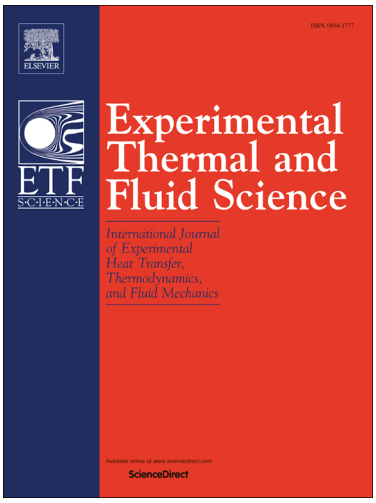

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Ourania Oikonomidou, Sotiris P. Evgenidis, Margaritis Kostoglou, Thodoris D. Karapantsios

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DEGASSING OF A PRESSURIZED LIQUID SATURATED WITH DISSOLVED GAS WHEN INJECTED TO A LOW PRESSURE LIQUID POOL

Ourania Oikonomidou[a], Sotiris P. Evgenidis[a], Margaritis Kostoglou[a], Thodoris D. Karapantsios[a,*]

[a]Division of Chemical Technology, School of Chemistry, Aristotle University of Thessaloniki, University Box 116, 541 24 Thessaloniki, Greece

*Corresponding author: tel & fax: +302310997772 e-mail: karapant@chem.auth.gr

E-mail addresses: oikonomid@chem.auth.gr (O. Oikonomidou), sevgenid@chem.auth.gr (S.P. Evgenidis), kostoglu@chem.auth.gr (M. Kostoglou).

Abstract

Bubbles forming due to decompression of a liquid saturated with dissolved gas at elevated pressures when it enters a low pressure liquid pool can either limit or promote the efficiency of several ground and space applications. Among the experimental parameters influencing flow decompression degassing, dissolution pressure is the most studied, yet controversial, parameter. The present work aims to shed light on how dissolution pressure of a liquid affects the final size of bubbles and the generated gas fraction by conducting gas desorption (degassing) experiments of liquid jets that decompress passing though a nozzle to a vertical column filled with the same non-degassed liquid. Bubbles size distributions at different radial positions in the column are computed analyzing high resolution digital images. A patented electrical impedance technique is employed to measure instantaneously local volumetric gas fraction. Flow dispersion in the column is studied by residence time distributions using conductivity tracers. On-line continuous dissolved oxygen measurements yield the kinetics and final extent of degassing. Experimental results are discussed to comprehend why bubbles size distributions vary with dissolution pressures and how this variation affects gas fraction in the column.

Keywords

Gas desorption; decompression; nozzle; dissolved air flotation; bubble size distribution; gas fraction