

Supplementary Materials

# Sorption of Halogenated Anti-inflammatory Pharmaceuticals from Polluted Aqueous Streams on Activated Carbon: Lifetime Extension of Sorbent Caused by Benzalkonium Chloride Action

Barbora Kamenická <sup>1</sup>, Tomáš Weidlich <sup>1\*</sup>, Miloslav Pouzar <sup>1</sup>,

<sup>1</sup> Chemical Technology Group, Institute of Environmental and Chemical Engineering, Faculty of Chemical Technology, University of Pardubice, Studentská 573, 532 10 Pardubice, Czech Republic.

\* Correspondence: tomas.weidlich@upce.cz; Tel.: +420-46-603-8049

Academic Editor: name

Received: ..... 2023; Accepted: ... 2023; Published: .....2023

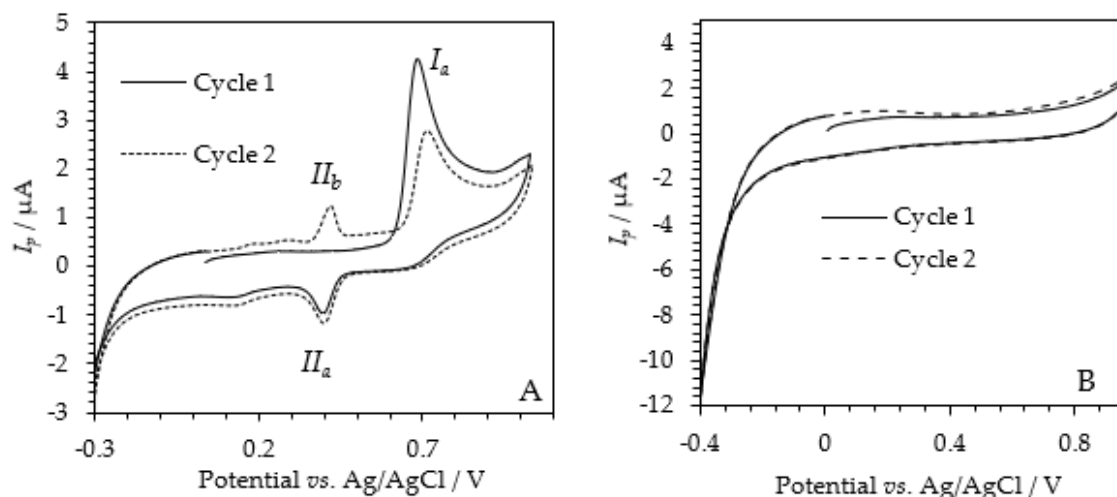
Number of Pages: 8

Number of Tables: 0

Number of Schemes: 1

Number of Figures: 8

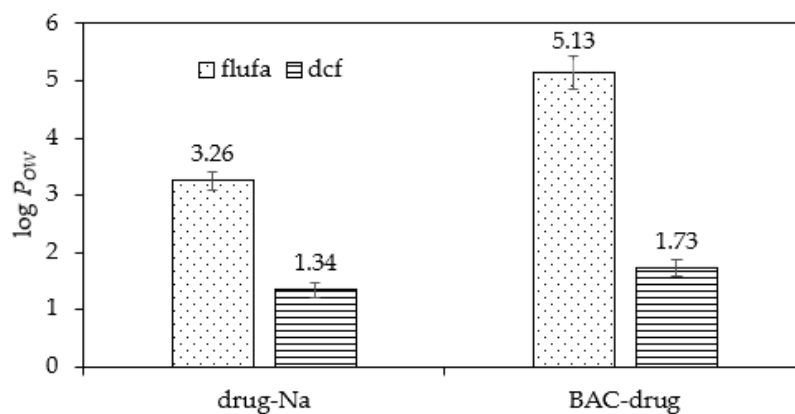
## Supplementary Materials



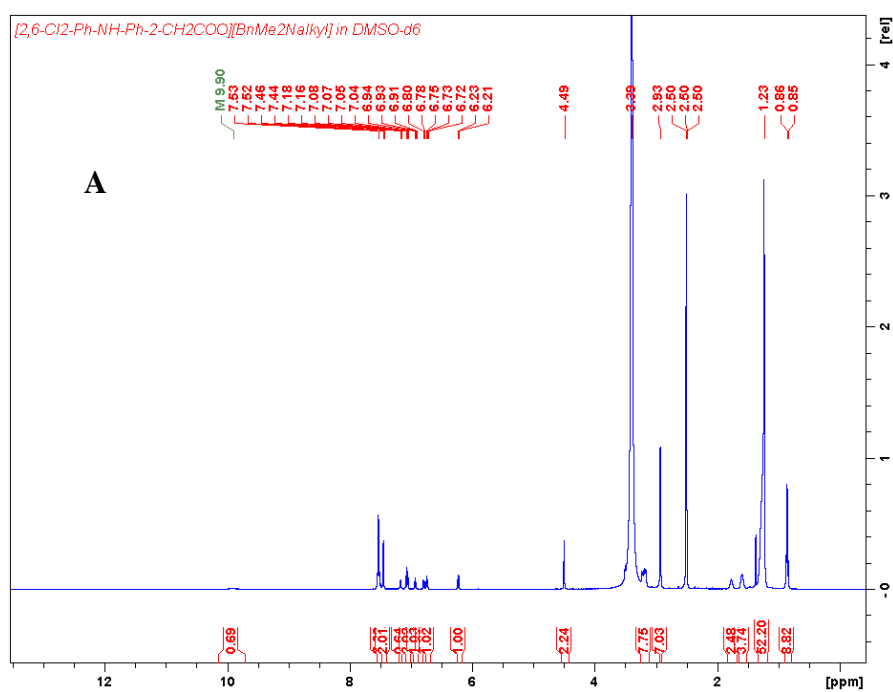
**Figure S1.** A CV-voltammogram of *flufa* (A) and CV-voltammogram of sample after leaching of spent-GAC in water (B).

(Exp. conditions: bare CPE, 0.1 mmol L<sup>-1</sup> PBS, pH = 7; CV: scan rate 100 mV s<sup>-1</sup>, 2 anodic-cathodic cycles,  $c_{flufa} = 50 \mu\text{mol L}^{-1}$  and dilution factor of leaching sample 10)

Note: Cyclic Voltammetry (CV) voltammogram (A) shows the electrochemical oxidation of *flufa* (process  $I_a$ ) at +0.71 V vs. ref. at CPE according to the *flufa* oxidation mechanism [56]. On the backward potential scan, a cathodic process ( $II_a$ ) is observed, forming a reversible pair with the anodic process ( $II_b$ ) that appears on the second oxidation scan, for proposed mechanism see ref. [56]. CV-voltammogram (B) shows that leaching sample of spent-GAC provide no signal in voltammogram at the *flufa* determination conditions.



**Figure S2.** A partition coefficients octan-1-ol/water of sodium salts of *flufa* and *dcf* (drug-Na) and corresponding ion pairs (BAC-drug).



