

# Removal of naproxen sodium from solution by activated carbon

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## Abstract

In this study, activated carbon fibers were prepared from textile waste by chemical activation with  $\text{ZnCl}_2$  and KOH. Poly(ethyleneterephthalate) is to form 90 % of the textile waste. Activation temperature was selected for  $\text{ZnCl}_2$  and KOH, as  $500^\circ\text{C}$  and  $800^\circ\text{C}$ , respectively. Activated carbon samples and raw material were characterized by BET, Boehm titration, XRD, FT-IR, DTA and TGA. The ability of activated carbons, to remove naproxen sodium from effluent solutions by adsorption was studied. Results were analyzed by the Langmuir, Freundlich, Dubinin-Radushkevich (D-R), Temkin, Frumkin equations using linearized correlation coefficients at 298 K.

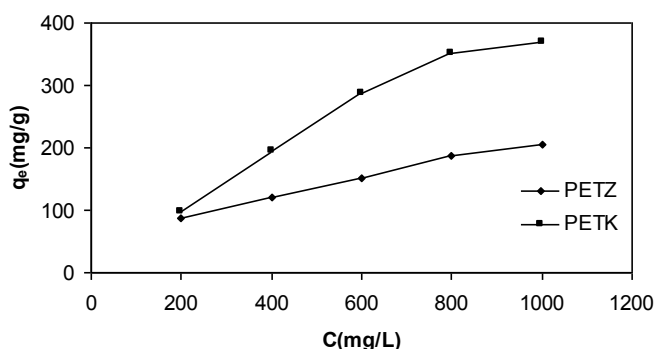
## Introduction

Evaluation of textile waste is getting increased attention in all over the world. One of the effective uses of textile waste is the production of activated carbon by chemical activation. Its high porosity makes activated carbons the most widely used material for adsorption of hazardous substances. Naproxen is a member of the arylacetic acid group of non-steroidal anti-inflammatory drugs of which naproxen sodium is one. Naproxen sodium leaves the human organism unmetabolized via urine or sludge, and can affect water quality as it has the potential to impact on drinking water supplies and health of the ecosystem [1-2].

## Experimental

Waste was mixed with KOH and  $\text{ZnCl}_2$  and the mixture was kneaded with the addition of distilled water. The mixture was subsequently dried at  $110^\circ\text{C}$  to impregnate the sample. The impregnated sample was heated at the rate of  $10^\circ\text{C}/\text{min}$  up to the activation temperature ( $800^\circ\text{C}$  for KOH,  $500^\circ\text{C}$  for  $\text{ZnCl}_2$ ) under  $\text{N}_2$  flow ( $100\text{ mL. min}^{-1}$ ) and held at the activation temperature for 1 h. Adsorption experiments were carried out by agitating 0.1 g of activated carbon with 50 mL naproxen sodium solutions of the desired concentration.

## Results and Discussion



The BET surface area of activated carbons was calculated 1775 and  $335\text{ m}^2.\text{g}^{-1}$ . The highest area was obtained from impregnation with KOH. Functional groups of activated carbons were estimated as  $5\text{ mmol.g}^{-1}$  and  $3.25\text{ mmol.g}^{-1}$  from Boehm titration. Results of adsorption experiment shown in Fig.1. The adsorption results supported to surface areas. The adsorption capacity of PETZ and PETK obtained 227 and  $442\text{ mg.g}^{-1}$  respectively from Langmuir

isotherm. Activation energy values from D-R equation was calculated 13.6 and  $13.8\text{ kJ.mol}^{-1}$ .

## REFERENCE

1. M.Carballa, F. Omil, J. Lema, et. al., Water Research. 38(2004)2918–2926.
2. Y. Önal, C.Akmil-Başar, Ç. Sarıcı-Özdemir J. Hazard. Mater. 148(2007) 727–734.