Electronic Supplementary Material

Efficient removal of Cr(VI) and Pb(II) from aqueous solution by magnetic nitrogen-doped carbon

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Table S1

		$q_t=(C_0-C_t)V/m$
		$q_e=(C_0-C_e)V/m$
		$Removal\ (\%)=(C_0-C_t)\times100/C_0$
Kinetic model	Pseudo-first-order	$ln[(q_e-q_t)/q_e]=-k_1t$
	Pseudo-second-order	$t/q_t=1/(k_2q_e^2)+t/q_e$
	Elovich	$q_t=(1/\beta)ln(\alpha\beta)+(1/\beta)lnt$
	Liquid-film	$ln(1-q_t/q_e)=-k_{lf}t$
	Intraparticle diffusion	$q_t=k_dt^{1/2}+C$
Isotherm model	Langmuir	$q_e=q_mK_LC_e/(1+k_LC_e)$
		$R_L=1/(1+K_LC_e)$
	Freundlich	$q_e=K_FC_e^{1/n}$

q_t is adsorption capacity of time t, C_0 is the initial concentration of adsorbates, C_t (mg/L) is the concentrations of adsorbates at the time t. C_e (mg L^{-1}) is the concentrations of adsorbates at adsorption equilibrium. V (L) is the volume of the solution, and m (g) is the mass of the dry adsorbent. k_1 and k_2 are pseudo-first-order and pseudo-second-order adsorption rate constants, respectively. α is initial adsorption rate constant and β is desorption rate constant. k_{lf} is the liquid film diffusion rate constant. k_d is intraparticle diffusion constant and C is the intercept. q_m is the maximum adsorption capacity, K_L is Langmuir constant, R_L is the separation factor. K_f and n are Freundlich constants.

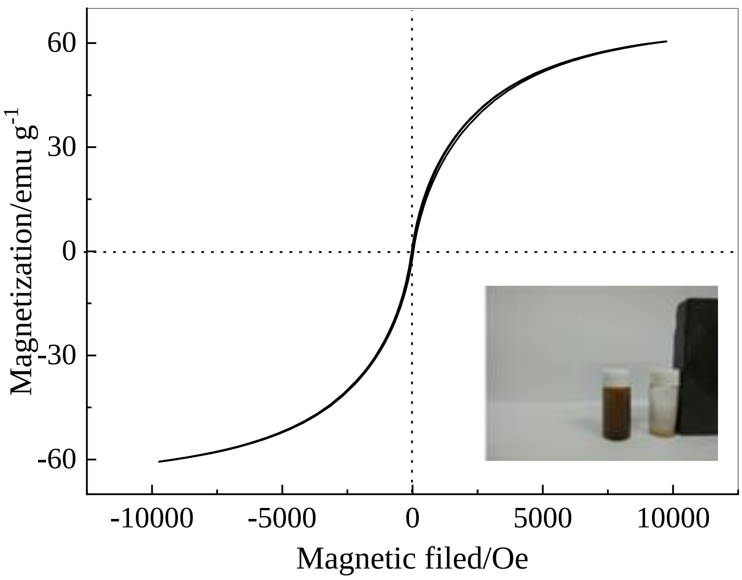

Fig. S1 Magnetic hysteresis loop of MNC.