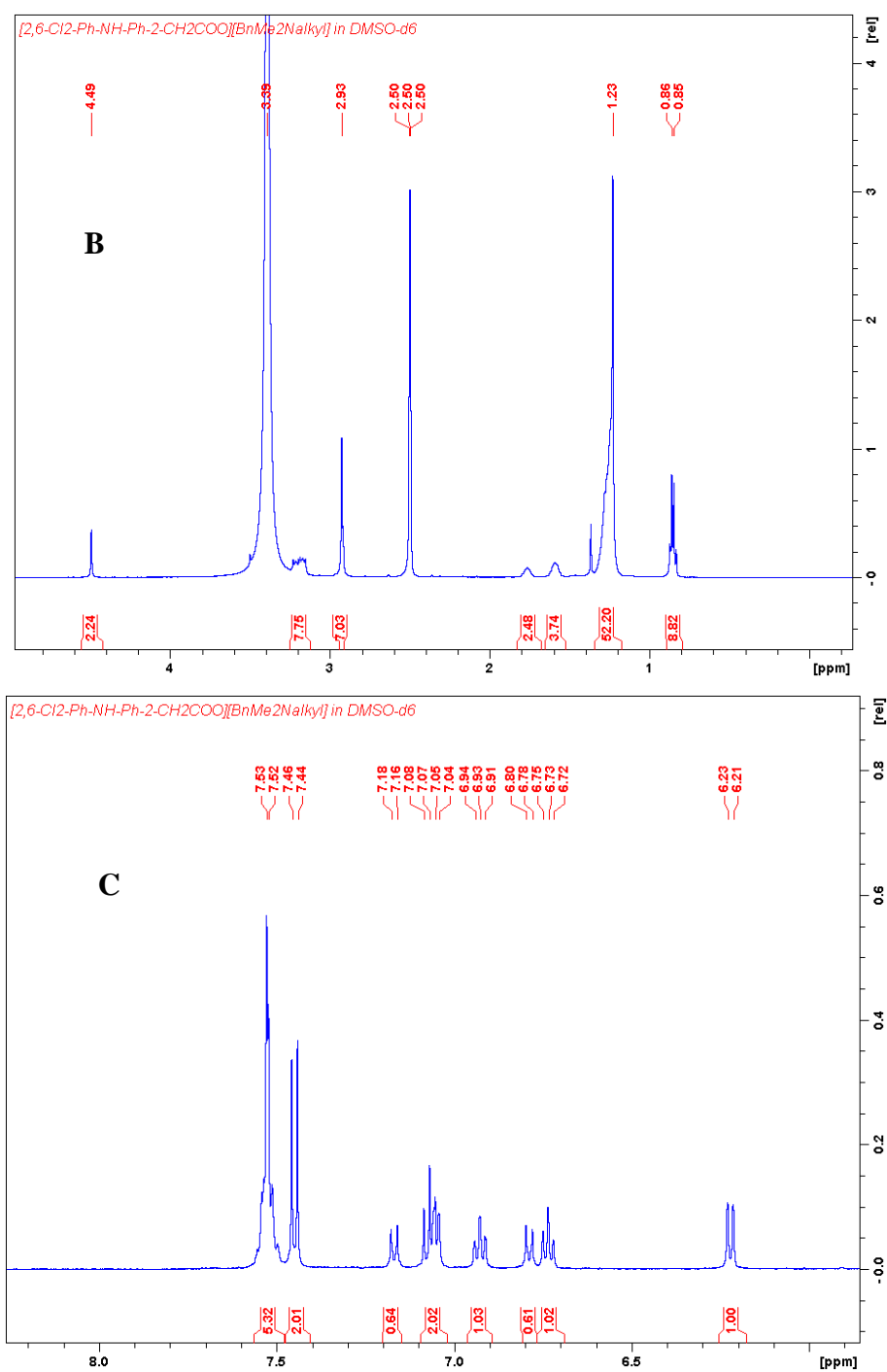
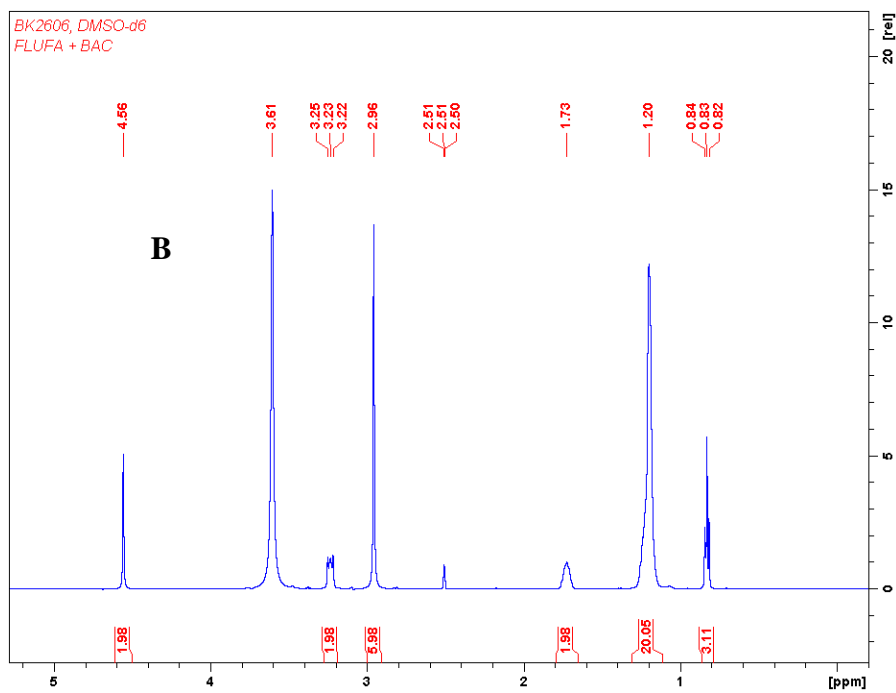
