

Accepted Manuscript

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PII: S0896-8446(17)30337-6
DOI: <http://dx.doi.org/doi:10.1016/j.supflu.2017.07.033>
Reference: SUPFLU 4000

To appear in: *J. of Supercritical Fluids*

Received date: 11-5-2017
Revised date: 28-7-2017
Accepted date: 28-7-2017

Please cite this article as: Eduardo Pérez, Christopher O.Tuck, Martyn Poliakoff, Valorisation of lignin by depolymerisation and fractionation using supercritical fluids and conventional solvents, The Journal of Supercritical Fluids <http://dx.doi.org/10.1016/j.supflu.2017.07.033>

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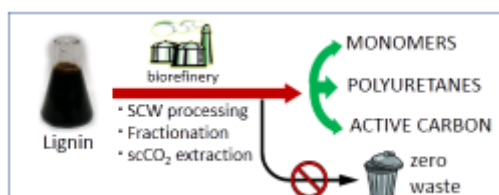
Valorisation of lignin by depolymerisation and fractionation using supercritical fluids and conventional solvents

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Graphical abstract



Highlights

- Lignin is rapidly depolymerized by supercritical water oxidation
- Lignin is valorised into different fractions that have potential applications
- Analytical techniques are proposed to characterize the fractions

Abstract

A procedure for Lignosulphonate valorisation is investigated. An attempt has been made to obtain diverse value-added products maximizing the atom economy. This procedure is carried in sequential steps starting with an oxidative depolymerization in supercritical water. Next, the reaction mixture is fractionated according to its solubility in water and in ethyl acetate. Several analytical methods - CHN elemental analysis, aqueous GPC and ³¹P-NMR - were used to determine the composition of these fractions and to assess their suitability for different applications. Water-insoluble fractions were converted to a lignin-derived hydrochar for the synthesis of active carbon of superior quality. Monomers were recovered from bio-oil fraction by supercritical carbon dioxide extraction and the remaining oil is proposed as a potential starting material for the synthesis of polyurethane foams.

Abbreviations¹

¹ GPC: Gel Permeation Chromatography

PH: Preheater

BPR: Back Pressure Regulator

LS: Lignosulphonate

Q: Quench

AcEt: Ethyl Acetate

VAN: Vanillin

GUA: Guaiacol

AcV: Acetovanillone

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