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Short Communication

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Julian Velez, Mark C. Thies

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## Solvated Liquid-Lignin Fractions from a Kraft Black Liquor

Julian Velez and Mark C. Thies\*, *Department of Chemical and Biomolecular Engineering, Clemson University, Clemson, SC, USA 29634-0909.*

\* Corresponding author. Tel: +1 864 656 5424; fax: +1 864 656 0784

E-mail address: mcths@clemson.edu (Mark C. Thies)

**Abstract.** A softwood Kraft black liquor was acidified with carbon dioxide at 115 °C and 6.2 bar over a pH range of 13.6–9.5, resulting in the precipitation of liquefied-lignin fractions as a separate phase. Seven such “liquid-lignin” fractions were produced, with each fraction being phase-separated within a narrow pH band of 0.5 units. The fractions were found to be highly hydrated phases, containing 32.3–48.2 wt % water; as a result, their measured melting points were quite low, 92.4–112.2 °C. In contrast, no melting point was detected up to 375 °C for any of the lignin fractions after drying. Significant reductions in metals content were observed for the lignin fractions compared to the original black-liquor feed.

**Keywords:** lignin, hydration, fractionation, precipitation, CO<sub>2</sub> acidification.

### 1. Introduction

Lignin separated from Kraft black liquor has the potential to become an inexpensive and renewable platform for the production of aromatic chemicals, bio-based materials, and clean biofuels (Doherty et al., 2011; Holladay et al., 2007). However, the heterogeneity of lignin presents a challenge for obtaining a more fundamental understanding of the chemical structure of this material. The fractionation of lignin has two potential benefits: (i) chemical structure-vs.-bulk property relationships can be obtained, and (ii) the fractions themselves can have properties useful for various applications (Doherty et al., 2011; Holladay et al., 2007).

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