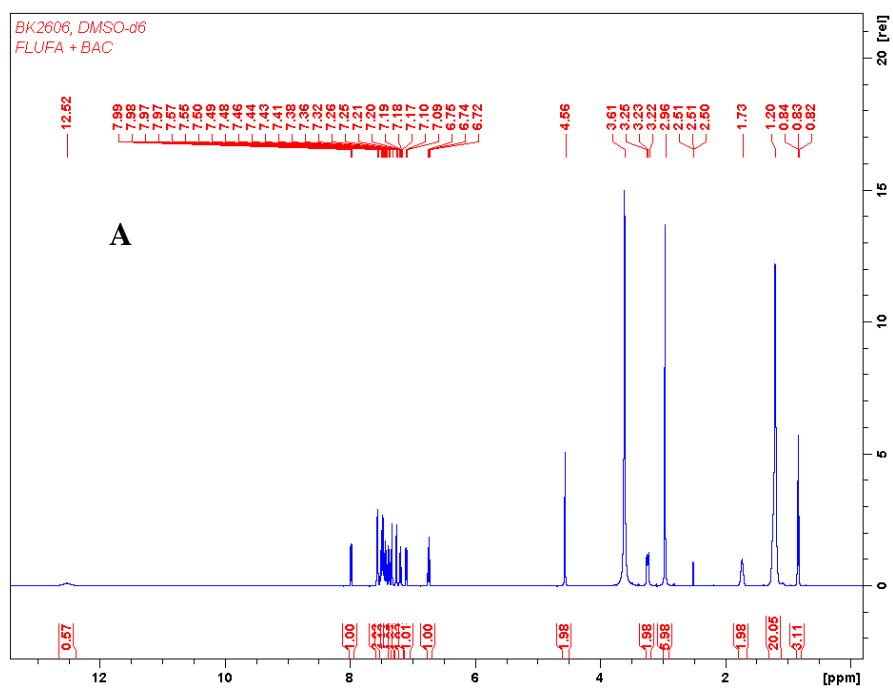
