Characterization of hydrochar prepared from hydrothermal carbonization of peels of *Carya cathayensis sarg*

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**ABSTRACT**

Hydrothermal carbonization of peels of *Carya cathayensis sarg* (PCCS) by subcritical water or acetone- and ethanol-modified subcritical water was carried out at the temperature from 280 to 360°C and coal-like hydrochar was obtained. The hydrochar yield decreased with increasing of treatment temperature, but the higher heating value (HHV) and carbon content of hydrochar were promoted at higher treatment temperature. The HHV of hydrochar was in range of 30–46 MJ/kg with an increase from 52.4 to 127.6%, compared to the original PCCS. The HHVs of hydrochars obtained at 360°C could be comparable with those of heavy fuel oil (42.9 MJ/kg) and diesel oil (45.7 MJ/kg). The O/C and H/C values of hydrochar were similar to those of lignite and subbituminous, except the ash content. Especially, the O/C and H/C values of hydrochars prepared at 360°C could be compatible with those of bituminous. When treated with acetone- or ethanol-modified subcritical water, a synergistic effect of acetone–water or ethanol–water for hydrothermal carbonization was observed; the liquefaction rate with acetone–water or ethanol–water mixture was larger than that of water or acetone or ethanol only. There was no significant change on the O/C and H/C values and HHV on the hydrochar, although more PCCS, was decomposed when using acetone–water or ethanol–water mixture.

**Keywords:** Hydrothermal carbonization; Organic solvent-modified subcritical water; Hydrochar; Peels of *Carya cathayensis sarg* (PCCS)

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