Supporting Information

Sustainable activated carbons prepared from a sucrose-derived hydrochar: remarkable adsorbents for pharmaceutical compounds

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Kinetic and equilibrium models

Table S1. Kinetic and isotherm models in their non-linear and linear forms.

	Model	Non-linear form	Linear form	Ref.
Kinetic	Pseudo-first order	$\frac{dq_t}{dt} = k_1 (q_e - q_t)$	$\log(q_e - q_t) = \log(q_e) - \left(\frac{k_1}{2.303}\right) t$	1
	Pseudo-second order	$\frac{dq_t}{dt} = k_2 (q_e - q_t)^2$	$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \left(\frac{1}{q_e}\right) t$	1
Isotherm	Langmuir	$q_e = \frac{b\ q_m C_e}{1 + b\ C_e}$	$\frac{C_e}{q_e} = \frac{1}{K_L q_m} + \frac{1}{q_m} C_e$	2
	Freundlich	$q_e = K_F (C_e)^{1/n}$	$\ln(q_e) = \ln(K_F) + \frac{1}{n} \ln(C_e)$	3

Kinetic parameters: k_1 - pseudo-first order rate constant (h^{-1}), k_2 - pseudo-second order rate constant (g mg^{-1} h^{-1}), q_e and q_t - adsorbate uptake (mg g^{-1}) at equilibrium and at time t (h).

Isotherm parameters: q_e – uptake at equilibrium (mg g^{-1}), K_L – Langmuir constant (dm^3 mg^{-1}), K_F – Freundlich constant ($mg^{1-1/n}$ $(dm^3)^{1/n}$ g^{-1}), n – Freundlich exponent, q_m - monolayer adsorption capacity (mg g^{-1}), C_e – solution concentration at equilibrium (mg g^{-1}).

SEM images of sucrose-derived carbons obtained by KOH activation at increasing temperatures

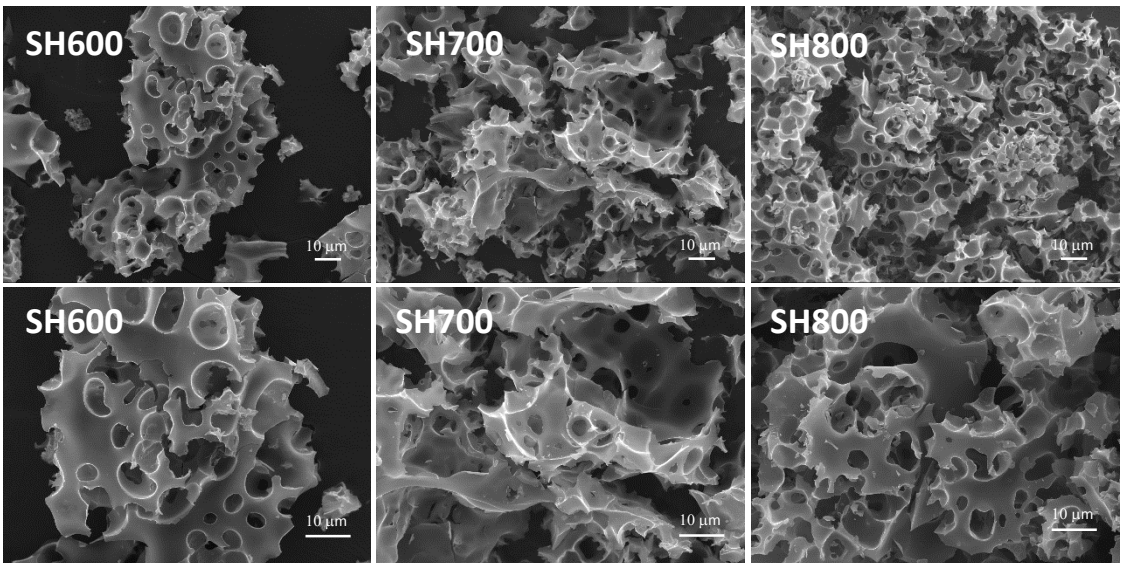

Figure S1. SEM images of sucrose-derived carbons obtained by KOH activation at 600 ºC (SH600), 700 ºC (SH700) and 800 ºC (SH800).