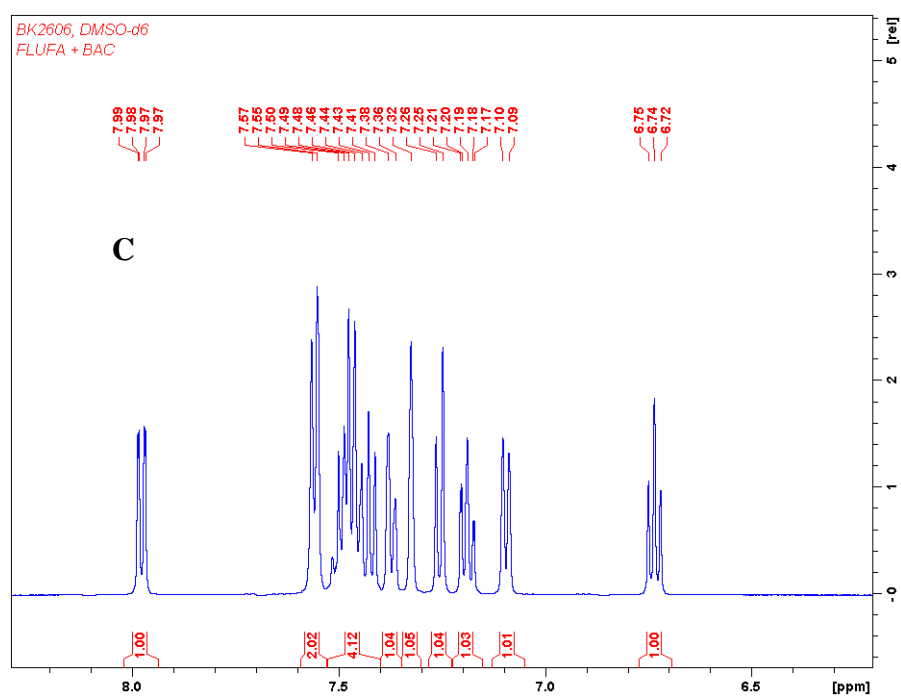
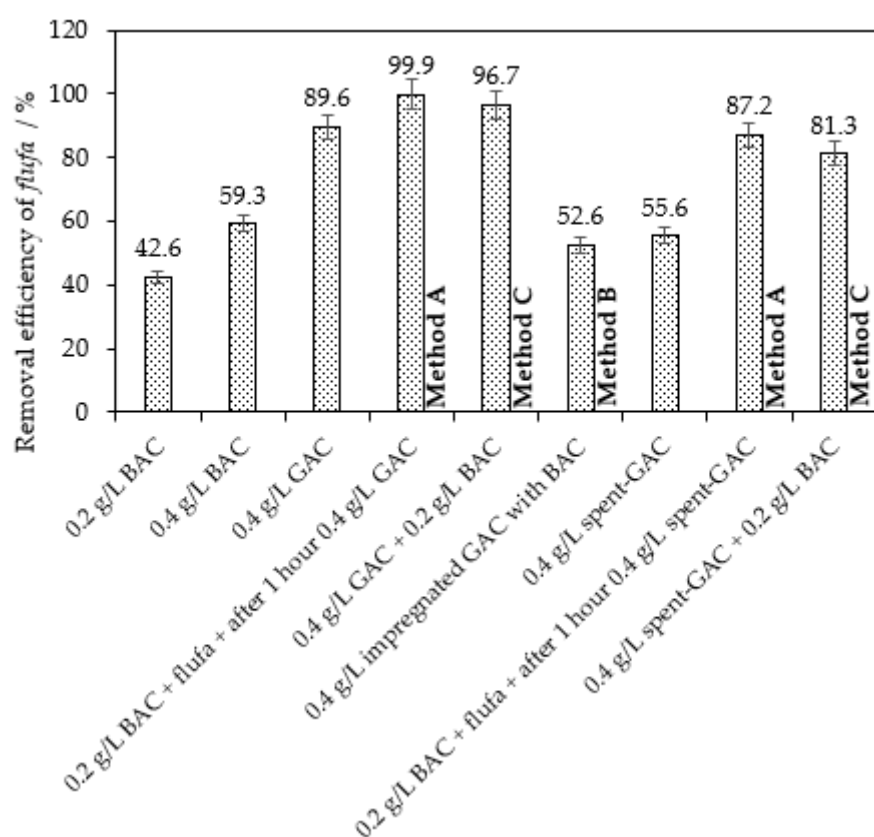


