Supplementary data

Preparation and re-activation of magnetic biochar by molten salt method: relevant performance for chlorine-containing pesticides abatement

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Adsorption kinetics, namely pseudo-first-order and pseudo-second-order models was investigated. The linear forms of pseudo-first-order and pseudo-second-order models are expressed as follows:

$$Q_t = Q_e(1 - e^{-k_1 t}) \quad (1)$$

$$t/Q_t = 1/(k_2 Q_e^2) + t/Q_e \quad (2)$$

Where k_1 (min^{-1}) and k_2 ($g \cdot mg^{-1} \cdot min^{-1}$) are successively the pseudo-first-order and pseudo-second-order rate constants; Q_t is the amount adsorbed at time t (min), and Q_e denotes the amount adsorbed at equilibrium, both in units of $mg \cdot g^{-1}$.

The adsorption equilibrium experiment of DCP and atrazine was carried out at 20 °C and pH 7. The adsorption isotherm experimental data were fitted by Langmuir and Freundlich models, respectively. Langmuir isotherm model, which has been assumed that the monolayer coverage of sorption occurs in the process and the adsorption sites are identical and energetically equivalent (Ge et al., 2016), can be expressed as follows:

$$\frac{C_e}{Q_e} = \frac{C_e}{Q_m} + \frac{1}{K_L Q_m} \quad (3)$$

Where Q_e ($mg \cdot g^{-1}$) is the amount of DCP and atrazine adsorbed at equilibrium; C_e ($mg \cdot L^{-1}$) is the residual concentration in solution at equilibrium; Q_m ($mg \cdot g^{-1}$) is the maximum adsorption capacity when an adsorbent is saturated; and K_L ($L \cdot mg^{-1}$) is a constant related to the affinity of the binding sites.

The Freundlich model is an empirical equation that can be used to describe the multilayer adsorption equilibrium on a heterogeneous surface (Agrawal et al., 2004). It is mathematically described by Eq. (4).

$$\mathrm{In}Q_e = \mathrm{In}K_F + \frac{1}{n}\mathrm{In}C_e \quad (4)$$

where K_F [(mg·g^{-1})(L mg^{-1})$^{1/n}$] and n are the Freundlich constants related to adsorption capacity and adsorption intensity, respectively. K_F and n can be determined from the linear plot of InQ_e versus InC_e.

Table **S1. Kinetic model parameters for 2,4-DCP sorption onto MBC**

Pollutant		Pseudo-first-order			Pseudo-second-order		
2,4-DCP	$Q_{e,exp}$(mg·g^{-1})	Q_e (mg·g^{-1})	K_1	R^2	Q_e (mg·g^{-1})	K_2	R^2
	298.12	304.88	0.038	0.981	343.36	0.0001	0.977
atrazine	102.17	111.15	0.022	0.921	140.20	0.0001	0.88

Table S2. Isotherm parameters for 2, 4-DCP sorption onto MBC

Pollutant	Langmuir model $R_L=1/(1+K_LC_0)$					Freundlich model		
	$Q_{m,exp}$(mg·g^{-1})	$Q_{m,cal}$(mg·g^{-1})	K_L	R^2	R_L	K_F	n	R^2
2,4-DCP	1609.4	1706.64	0.015	0.984	0.0251-0.340	102.80	2.06	0.929
atrazine	210.86	283.54	0.029	0.826	0.187-0.775	33.31	2.53	0.672

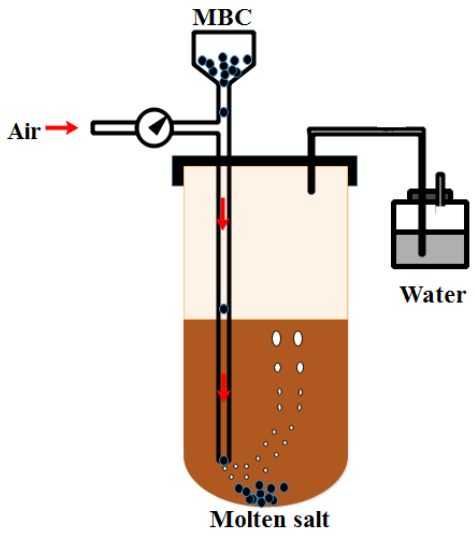

Fig.S1. Man-made reactor for the detruction of saturated MBC