

## Preparation of Activated Carbon Fibers (ACF) Impregnated with Ionic Silver Particles from Cotton Woven Waste and Its Performance as Antibacterial Agent

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**Abstract :** In this work, the antibacterial effect of activated carbon fibers (ACF) impregnated with ionic silver particles was studied. ACF were prepared from samples of cotton woven wastes (cotton based fabrics 5x10 cm) by applying a chemical activation procedure with H<sub>3</sub>PO<sub>4</sub>. This treatment was performed using several H<sub>3</sub>PO<sub>4</sub>: Cotton based fabrics weight ratios (1:2-2:1), temperatures (600-900 °C) and activation times (0.5-2 h). The ACF obtained under the best activation conditions showed BET surface area of 1103 m<sup>2</sup>/g; this result along with iodine index demonstrated the microporous nature of the fibers herein obtained. Then, the obtained fibers were impregnated with ionic silver particles by immersion in 0.1 and 0.5 M AgNO<sub>3</sub> solutions followed by drying and thermal decomposition in order to fix the silver particles in the structure of ACF. It was determined that the presence of Ag ions lowered the BET surface area of the ACF in approximately 17 % due to the obstruction of the porosities along the carbonized structure. Finally, the antibacterial effect of the ACF impregnated with silver was studied through direct counting method for coliforms. The antibacterial activity of the impregnated fibers was demonstrated, and it was attributed to the strongly inhibition of bacteria growth because of chemical properties of the particles of silver inside the ACF. This behavior was demonstrated at concentrations of silver as low as 0.035 % w/w.

**Keywords :** activated carbon, adsorption, antibacterial activity, coliforms, surface area

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