Figure S3. <sup>1</sup>H NMR (A-C) spectra of isolated ion-pair BAC-dcf.

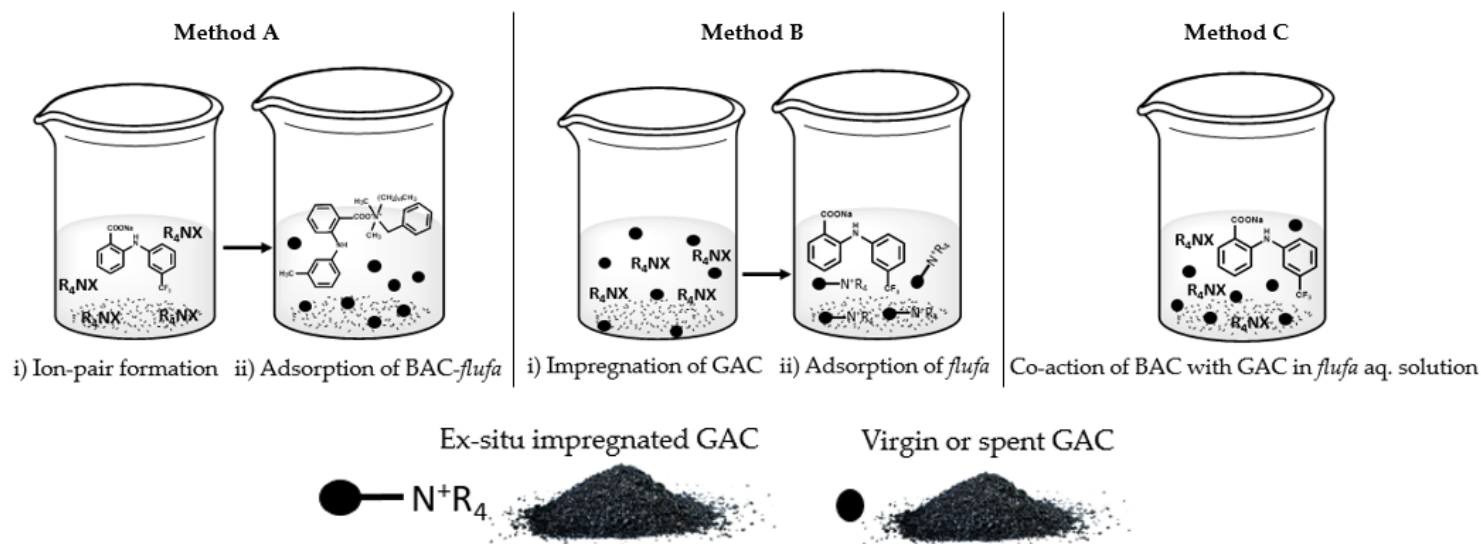




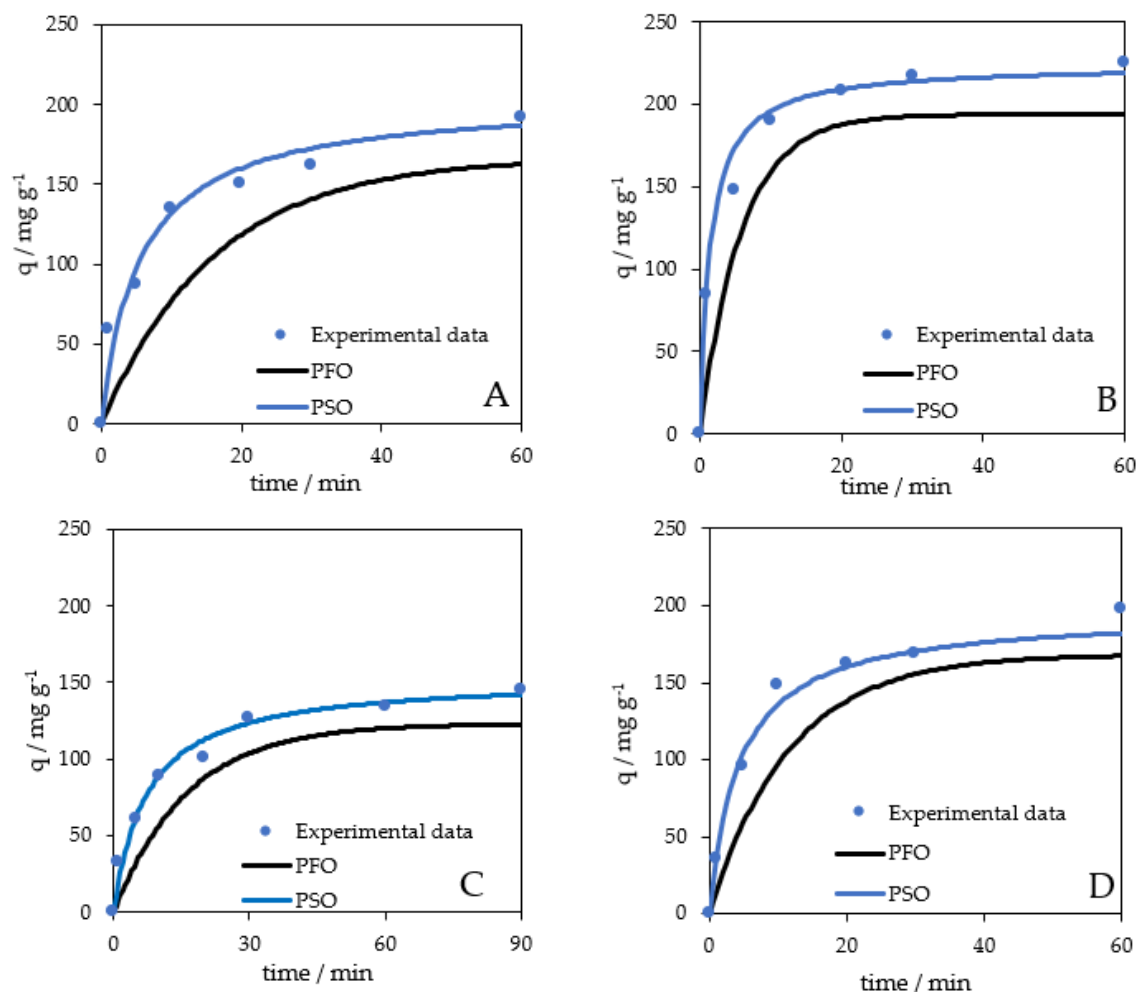
**Figure S4.** <sup>1</sup>H NMR (A-C) spectra of isolated ion-pair BAC-*fluflu*.



