VERSITA

Chemical Papers 68 (2) 203–209 (2014)
DOI: 10.2478/s11696-013-0430-9

ORIGINAL PAPER

Chemical composition and antioxidant activity of sulphated polysaccharides extracted from *Fucus vesiculosus* using different hydrothermal processes

[a]Rosa M. Rodriguez-Jasso, [a]Solange I. Mussatto*, [b]Lorenzo Pastrana, [c]Cristóbal N. Aguilar, [a]José A. Teixeira

[a]*Institute for Biotechnology and Bioengineering (IBB), Centre of Biological Engineering, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal*

[b]*Department of Analytical and Food Chemistry, Food Science and Technology Faculty, University of Vigo, Ourense Campus, 32004 Ourense, Spain*

[c]*Food Research Department, School of Chemistry, Universidad Autónoma de Coahuila, Unidad Saltillo, Saltillo, 25001 Coahuila, Mexico*

Received 7 February 2013; Revised 16 April 2013; Accepted 27 April 2013

Sulphated polysaccharides (SP) were extracted from *Fucus vesiculosus* seaweed by using two different hydrothermal processes: microwave-assisted extraction (MAE) and autohydrolysis (AH). The extraction yields, chemical composition, and antioxidant activity of the polysaccharides extracted were determined and compared. Although both processes afforded SP with similar yields (18.2 mass % and 16.5 mass %, for MAE and AH, respectively) and L-fucose as the main monosaccharide, the heterogeneous structure of the polysaccharide recovered was significantly affected by the AH process. The SP obtained by MAE contained 53.8 mole % of fucose, 35.3 mole % of xylose, and 10.8 mole % of galactose; while the SP obtained by AH was composed of 76.8 mole % of fucose and 23.2 mole % of galactose. Both samples presented comparable values of antioxidant activity by the di(phenyl)-(2,4,6-trinitrophenyl)iminoazanium (2,2-diphenyl-1-picrylhydrazyl, DPPH), 2,2′-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) (ABTS), and lipid oxidation inhibition methods, but the polysaccharide obtained by AH exhibited a higher antioxidant potential by the differential pulse voltammetry technique. This study demonstrates that the chemical composition and antioxidant activity of SP obtained from *F. vesiculosus* vary according to the process used for their extraction. However, the SP obtained by MAE or AH both have the potential for use as natural antioxidants in industrial applications.

Keywords: antioxidant activity, autohydrolysis, fucan, *Fucus vesiculosus*, microwave-assisted extraction, sulphated polysaccharides

Introduction

Oxidative stress induced by oxygen radicals is regarded as a primary factor in various degenerative and chronic diseases including alcoholic liver disease, ageing, and diabetes. Reactive oxygen species (ROS), such as the superoxide anion-radical ($O_2^{\bullet -}$), hydroxyl radicals ($OH^{\bullet}$), and other non-radicals oxygen derivatives such as hydrogen peroxide (H_2O_2) are constantly generated by normal metabolic processes as part of controlled inflammatory reactions, and as a result of exposure to environmental factors (Halliwell, 2012). The excessive production of ROS may result in oxidative damage to many large biomolecules, such as

*Corresponding author, e-mail: solange@deb.uminho.pt, solangemussatto@hotmail.com