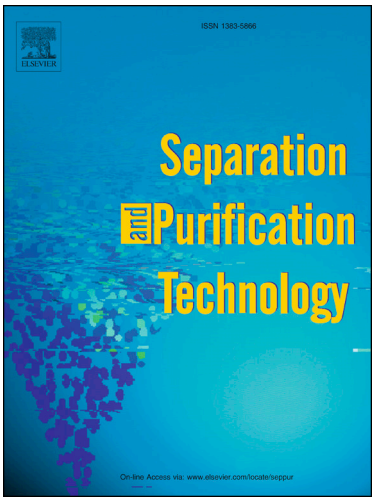

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PII: S1383-5866(18)31441-2
DOI: https://doi.org/10.1016/j.seppur.2018.10.005
Reference: SEPPUR 14992

To appear in: *Separation and Purification Technology*

Received Date: 26 April 2018
Revised Date: 11 September 2018
Accepted Date: 2 October 2018

Please cite this article as: G. Alves Oliveira, I. Monje-Ramirez, E. Carissimi, R. Teixeira Rodrigues, S.B. Velasquez-Orta, A. Concepción Chávez Mejía, M. Teresa Orta Ledesma, The effect of bubble size distribution on the release of microalgae proteins by ozone-flotation, *Separation and Purification Technology* (2018), doi: https://doi.org/10.1016/j.seppur.2018.10.005

The effect of bubble size distribution on the release of microalgae proteins by ozone-flotation

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Abstract

Interest in sustainable energy production is one of the most important resources in the development of technologies, and one of the promising sources is the use of microalgae as a raw material. These are obtained in nature, do not need good conditions to develop, occupy a small area for growth and replace the use of food products for the production of biofuel. However, one of the biggest hurdle is the biomass harvest and one of the innovative techniques being proposed is ozone-flotation. Flotation processes are influenced by the physical characteristics of bubbles and particles, and therefore it is necessary to investigate the size distribution of generated bubbles, their action in microalgal cells and the oxidation and release of proteins that act as biosurfactants. In this work the effect-of ozone bubble size in a three-phase system (ozone – wastewater - microalgae) and size of microalgal particles separated by ozone-flotation were evaluated. Three ozone flows were used (0.2, 0.6 and 1 L/min). Best results were obtained with a flow of 0.6 L/min achieving 88.5% efficiency, increased biomass oxidation, destabilization of microalgal cells (zeta potential 3.17 mV), highest protein release (46.7 mg/L) and, a demonstrated efficiency of proteins in reducing bubble coalescence. Regarding the latter, no differences in size or distribution of the ozone bubbles were obtained between the 3 evaluated heights of the column (bottom, middle and top). At this flow the mean bubble diameters were maintained at 1910, 2028 and 2071 μm for bottom, middle and top, respectively, with approximately 50% of the bubbles concentrated up to 2000 μm. In addition, due to the higher action of ozone with microalgal cells, smaller particle sizes in the column were found due to the oxidizing action of ozone.

Keywords: *Scenedesmus* sp.; Wastewater; Biosurfactant; Ozone bubble size; Digital image analysis.

Introduction

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