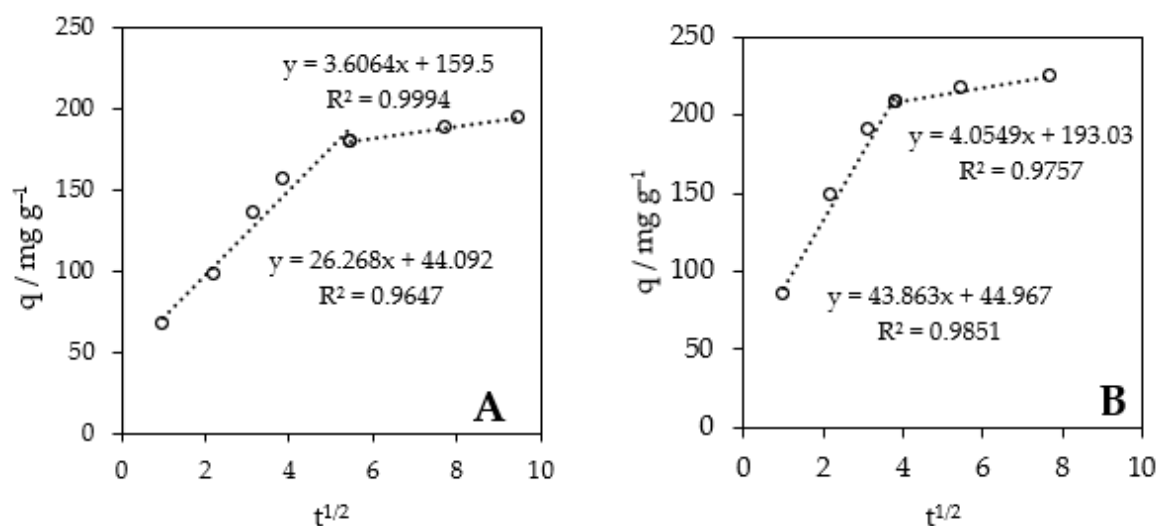
**Figure S5-A.** Effect of the modification mechanism on separation of flufen ( $c_0 = 100 \text{ mg L}^{-1}$ ) after 20 hours of action.



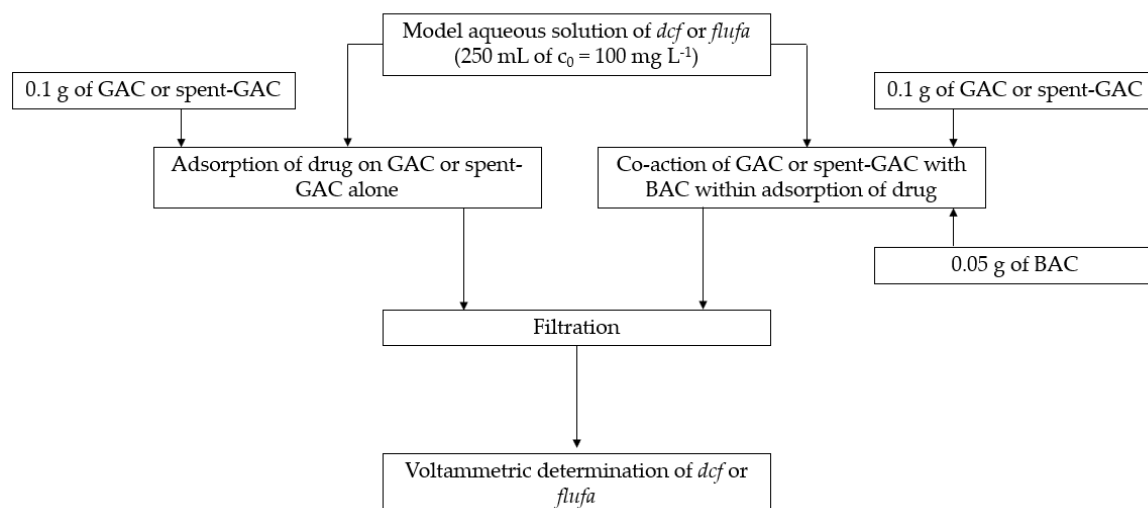
**Figure S5-B.** Graphical presentation of impregnation/modification methods of GAC using BAC within flufen adsorption.