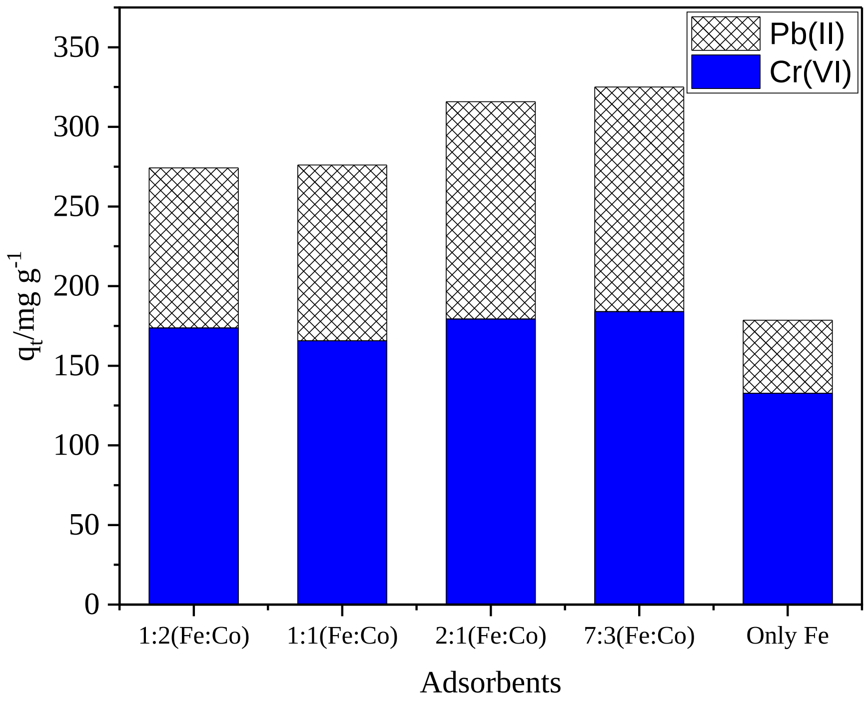

Fig. S2 The influence of different molar ratios of $FeSO_4 \cdot 7H_2O$ and $Co(NO_3)_2 \cdot 6H_2O$ on the adsorption performance of pollutants.

The different ratios of Fe:Co MNC were prepared by the same method (Fe:Co(7:3)). The ratio of $FeSO_4 \cdot 7H_2O$ and $Co(NO_3)_2 \cdot 6H_2O$ was changed from 1:2 to 7:3 or only Fe. The different preparation methods of MNC without $Co(NO_3)_2 \cdot 6H_2O$ was as follows: Fe nanoparticles were added to PPy particles, mixed uniformly by ball milling, and directly calcined. In this work, the composite Fe/Co MNC had better adsorption performance for pollutants than the only Fe-based material. When Fe:Co was close to 7:3, the ratio of $FeSO_4 \cdot 7H_2O$ and $Co(NO_3)_2 \cdot 6H_2O$ had little effect on the adsorption performance.

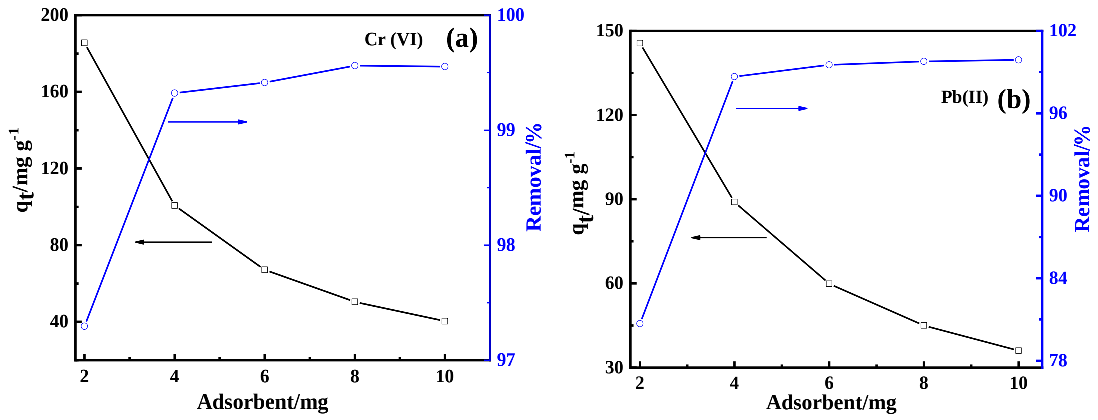

Fig. S3 Effect of the dosage on the adsorption process. (Adsorption equilibrium time =2 h, The initial $C_{Cr(VI)}$=20 mg L^{-1} (a), $C_{Pb(II)}$=20 mg L^{-1} (b).)

