Supplementary material

Conversion of argan nutshells into novel porous carbons in the scope of circular economy: adsorption performance of emerging contaminants

A. Mokhati*, O. Benturki, A.Benturki, R. Fennouh, Z. Kecira, M. Bernardo*, I. Matos, N. Lapa, M. Ventura, O.S.G.P. Soares, A.M. Botelho do Rego, I.M. Fonseca

*Corresponding authors:

A. Mokhati (Tel.: +213 699886459; email: amokhati@usthb.dz)

M. Bernardo (Tel.: +351 212948300; email: maria.b@fct.unl.pt)

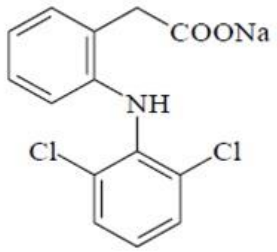
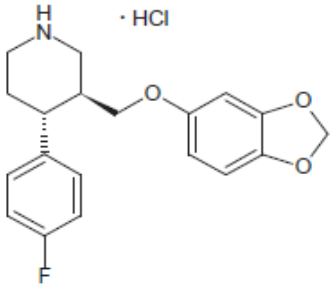
Sodium diclofenac	Paroxetine hydrochloride
	

Figure S1. Molecular structures of the pharmaceutical compounds used in the present study.

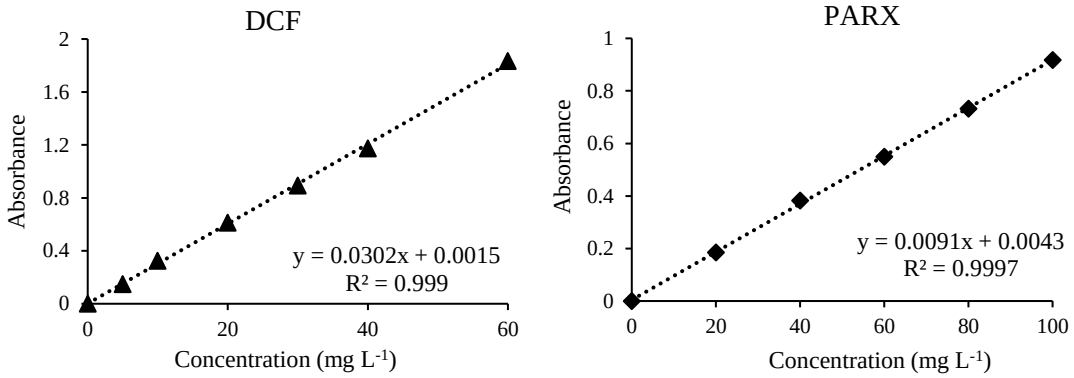


Figure S2. Calibration curves of DCF and PARX determined by UV-Vis spectrophotometry.

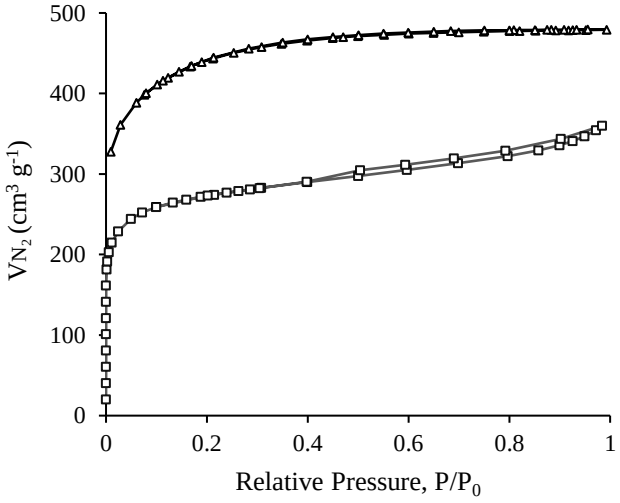


Figure S3. N_2 adsorption-desorption isotherms of ACK and CC carbon samples.