Relationship between the octanol-water partition coefficient and water solubility

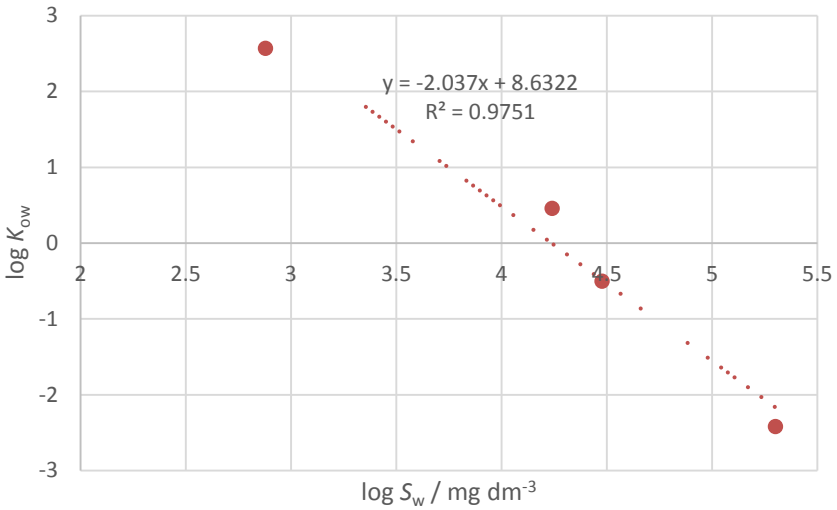

Figure S2. The relation between the octanol-water partition coefficient (log K_{ow}) and water solubility (log S_w) for paracetamol, clofibric acid, caffeine and iopamidol (molecular pharmaceutical compounds). The line was obtained by regression log K_{ow} on log S_w.

Screening studies of PhACs removal using 9 cm^3 of PhAC solution

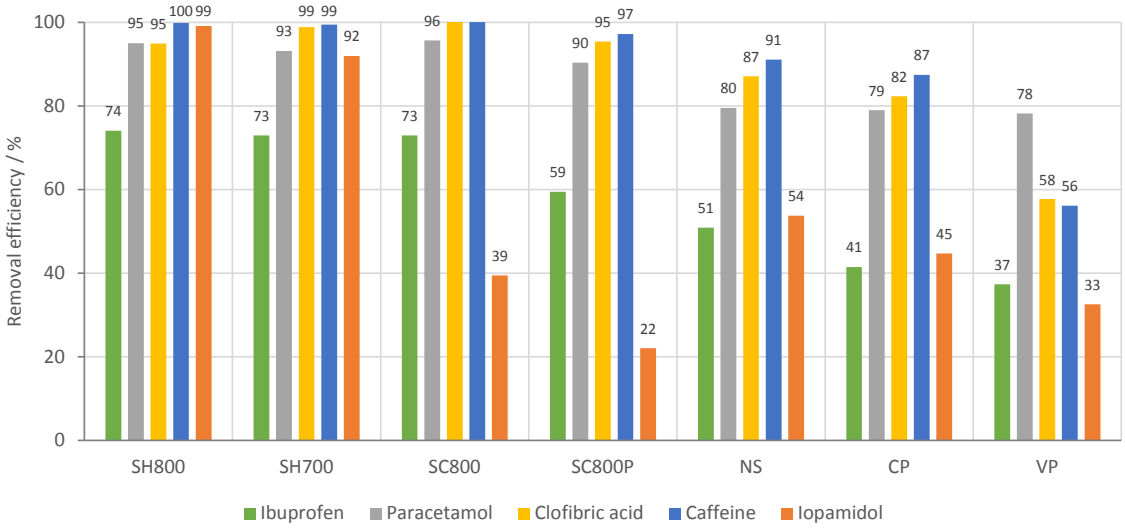

Figure S3. Removal efficiency of the mentioned activated carbons for the five PhACs (6 mg carbon/9 cm^3 of PhAC solution with 180 mg dm^{-3}, 24 h of contact time at 30 ºC).

