bubble count; Gas holdup; Perforated sparger

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