

## Accepted Manuscript

Temperature Distribution Measurements and Modelling of a Liquid-Liquid-Vapour Spray Column Direct Contact Heat Exchanger

Ali Sh. Baqir, Hameed B. Mahood, Asaad H. Sayer

PII: S1359-4311(17)37020-5

DOI: <https://doi.org/10.1016/j.applthermaleng.2018.04.128>

Reference: ATE 12125

To appear in: *Applied Thermal Engineering*

Received Date: 2 November 2017

Revised Date: 10 March 2018

Accepted Date: 26 April 2018

Please cite this article as: A. Sh. Baqir, H.B. Mahood, A.H. Sayer, Temperature Distribution Measurements and Modelling of a Liquid-Liquid-Vapour Spray Column Direct Contact Heat Exchanger, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.04.128>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Temperature Distribution Measurements and Modelling of a Liquid-Liquid-Vapour Spray Column Direct Contact Heat Exchanger

Ali Sh. Baqir<sup>1</sup>, Hameed B. Mahood\*<sup>2</sup> and Asaad H. Sayer<sup>3</sup>

<sup>1</sup> Najaf Technical College, Department of Aeronautical Engineering, Iraq

\*<sup>2</sup> University of Misan, Misan, Iraq: [hbmahood@yahoo.com](mailto:hbmahood@yahoo.com)

<sup>3</sup> University of Thi-Qar, College of Science, Chemistry Department, Thi-Qar, Iraq

## Research Highlights

- Measurements and calculation of  $T_c$  and  $T_d$  along 3-phase spray column DCHE.
- Effect of  $Q_c$ ,  $Q_d$ ,  $D_{nz}$ ,  $ja$  and sparger configuration was examined.
- $T_c$  decreases with  $Z$ , whilst  $T_d$  increases
- $T_{c\ out}$  increases with increasing continuous phase flow rates.
- $T_{c\ out}$  decreases with increasing dispersed phase flow rates.
- $T_{c\ out}$  increases with increasing  $Ja$ .

## Abstract

This study investigates the temperature distribution of a liquid-liquid-vapour three-phase direct contact heat exchanger, both experimentally and theoretically. The experimental investigation was conducted using a Perspex column with an internal diameter of 10 cm and 100 cm height. Liquid pentane at its saturation temperature and warm water were used in the dispersed phase and continuous phase respectively. Various dispersed phase flow rates (10, 15 & 20 L/h) and continuous phase flow rates (10, 20, 30 & 40 L/h) were tested using three different sparger configurations (7, 19 & 36 nozzles) and two different nozzle diameters (1 & 1.25 mm). The results showed that the temperature of the continuous phase decreased with the height of the heat exchanger from its inlet at the top towards its outlet at the bottom. This behaviour was entirely opposite to the dispersed phase that flows counter currently with the continuous phase in the heat exchanger. For the same sparger and constant continuous phase flow rate ( $Q_c$ ), the outlet temperature of the continuous phase was inversely affected by the dispersed phase flow rate ( $Q_d$ ); while decreasing the nozzle numbers in the sparger led to a decrease in the outlet temperature of the continuous phase. Furthermore, the

Download English Version:

<https://daneshyari.com/en/article/7045180>

Download Persian Version:

<https://daneshyari.com/article/7045180>

[Daneshyari.com](https://daneshyari.com)