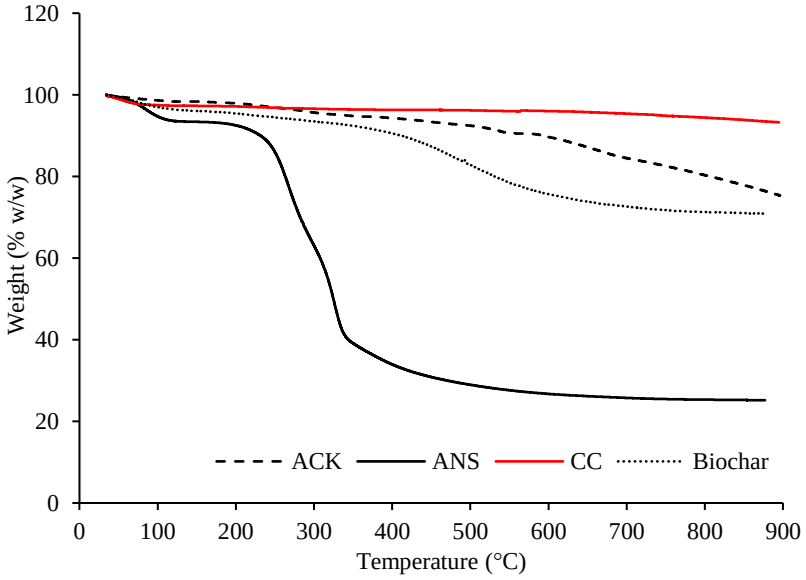


Figure S4. TGA curves of ANS biomass, biochar, ACK, and CC under argon atmosphere.

