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**Impact of ultrasounds and high voltage electrical discharges on physico-chemical properties of rapeseed straw's lignin and pulps**

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**Abstract**

In this study, ultrasound (US) and high voltage electrical discharges (HVED) were combined with chemical treatments (soda or organosolv) for rapeseed straw delignification. Delignification was improved by both physical pretreatments. US increased the extractability of hemicelluloses and HVED induced a partial degradation of cellulose. Best synergies were observed for HVED-soda and US-organosolv treatments. The obtained lignin fractions were characterized with <sup>13</sup>C-NMR and 2D <sup>1</sup>H-<sup>13</sup>C HSQC. It was observed that the physical treatments affected the syringyl/guaiacyl (S/G) ratios. The values of S/G were ≈ 1.19, 1.31 and 1.75 for organosolv, HVED-organosolv and US-organosolv processes, suggesting recondensation reactions. The lignin fractions obtained from HVED-organosolv treatment contained less quantity of p-coumaric acid and ferulic acid as compared to those extracted by US-organosolv. Thermogravimetric analysis (TGA) revealed a better heat resistance of physically extracted lignins as compared to the control. The enzymatic digestibility increased by 24.92 % when applying HVED to mild organosolv treatment.

**Keywords:** ultrasound, high voltage electrical discharges, soda, organosolv, delignification

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