

Supporting Information

Utilization of organosolv waste waters as liquid phase for hydrothermal carbonization of chaff

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The higher heating values (HHV) of solid materials were calculated according to Channiwala *et al.* via the following formula,

$$HHV \text{ [MJ kg}^{-1}\text{]} = 0.3491 * C + 1.178 * H - 0.1034 * O - 0.0151 * N - 0.0211 * \text{ash}$$

where inorganic constituents (ash residue) are considered in the balance via burning to 900°C. C, H, N are the weight percentages of these elements in the solid materials obtained by elemental analysis and O by calculations of the difference to 100%.

HHV improvements were calculated via:

$$HHV \text{ improvement [\%]} = \frac{HHV_{\text{hydrochar}} - HHV_{\text{feedstock}}}{HHV_{\text{feedstock}}} * 100\%$$

The energy densification via:

$$Energy \text{ densification [\%]} = \frac{HHV_{\text{hydrochar}}}{HHV_{\text{feedstock}}} * 100\%$$

The mass yield on a dry solid mass basis via:

$$Mass \text{ yield [\%]} = \frac{mass_{\text{recovered solids}}}{mass_{\text{solid feedstock}}} * 100\%$$

The energy yield on a dry solid mass basis via:

$$Energy \text{ yield [\%]} = \frac{mass_{\text{recovered solids}}}{mass_{\text{solid feedstock}}} * HHV \text{ improvement}$$

References

Channiwala, S. A.; Parikh, P. P. A unified correlation for estimating HHV of solid, liquid and gaseous fuels. *Fuel* **2002**, 84, 1051-1063.