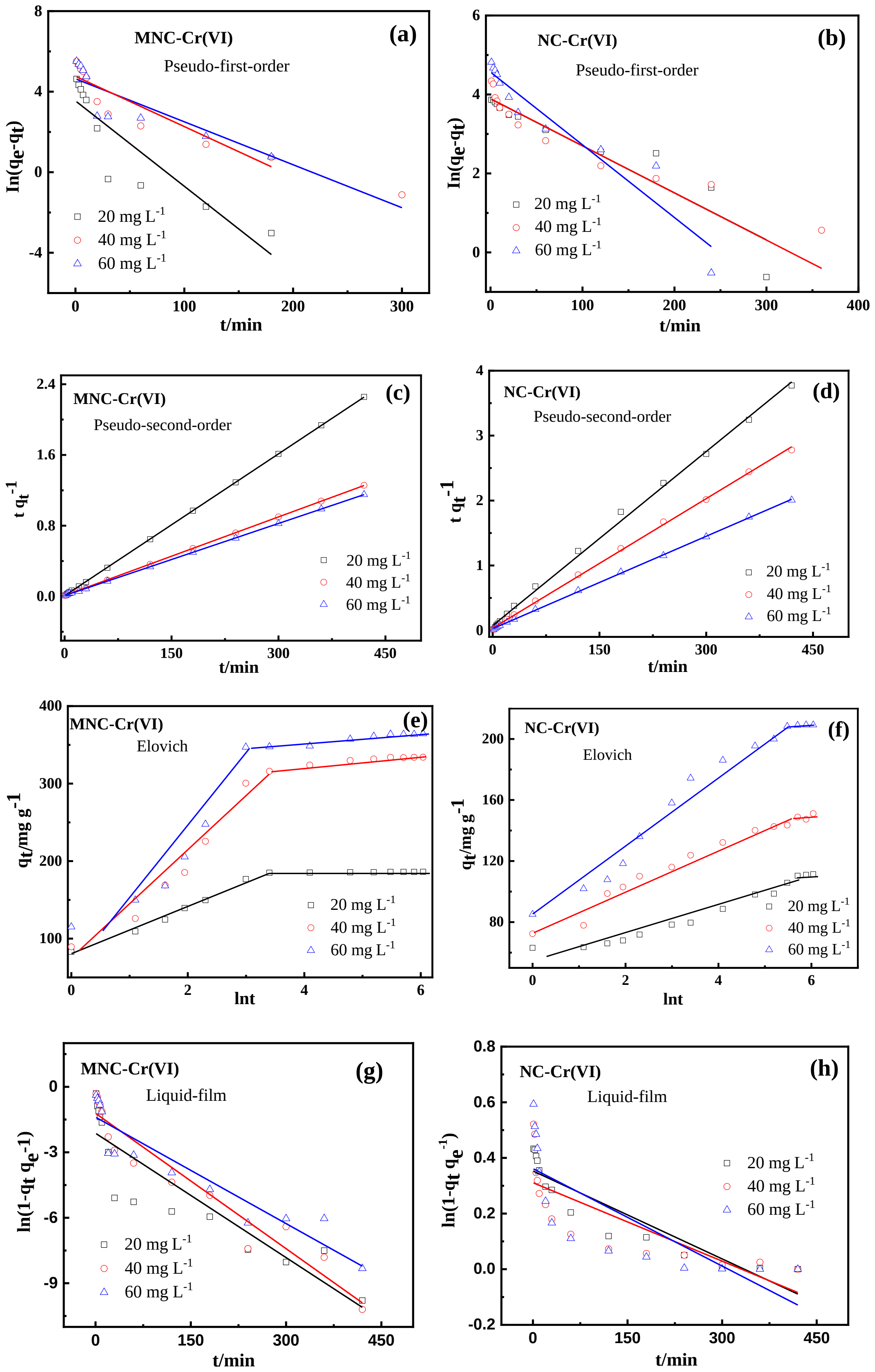

Fig. S4 Kinetic model of MNC and NC in Cr(VI) solution.

