

Accepted Manuscript

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PII: S0960-8524(18)30075-0
DOI: <https://doi.org/10.1016/j.biortech.2018.01.061>
Reference: BITE 19418

To appear in: *Bioresource Technology*

Received Date: 2 November 2017
Revised Date: 10 January 2018
Accepted Date: 11 January 2018

Please cite this article as: Zhuang, X., Zhan, H., Huang, Y., Song, Y., Yin, X., Wu, C., Denitrification and desulphurization of industrial biowastes via hydrothermal modification, *Bioresource Technology* (2018), doi: <https://doi.org/10.1016/j.biortech.2018.01.061>

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Denitrification and desulphurization of industrial biowastes via hydrothermal modification

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Abstract

In attempt to decrease NO_x and SO₂ 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 NH₄⁺-N and soluble organic-N (Org-N), respectively; subsequently, Org-N could further decompose to NH₄⁺-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 removed from biowastes at 240 °C. 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.

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