

Hydrothermal fractionation of *Gelidium sesquipedale* alga residue by subcritical water extraction

Esther Trigueros*, Patricia Alonso-Riaño, María Teresa Sanz, Sagrario Beltrán, Cipriano Ramos Rodríguez, Óscar Benito-Román

University of Burgos, *Biotechnology and Food Science Dept. Chemical Engineering Division*
 Pza. Misael Bañuelos s/n 09001 Burgos (Spain)

*Corresponding author: etrigueros@ubu.es

Introduction

Gelidium sesquipedale residue after industrial agar extraction is a very valuable by-product because of its carbohydrate, protein and bioactive compounds content. Subcritical water (SW) extraction was carried out by using different solvent flow rates (4, 6 and 8ml/min) to study the effect of residence time (RT = 6.0, 4.2 and 3.0 minutes, respectively) on sugars hydrolysis and fractionation at 185°C.

Results and discussion

Macroalga residue after industrial agar extraction presents an important fraction of carbohydrate composed by glucans (23.4%), galactans (10.9%) and arabinans (2.9%).

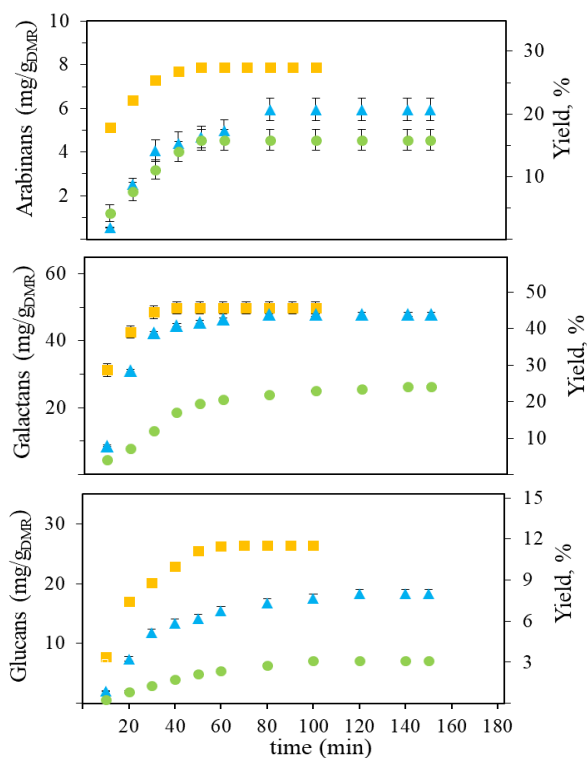


Figure 1. Sugars curves extraction (mg/g of dried macroalga residue) and yield (%) obtained by SW extraction at 185°C and different residence times: 3.0 min (■), 4.2 min (▲), 6.0 min (●).

Accumulated hydrolysis curves for arabinans, galactans and glucans by using SW are shown in Figure 1.

No monomers were observed under work conditions in subcritical water extracts so that carbohydrate fraction was recovered as sugar oligomers.

Sugars extraction curves show how the lower the residence time, the higher extraction yields for all components. Moreover, a preferential hydrolysis was observed for galactans, followed by arabinans and glucans that showed the lowest yield.

As has been seen, increasing and faster extraction has been found at increasing flow rate due to promotion of mass transfer of the solutes from by-product matrix¹, that is translated into a greater compounds extraction. Similar results were found in literature about residence time effect on bioactive compounds extraction^{2,3}.

Conclusions

SWE constitutes an interesting technique for sugars recovery, promoting a better use of the alga residue generated in the food industry without using organic solvents in compare to conventional treatments. Low residence times led to higher sugars recovery by SW treatment.

Acknowledgements

To JCYL and ERDF for financial support of projects BU301P18, BU050P20 and O. Benito-Román's post-doctoral contract. To Agencia Estatal de Investigación for project funding PID2019-104950RB-I00/AEI/10.13039/501100011033. To the company Hiperbaric through project BIOLIGNO (10/16/BU/0017), funded by ERDF and JCYL through ICE. To JCYL and ESF for E. Trigueros and P. Alonso-Riaño predoctoral contracts.

References

1. Wiboonsirikul J., Adachi S., *Food Sci. Technol. Res.* **2008**, 14 (4), 319 – 328.
2. Eikani M.H., Golmohammad F., Mirza M., Rowshanzamir S., *Journal of Food Process Engineering* **2007**, 30, 255–266.
3. Liu J., Sandahl M., Sjöberg J.R., Turner C., *Anal. Bioanal. Chem.* **2014**, 406, 441–445.