

Supplementary Materials

Adsorptive Removal of Lead and Chromate Ions from Water by Using Iron-Doped Granular Activated Carbon Obtained from Coconut Shells

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Tables

Table S1. List of the isotherm models used for surfactants equilibrium data interpretation.

Isotherm Model	Mathematical Equation	Related Parameters
Langmuir [52]	$q_e = \frac{X_m h C_e}{(1 + h C_e)}$	X_m , Langmuir maximum adsorption capacity (mg g^{-1}), h Langmuir constant (L mg^{-1})
Freundlich [53]	$q_e = K_F C_e^{\frac{1}{n_F}}$	K_F Freundlich adsorption capacity coefficient ($\text{mg/g}/(\text{mg L}^{-1})^{1/n}$), n_F coefficient of adsorption intensity
Sips [54]	$q_e = \frac{Q_S K_S C_e^{n_S}}{1 + K_S C_e^{n_S}}$	Q_S and K_S Sips model constants (L g^{-1} and L mg^{-1} , respectively), n_S Sips model exponent
Redlich-Peterson [55]	$q_e = \frac{K_R C_e}{1 + b_R C_e^{n_R}}$	K_R and b_R Redlich-Peterson model constants (L g^{-1} and mg^{-1} , respectively), n_R Redlich-Peterson exponent.

Where, q_e is the adsorption capacity (mg g^{-1}) and C_e is the equilibrium concentration (mg L^{-1}).

Table S2. Kinetic models used for experimental data interpretation.

Kinetic Model	Non linearized Mathematical Equation	XY Scheme
Intra-particle diffusion [56]	$q_t = k_{ip} \sqrt{t} + c$	q_t vs $t^{1/2}$
Pseudo-1st order [57]	$\frac{dq_t}{dt} = k_1 (q_e - q_t)$	$\log(q_e - q_t)$ vs t
Pseudo-2nd-order [58]	$\frac{dq_t}{dt} = k_2 (q_e - q_t)^2$	$\frac{t}{q_t}$ vs t
Elovich model [59]	$\frac{dq_t}{dt} = \alpha \exp(-\beta q_t)$	q_t vs $\ln(t)$

Where, q_t (mg g^{-1}) is the amount of surfactant removed at time t (min). k_{ip} ($\text{mg (g min}^{1/2})^{-1}$) and c (mg g^{-1}) are the intra-particle diffusion model constant and intra-particle diffusion model intercept, respectively. k_1 (min^{-1}) is the rate constant of the pseudo-first order whereas k_2 (min.mg/g) is the rate constant of the pseudo-second order. Lastly, q_e (mg g^{-1}) is the amount of Pb(II) and Cr(T) removed at equilibrium.

Figures

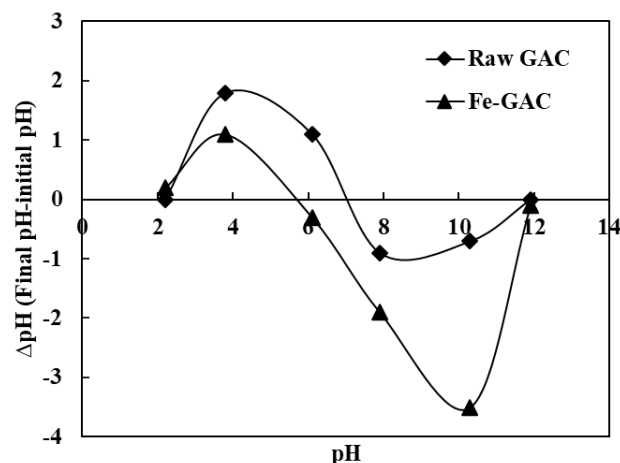


Figure S1. Determination of pH_{pzc} of raw GAC and Fe-GAC 5.

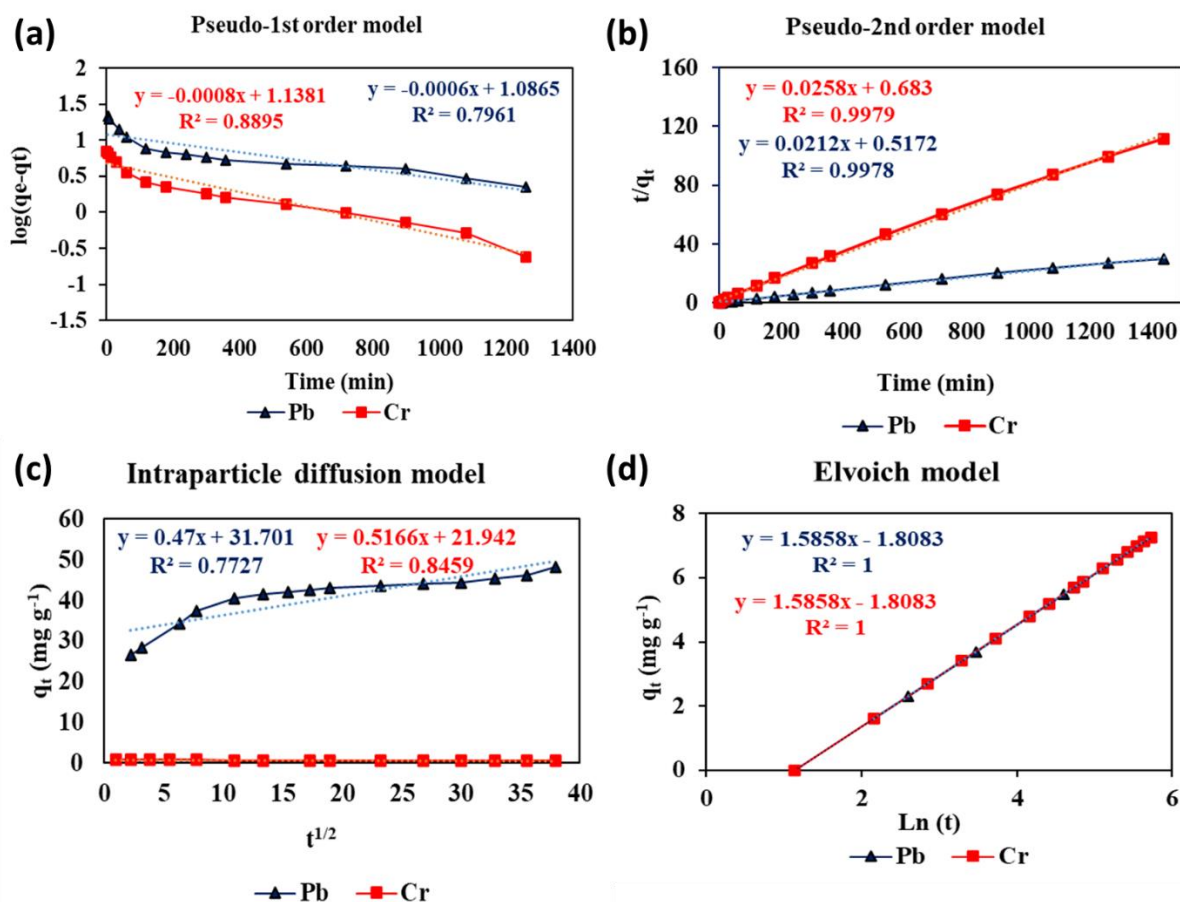


Figure S2. (a) Pseudo-first order, (b) Pseudo-second order, (c) Intra-particle diffusion and (d) Elvovich kinetic models for Pb(II) and Cr(T) adsorption onto Fe-GAC 5 adsorbent in an aqueous system.

References

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