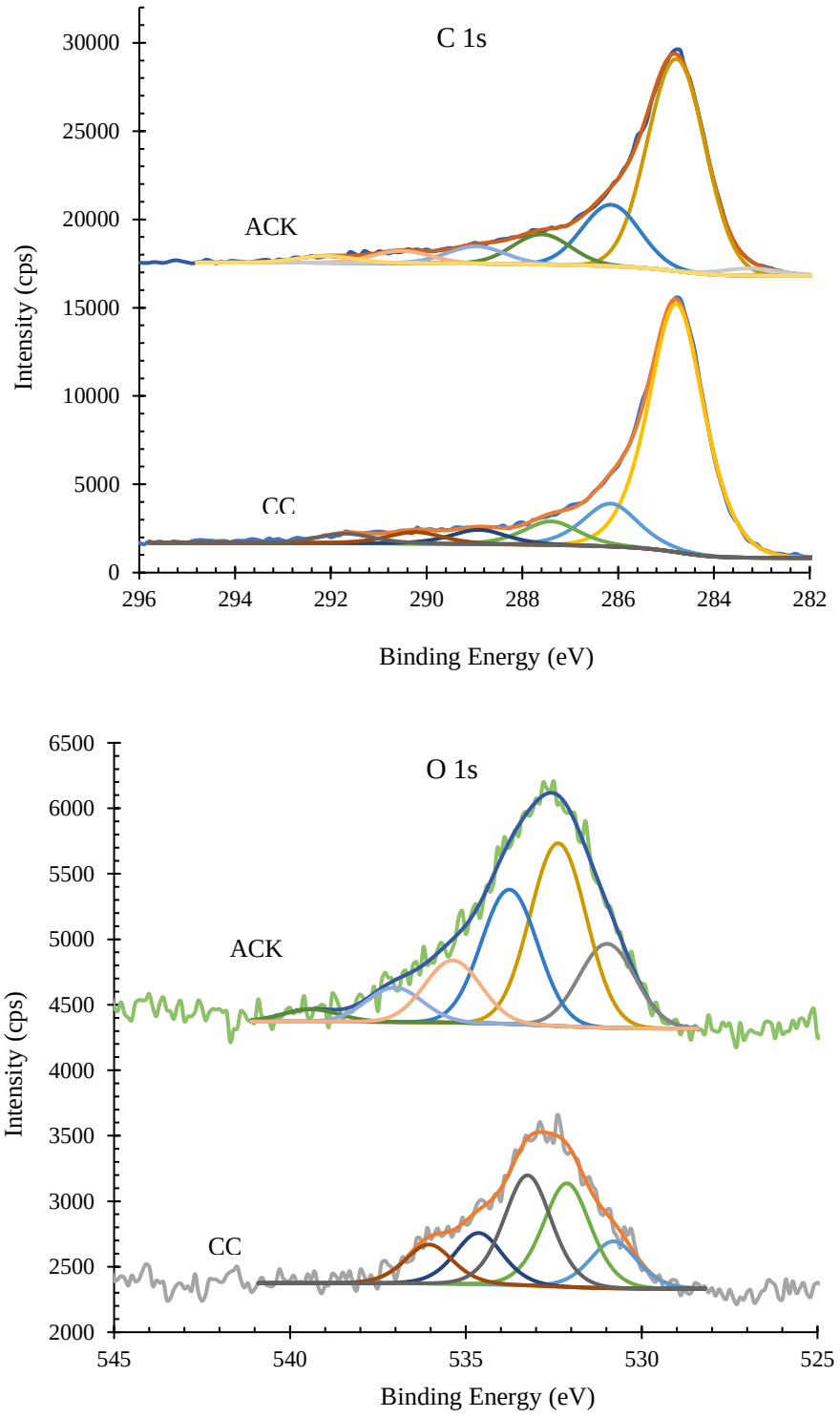


Figure S5. XPS peak fitted profiles of C 1s and O 1s regions of ACK and CC carbons.

