

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JEP](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[JEP](#) > Vol.2 No.8, October 2011



Production of Safe Charcoal from Waste Construction Wood Treated With Citric Acid

PDF (Size: 2149KB) PP. 1134-1142 DOI: 10.4236/jep.2011.28132

Author(s)

Masafumi Tateda, Masaru Okura, Youngchul Kim, Bandunee C. L. Athapattu

ABSTRACT

For practical reuse of wastewater containing citric acid and the production of safe and healthy high-quality charcoal from waste construction wood, basic data regarding the influence of citric acid washing treatments on the physico-chemical property of charcoal was investigated in order to find the benefits of using citric acid for washing out impurities of the wood, owing to its chelate bonding ability with elements such as metals. Parameters obtained for evaluating the benefits were water content, volatile component content, ash content, fixed carbon content, and the heat value of the charcoal. All parameters, except ash content, throughout all carbonization temperatures were not significantly different between the charcoal of the wood treated with and without citric acid. However, the ash content showed significant differences between the charcoal treated with and without citric acid throughout all carbonization temperatures. Regarding the heat value, the highest heat value was shown on the charcoal carbonated at 600°C with the static washing treatment. Dioxins that were higher in content than the control sample were somehow detected in the ash of the charcoal with the shaking treatment. Further investigation is needed for the production of safe and healthy charcoal using waste citric acid.

KEYWORDS

Charcoal, Waste Construction Wood, Citric Acid, Metals, Ash, Dioxins

Cite this paper

M. Tateda, M. Okura, Y. Kim and B. Athapattu, "Production of Safe Charcoal from Waste Construction Wood Treated With Citric Acid," *Journal of Environmental Protection*, Vol. 2 No. 8, 2011, pp. 1134-1142. doi: 10.4236/jep.2011.28132.

References

- [1] Japan Federation Construction Contractors, "Construction Handbook," 2010, p. 24.
- [2] , "Difference between Black and White Charcoals," . <http://www.kishu-binchotan.jp/mame/page3.html>
- [3] , "Charcoal Characteristics Given by Combustion Temperature Differences," . <http://www.shiratori.com/jyuutaku/osusume/sumisetsu1.html>
- [4] M. Hisao, "Features and Characteristics of Coal, Chapter 1, Denchukun Review," Central Research Institute Electric Power Industry, No. 46, 2002. <http://criepi.denken.or.jp/research/review/No46/chap-1.pdf>
- [5] E. D. Lavric, A. A. Konnov and J. De Ruyck, "Dioxin Levels in Wood Combustion—A Review," *Biomass and Bioenergy*, Vol. 26, No. 2, 2004, pp. 115-145. doi:10.1016/S0961-9534(03)00104-1
- [6] E. D. Lavric, A. A. Konnov and J. De Ruyck, "Modeling the Formation of Precursors of Dioxins during Combustion of Woody Fuel Volatiles," *Fuel*, Vol. 84, No. 4, 2005, pp. 323-334. doi:10.1016/j.fuel.2004.09.012
- [7] B. R. Stannmore, "The Formation of Dioxins in Combustion Systems," *Combustion and Flame*, Vol. 136, No. 3, 2004, pp. 398-427. doi:10.1016/j.combustflame.2003.11.004

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JEP Subscription](#)
[Most popular papers in JEP](#)
[About JEP News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads:	301,507
Visits:	673,552

[Sponsors, Associates, and Links >>](#)

- [The International Conference on Pollution and Treatment Technology \(PTT 2013\)](#)

- [8] T. Nakao, O. Aozasa, S. Ohta and H. Miyata, " Formation of Toxic Chemicals Including Dioxin-Related Compounds by Combustion from a Small Home Waste Incinerator," *Chemosphere*, Vol. 62, No. 3, 2006, pp. 459-468. doi:10.1016/j.chemosphere.2005.04.060
- [9] N. W. Tame, B. Z. Dlugogorski and E. M. Kennedy, " Formation of Dioxins and Furans during Combustion of Treated Wood," *Progress in Energy and Combustion Science*, Vol. 33, No. 4, 2007, pp. 384-408. doi:10.1016/j.pecs.2007.01.001
- [10] D. J. Lisk, " Environmental Implications of Incineration of Municipal Solid Waste and Ash Disposal," *The Science of the Total Environment*, Vol. 74, No. 1, 1988, pp. 39-66. doi:10.1016/0048-9697(88)90128-3
- [11] F. Tsutomu, " Waste Processing and Resource Recovery Engineering," Kyoritsu Shuppan, Tokyo,