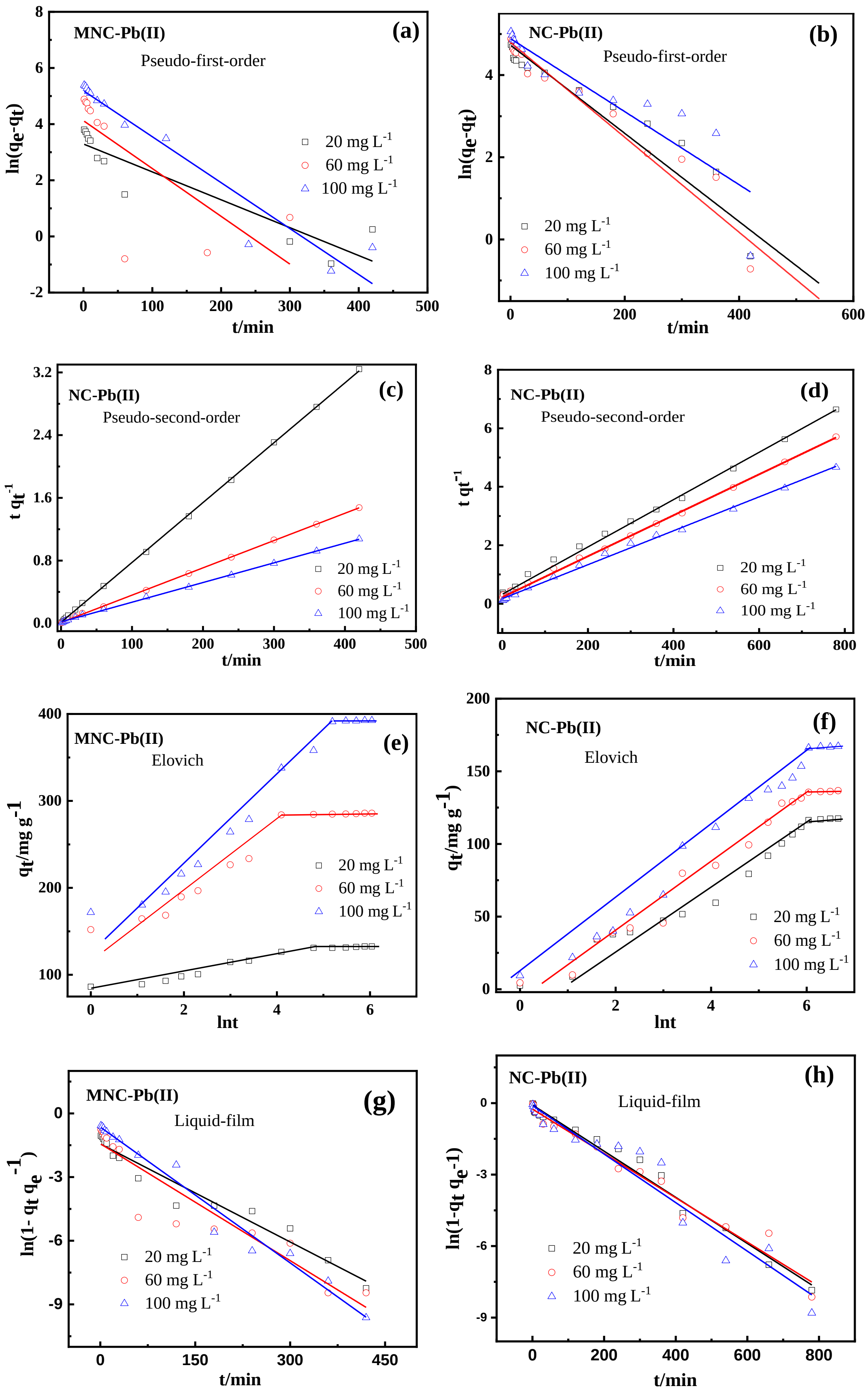

Fig. S5 Kinetic model of MNC and NC in Pb(II) solutions.