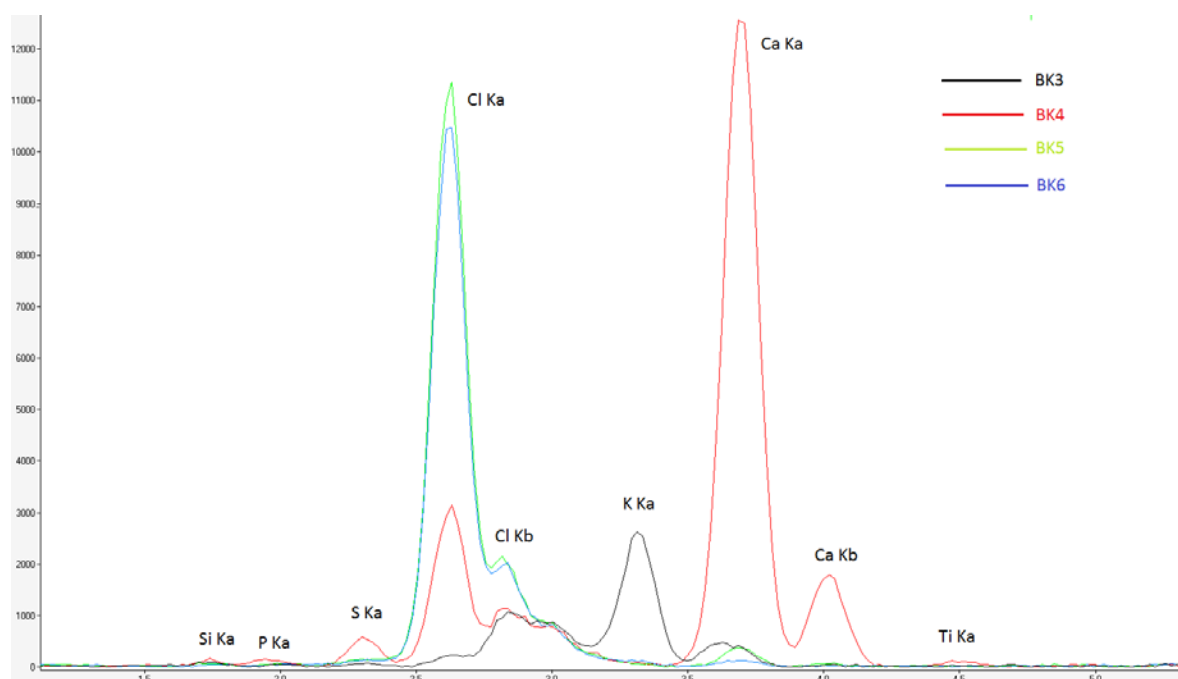
**Figure S6.** A fitting of experimental data with PFO and PSO models for GAC (A), GAC+BAC (B), spent-GAC (C) and spent-GAC+BAC (D) within *flufa* adsorption.



**Figure S7.** Linear plots of interparticle diffusion model for adsorption of *flufa* on (A) GAC and (B) GAC+BAC.

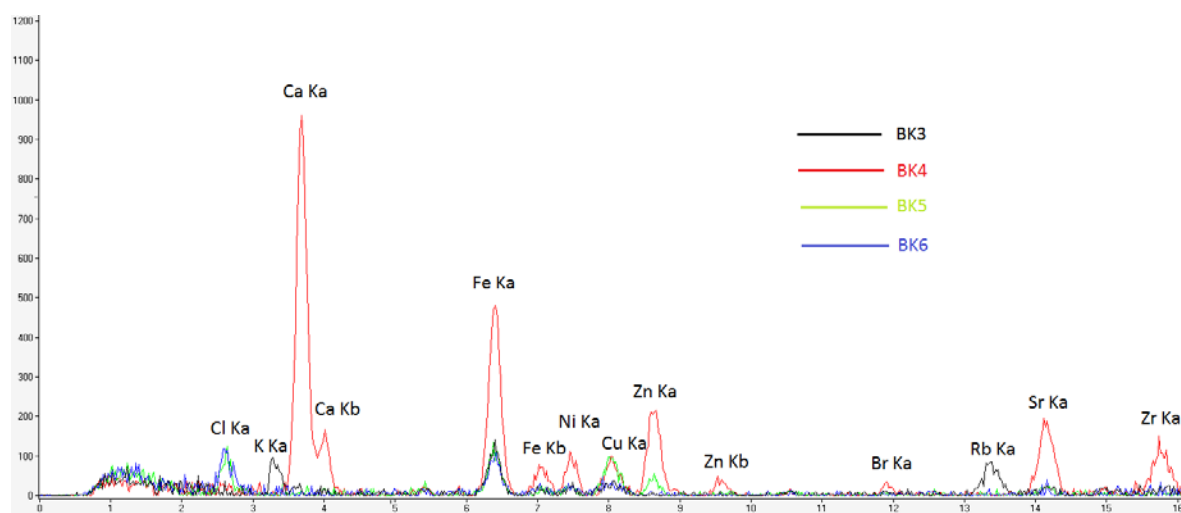


**Scheme S1.** The experimental scope of adsorption of tested drugs on GACs alone or in co-action with BAC.



**Figure S8a.** The ED XRF spectra of light elements spectral region (BK3: virgin GAC (Hydraffin CC8x30); BK4: spent GAC; BK5: virgin GAC saturated with DCF; BK6: virgin GAC saturated with ion-pair BAC-DCF).





**Figure S8b.** The ED XRF spectra of heavy elements spectral region (BK3: virgin GAC (Hydraffin CC8x30); BK4: spent GAC; BK5: virgin GAC saturated with DCF; BK6: virgin GAC saturated with ion-pair BAC-DCF).