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Xiuzheng Zhuang, Hao Zhan, Yanqin Huang, Yanpei Song, Xiuli Yin, Chuangzhi Wu

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Denitrification and desulphurization of industrial biowastes via hydrothermal modification

Xiuzheng Zhuang[a,b,c,d], *Hao Zhan*[a,b,c,d], *Yanqin Huang*[a,b,c], *Yanpei Song*[a,b,c,d], *Xiuli Yin*[a,b,c,*], *Chuangzhi Wu*[a,b,c]

[a]Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, China

[b]CAS Key Laboratory of Renewable Energy, China

[c]Guangdong Provincial Key Laboratory of New and Renewable Energy Research and Development, China

[d]University of Chinese Academy of Sciences, Beijing 10049, China

Abstract

In attempt to decrease NO_X and SO_2 emission from thermochemical utilization, three industrial biowastes (penicillin mycelia waste, sewage sludge and peat waste) contained high nitrogen (N) and sulfur (S) were chosen to investigate the denitrification and desulphurization of hydrothermal modification. The results demonstrated that hydrothermal modification destroyed the structure of N- and S-containing components, thereby altering their existed conformations. Inorganic-N (N-IN) and most of amino-N/polyamide-N (N-A) were enriched by liquid phase in the forms of NH_4^+-N and soluble organic-N (Org-N), respectively; subsequently, Org-N could further decompose to NH_4^+-N at higher temperature. Residual N in hydrochars was converted from N-A to heterocyclic-N (pyrrolic-N, pyridinic-N and quaternary-N) via hydrolysis and cyclization. Similarly, over 60% of S was remove form biowastes at 240℃. In solid phase, part of organic-S was altered to thiophenes-S after modified, while the remainder was transformed to inorganic-S; but the variation of inorganic-S in hydrochars strongly affected by its specific species.

*Corresponding author at: Laboratory of Biomass Thermo-chemical Conversion, Guangzhou Institute of Energy Conversion, Guangzhou 510650, China.
E-mail address: xlyin@ms.giec.ac.cn (X. Yin).