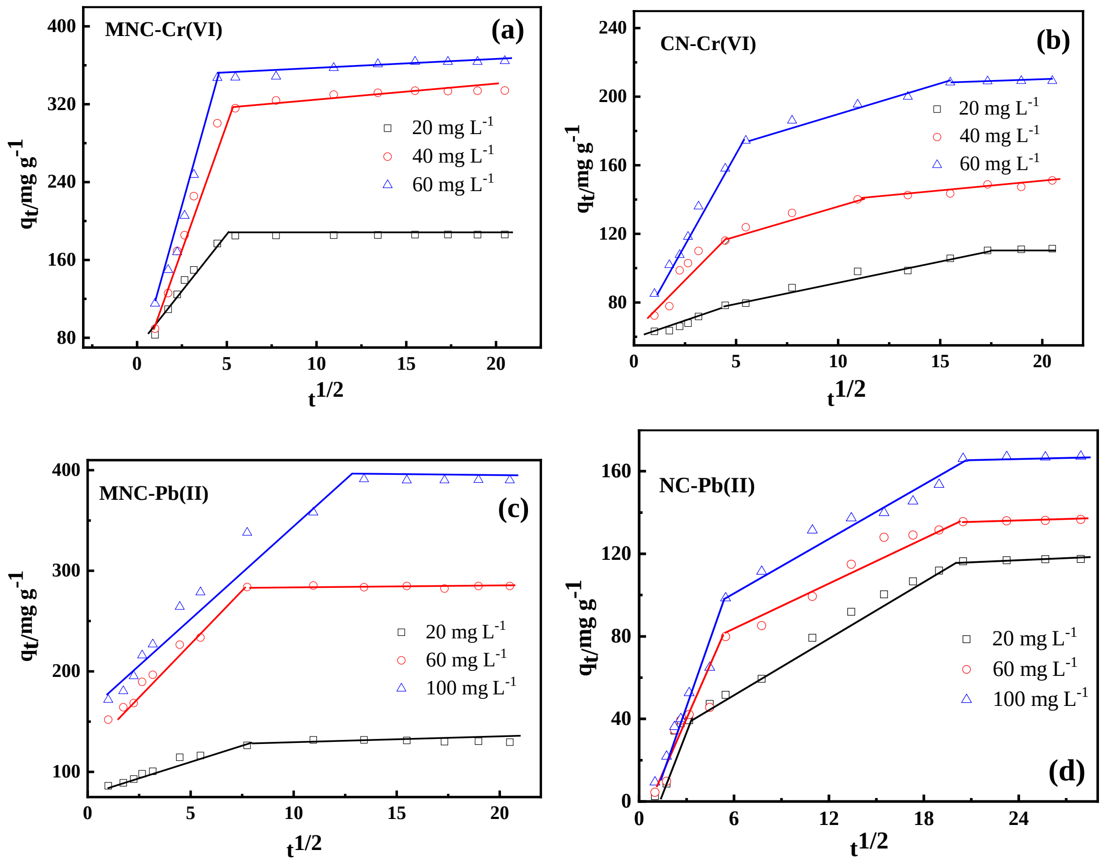

Fig. S6 Intraparticle diffusion model of MNC and NC in solutions.

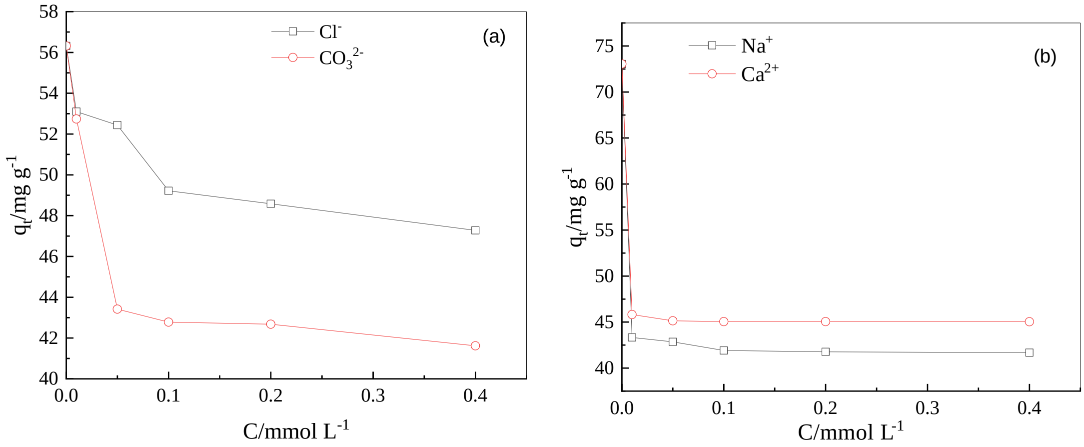

Fig. S7 The Effect of coexisting ions on the adsorption of MNC.

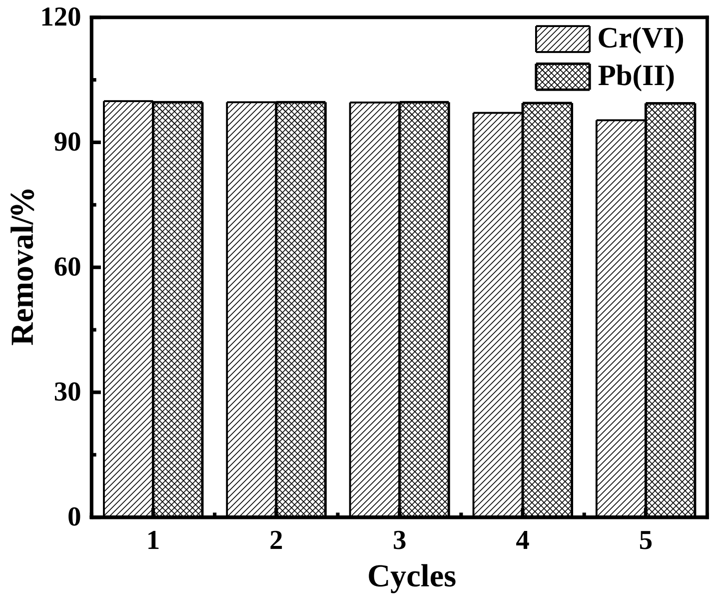

Fig. S8 Adsorption and recycling of Cr(VI) and Pb(II) in aqueous solutions by MNC .