



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Hydrodynamics of Jet Driven Gas-liquid-liquid Dispersion in Downflow Column and the Efficiency of Extraction

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Work : Downflow Column; Entrainment; Gas Holdup;
Frictional pressure drop; mixing; drop size, Interfacial
area; Extraction; Mass Transfer

SHORT ABSTRACT

Gas-liquid-liquid dispersion is an important process for the mass transfer operation in chemical and biochemical industries. The presence of gas for the liquid-liquid dispersion increases the degree of mass transfer and reactions compared to other dispersion mechanisms. Some of the examples for gas-liquid-liquid operations are carbonylation, hydroformylation, and gas-aided mass transfer (e.g., extraction). The gas-aided mass transfer operation has now been extended to such various applications in the petrochemical industry, pharmaceuticals, hydrometallurgy, nuclear industry, and environmental protection. The introduction of gas by liquid jet and its use for liquid-liquid dispersion is gaining importance to the scientific, academic, and research and development organization for the development of liquid-liquid extraction device. The jet-driven downflow column has several advantages and applications described by (Majumder (2016)). The present study focuses on some hydrodynamics and their effects on extraction in the jet-driven gas-aided liquid-liquid downflow extraction column.

The main objective of this study is to develop a jet-driven gas-aided liquid-liquid extraction system. Based on the literature survey and scope of the research, the following objectives of the work under this main objective are formulated as to study:

- Gas and dispersed liquid entrainment characteristics
- Gas holdup of the gas phase in the gas-liquid-liquid mixture.
- Frictional pressure drop and resistance of the flow
- Mixing characteristics of the phases in the proposed system
- Drop size and distribution and its analysis
- The efficiency of the gas-aided liquid-liquid extraction in the jet-driven extraction column