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[15563758 - International Journal of Food Engineering] Safe and Complete Extraction of Astaxanthi... 1 / 16

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International Journal of Food Engineering. 2019; 20190128

Muhammad Irshad^{1,2} / Min Eui Hong³ / Aye Aye Myint⁴ / Jaehoon Kim⁵ / Sang Jun Sim³

Safe and Complete Extraction of Astaxanthin from *Haematococcus pluvialis* by Efficient Mechanical Disruption of Cyst Cell Wall

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Abstract:

Haematococcus pluvialis (*H. pluvialis*) can naturally accumulate high amounts of astaxanthin – a powerful antioxidant. However, complete recovery of astaxanthin from the cysts of *H. pluvialis* is challenging because of the presence of a robust acetolysis resistant cell wall. Herein, a simple and effective planetary ball-milling pretreatment was developed to rupture the cells to attain an almost complete recovery of astaxanthin from *H. pluvialis*, using a supercritical CO₂ and conventional organic solvent-based extraction. An optimized pretreatment using planetary ball mill under very mild conditions (150 rpm, 60 min) allowed the recovery of 31.4 mg/g dry weight of astaxanthin from *H. pluvialis*, while slightly harsh milling (500 rpm) was found to be detrimental toward astaxanthin. The extracts in acetone exhibited higher antioxidant activity in 1-diphenyl-2-picrylhydrazyl assay than those in dichloromethane. These mild conditions were safe and highly effective for the complete extraction of astaxanthin along with the others extractables. This study opens a new avenue for the efficient recovery of valuable thermolabile ketocarotenoid species from microalgae, which can be applied to the development of economically viable biorefineries.

Keywords: Haematococcus pluvialis, cell wall disruption, astaxanthin, fatty acids, extraction

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