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Data Article

Biomass acid-catalyzed liquefaction – Catalysts performance and polyhydric alcohol influence

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ABSTRACT

Herein, the data acquired regarding the preliminary experiments conducted with different catalyst, as well as with two polyhydric alcohols (glycerol and 2-ethylhexanol), for the preparation biooils from cork liquefaction at 160 °C, is disclosed. This data may be helpful for those who intent to outline a liquefaction procedure avoiding, thus, high number of experiments.

Specifications Table

Subject area	*Chemistry*
More specific subject area	*Chemical Engineering*
Type of data	*figure*
How data was acquired	*Conversion yield was determined based on solid residue content*
Data format	*analyzed*
Experimental factors	*The samples were subjected to moderate temperatures in the presence of a acid catalyst and polyhydric alcohols without pre-treatment*

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Experimental features	*Thermochemical liquefaction of cork catalyzed by acids*
Data source location	*Lisbon, Portugal, GPS: 38° 44′ 10.31″N; 9° 08′ 19.66″W*
Data accessibility	*Data is provided in the article*

Value of the data

- The assembled data regards the performance of different catalyst during the liquefaction of cork.
- Comparison between a mineral, organic and a Lewis acid.
- The influence of two different *polyhydric alcohols* was screened.

1. Experimental design, materials and methods

1.1. Materials and chemicals

Cork Supply SA kindly supplied Cork powder. The reagents used were chemical grade and purchased from Sigma-Aldrich.

1.2. Liquefaction procedure

The adopted procedure for the liquefaction of cork was as described by Mateus et al. [1]: the reaction vessels were loaded with a mixture of solvents with a ratio of 1/2 w/w of polyhydric alcohol (glycerol or 2-ethylhexanol) and diethylene glycol (DEG) ratio, containing a 3% or 1.5% of catalyst [sulfuric acid (H_2SO_4), p-Toluenesulfonic acid (*p*-TsOH) and Praseodymium(III) trifluoromethanesulfonate ($Pr(OTf)_3$)] 10% w/w of cork powder. The reaction mixture was heated and the temperature controlled at 160 °C.

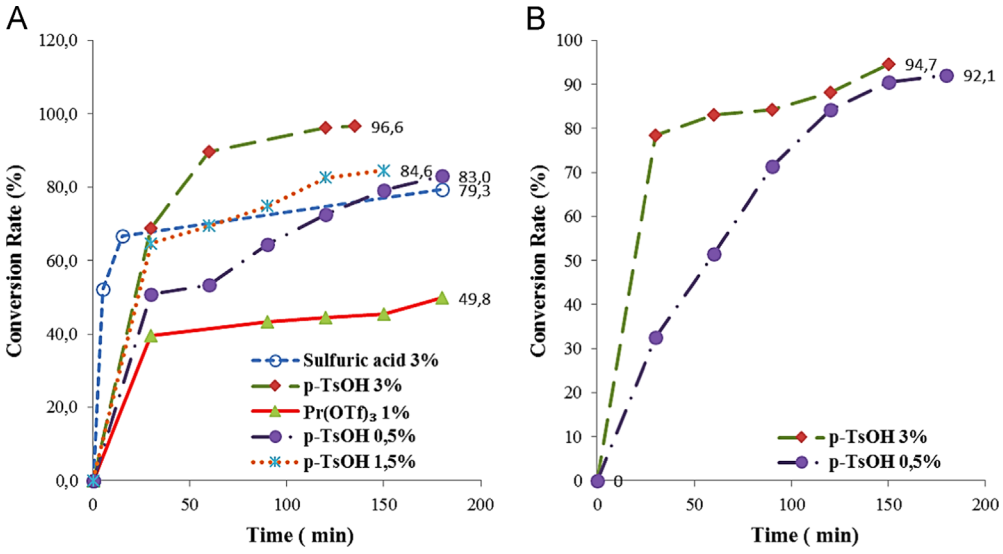

Fig. 1. Liquefaction of cork at 160 °C in: (A) glycerol/DEG and (B) 2-ethylhexanol/DEG.

The reaction was stopped when the conversion was higher than 95%. Afterwards the vessels were allowed to cool to room temperature. During the liquefaction process, samples were regularly retrieved to evaluate the liquefaction yield.

1.3. Measurement of liquefaction extent

The conversion was gravimetrically evaluated based on the residue content (unreacted raw material). A sample of the reaction mixture was diluted with acetone and filtered Afterwards the residual solid was washed with acetone and then dried in an oven set to 120 °C until constant weight. The liquefaction yield was calculated by the following equation:

$$\text{Liquefaction yield } (\%) = \left(1 - \frac{M_2 \times M_m}{M_S \times M_1}\right) \times 100 \quad (1)$$

where M_1 is the initial mass of cork, M_2 the mass of the residue obtained, M_s the weight of the sample withdrawn and the M_m is the initial mass of the reaction mixture.

2. Data analysis

The data acquired is analyzed and plotted in Fig. 1.

Acknowledgements

CorkSupply is acknowledged for supplying cork powder.

Reference

[1] M.M. Mateus, N.F. Acero, J.C. Bordado, R.Gd Santos, Sonication as a foremost tool to improve cork liquefaction, J. Ind. Crop. Prod. 74 (2015) 9–13.