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PII: S1658-3655(16)30021-8
DOI: http://dx.doi.org/doi:10.1016/j.jtusci.2016.04.006
Reference: JTUSCI 302

To appear in:

Received date: 20-1-2016
Revised date: 16-4-2016
Accepted date: 21-4-2016

Please cite this article as: G.M.S. ElShafei, I.M.A. ElSherbiny, A.S. Darwish, C.A. Philip, Artichoke as a non-conventional precursor for activated carbon: Role of the activation process, *Journal of Taibah University for Science* (2016), http://dx.doi.org/10.1016/j.jtusci.2016.04.006

Artichoke as a non-conventional precursor for activated carbon: Role of the activation process

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ABSTRACT. Artichoke peels were used to produce activated carbon using chemical activation methods. Two activation protocols were compared: a two-step method A and a one-step method B. As newly used activating agents, KCl, $CrCl_3$ and $TiCl_4$ were compared. The results show that method B is superior to A. KOH with method B had an area of 2321 m^2/g and a total pore volume 1.0071 cm^3/g, of which 0.9794 cm^3/g was confined to micropores. The corresponding values for KCl are 1731, 0.6925 and 0.6718. $TiCl_4$ had lower but comparable values with those of KCl. $CrCl_3$ appeared to be the least successful among the three newly used activating agents. The post-activation washing step strongly affects the characteristics of the final product. The differences among the effects of Zn, Cr and Ti are discussed in terms of the differences in polarizing power.

Key Words: Artichoke, Chemical activation, $TiCl_4$, KCl, non-conventional adsorbents

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1. INTRODUCTION.

Plant-based adsorbents require a simple alkali and/or acid treatment to remove lignin before the application to increase their efficiency. Non-conventional adsorbents require less maintenance and supervision. For activated carbon (AC), the production costs can be reduced by either choosing a cheap raw material or applying a proper production method. Nevertheless, the preparation of AC with notably specific characteristics using low-cost raw materials at low temperature (less energy costs) remains challenging. The use of non-conventional wastes as sources to produce ACs may be an efficient alternative for both effective waste management practices and low-cost AC production. A revision of the literature shows that there are a