

## Accepted Manuscript

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PII: S0960-8524(18)31329-4  
DOI: <https://doi.org/10.1016/j.biortech.2018.09.076>  
Reference: BITE 20492

To appear in: *Bioresource Technology*

Received Date: 13 August 2018  
Revised Date: 13 September 2018  
Accepted Date: 14 September 2018

Please cite this article as: Wu, Z., Li, Y., Zhang, B., Yang, W., Yang, B., Co-pyrolysis behavior of microalgae biomass and low-rank coal: kinetic analysis of the main volatile products, *Bioresource Technology* (2018), doi: <https://doi.org/10.1016/j.biortech.2018.09.076>

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# Co-pyrolysis behavior of microalgae biomass and low-rank coal: kinetic analysis of the main volatile products

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## Abstract

This work studied the kinetic characteristics of volatile products from co-pyrolysis of microalgae and low-rank coal. Iso-conversional method was applied to calculate the reaction order, activation energy and pre-exponential factor of gaseous products ( $H_2$ ,  $CO$ ,  $CH_4$ , and  $CO_2$ ) and benzene. The results indicated the activation energy of  $H_2$  generating from both individual and mixing samples was the highest, meaning  $H_2$  was the hardest to generate during the pyrolysis process. The values of activation energy from the formation of  $CO$  and benzene from low-rank coal and green algae were 31.11, 32.44, 18.21 and 24.31  $\text{kJ}\cdot\text{mol}^{-1}$ , respectively. The formation of benzene and  $CO$  were easier than other volatile products due to the lower activation energy. Synergistic effects were observed from the formation of  $CO_2$ , the addition of green algae decreased the activation energy. The order of the activation energy was in agreement with that of the releasing sequence of main volatile products.

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