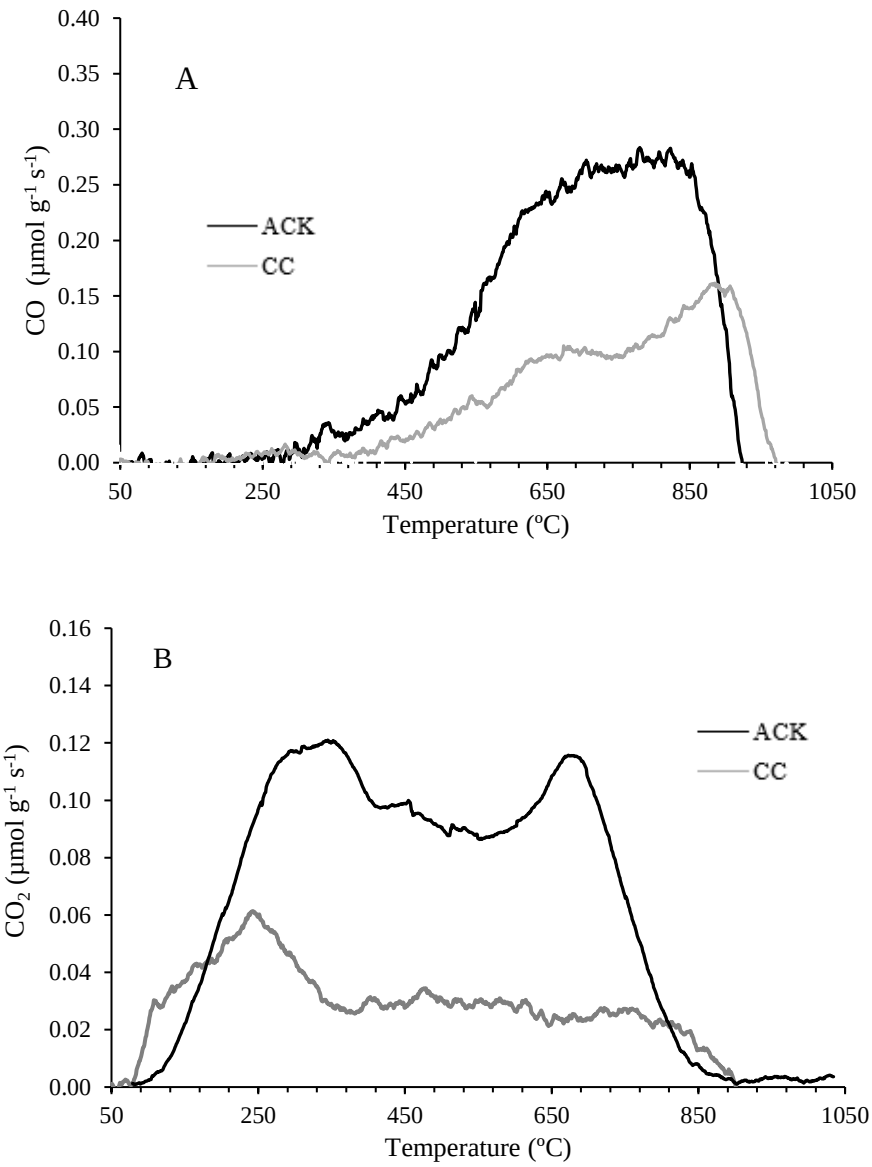


Figure S6. TPD spectra of the carbons: A) CO and B) CO_2 evolution.

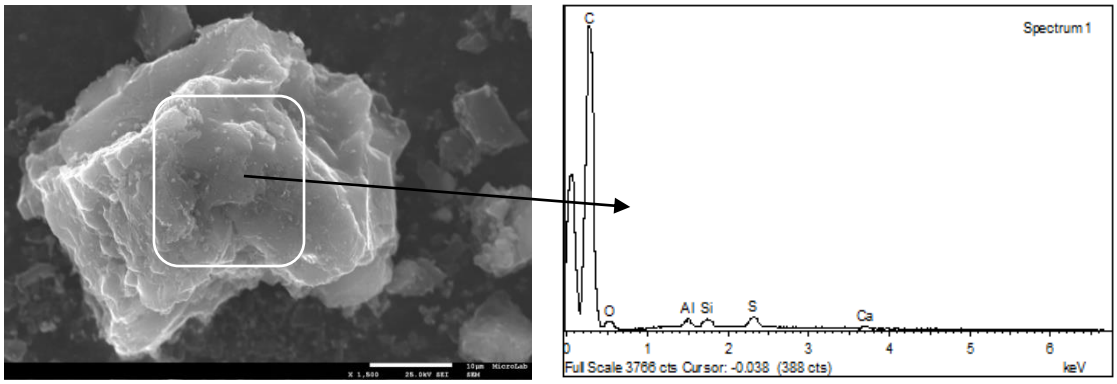


Figure S7. SEM image of CC sample with magnification 1500× and the corresponding EDS spectrum [29].

Table S1. Equations of the kinetic models and isotherm models used in the present work.

Kinetic models	**Equation**
Pseudo 1st order (PFO)	$q_t = q_e \times (1 - e^{-k_1 \times t})$ k_1 (min^{-1}), pseudo-1st order rate constant
Pseudo 2nd order (PSO)	$q_t = \frac{q_e^2 \times k_2 \times t}{1 + (k_2 \times q_e \times t)}$ k_2 (g mg^{-1} min^{-1}), pseudo-2nd order rate constant
Adsorption isotherms models	**Equation**
Langmuir	$q_e = \frac{q_m \times K_L \times C_e}{1 + K_L \times C_e}$ q_m (mg g^{-1}), monolayer adsorption capacity; K_L (L mg^{-1}), Langmuir constant

Freundlich	$q_e = K_F Ce^{1/n}$	K_F (mg g^{-1})/(mg L^{-1})^n, Freundlich isotherm constant; n (dimensionless), adsorption intensity
Sips	$q_e = \frac{q_{ms} K_s (C_e)^{ns}}{1 + K_s (C_e)^{ns}}$	q_{ms} (mg g^{-1}), maximum adsorption capacity; K_s (L mg^{-1}), Sips equilibrium constant; n_s (dimensionless), heterogeneity of the binding surface.

q_e - amount of adsorbate uptake per mass of adsorbent at equilibrium; q_t - amount of adsorbate uptake per mass of adsorbent at time t; C_e - amount of solute in the aqueous phase at equilibrium (mg L^{-1})