Screening studies of PhACs removal using 30 cm^3 of PhAC solution

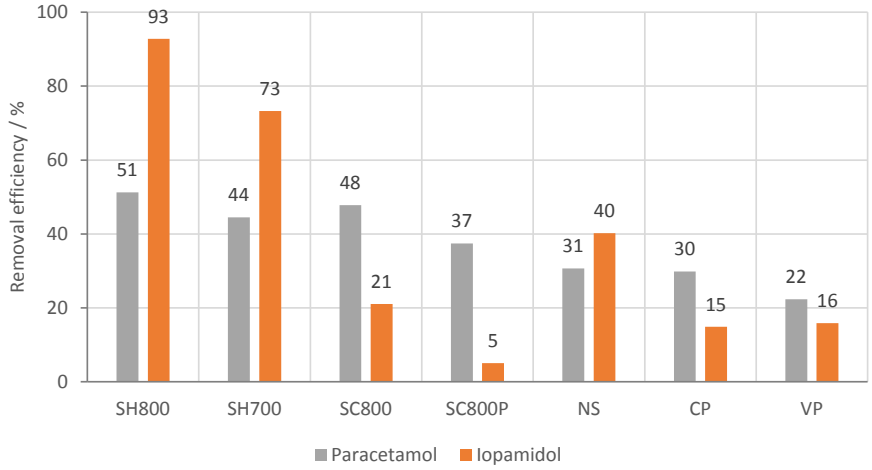

Figure S4. Removal efficiency of the mentioned activated carbons for paracetamol and iopamidol (6 mg carbon/30 cm^3 of PhAC solution with 180 mg dm^{-3}, 24 h contact time at 30 ºC).

Linear trend between removal efficiency and $V_{\alpha\ super} + V_{meso}$ for iopamidol

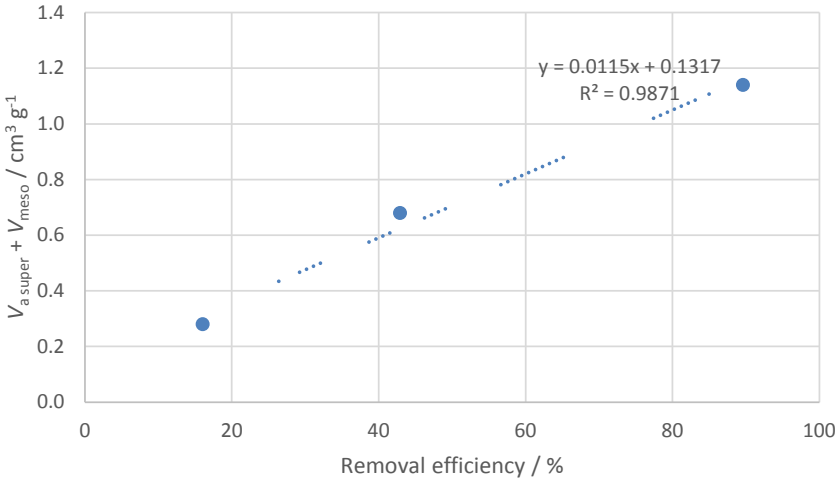

Figure S5. Correlation between the removal efficiency and $V_{\alpha\ super} + V_{meso}$ for iopamidol (6 mg carbon/9 cm^3 of PhAC solution with 180 mg dm^{-3}, 24 h of contact time at 30 ºC).

References

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2. I. Langmuir, *J. Am. Chem. Soc.*, 1918, **40**, 1361-1403.
3. H. M. F. Freundlich, *J. Phys. Chem.*, 1906, **57**, 385-470.