

Supporting Information

Influence of Environmental Factors on Pesticide Adsorption by Black Carbon: pH and Model Dissolved Organic Matter

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Table S1. Freundlich Coefficients for Pesticide Adsorption Isotherms.

Sorbent	pH	Propanil			2,4-D			Prometon		
		K_F	n	R	K_F	n	R	K_F	n	R
BC	1.25	143.78±5.65	0.24±0.02	0.9951	94.37±6.81	0.27±0.03	0.9894	22.11±1.89	0.36±0.03	0.9967
	5.90	154.63±6.61	0.23±0.02	0.9932	34.16±2.43	0.27±0.03	0.9932	46.95±6.20	0.33±0.05	0.9862
100TA-BC	1.25	76.40±3.45	0.25±0.01	0.9965	46.80±4.24	0.32±0.03	0.9850	10.15±0.81	0.49±0.02	0.9984
	5.90	81.16±4.77	0.25±0.02	0.9940	10.55±1.10	0.39±0.03	0.9956	29.60±1.74	0.29±0.02	0.9978
300TA-BC	1.25	15.69±1.09	0.42±0.02	0.9984	11.43±1.99	0.43±0.05	0.9885	4.87±0.33	0.57±0.00	0.9992
	5.90	15.14±0.60	0.44±0.01	0.9995	2.28±0.45	0.42±0.06	0.9903	6.70±1.11	0.41±0.05	0.9924
100GA-BC	1.25	133.80±5.74	0.24±0.02	0.9945	91.44±7.12	0.26±0.03	0.9877	20.14±1.52	0.37±0.03	0.9976
	5.90	142.77±5.87	0.23±0.02	0.9941	30.92±2.18	0.32±0.02	0.9970	52.04±6.42	0.24±0.05	0.9829
300GA-BC	1.25	114.87±4.05	0.27±0.01	0.9973	80.12±5.82	0.28±0.03	0.9916	19.61±1.64	0.38±0.02	0.9971
	5.90	129.56±3.87	0.24±0.01	0.9974	27.50±2.48	0.34±0.03	0.9958	47.63±4.75	0.26±0.03	0.9902

Table S2. Adsorption (q_{30}) of Pesticides at Equilibrium Concentration of 30 mg/l on BC and 300TA-BC

pH	Pesticide	BC q_{30} (cm ³ /g)	300TA-BC q_{30} (cm ³ /g)
1.25	Propanil	0.309	0.0629
	2,4-D	0.164	0.0344
	Prometon	0.0685	0.0311
5.90	Propanil	0.320	0.0654
	2,4-D	0.0604	0.00685
	Prometon	0.131	0.0244

Figure S1. Analysis of GA, TA and propanil before and after adsorption

Liquid chromatography of Propanil, GA and TA (Column: Eclipse XDB-C₁₈ 4.6 × 150 mm, 5 μm; Mobile Phase: 60% methanol/40% 0.1%-phosphoric acid aqueous solution; Flow rate: 1.0 ml/min; Sample injection volume: 10 μl; Detection: UV (252 nm); Temperature: 35 °C):

- Chromatogram of propanil.
- Chromatogram of GA indicating its high purity.
- Chromatogram of TA indicating its high purity.
- Chromatogram of propanil in solution in equilibrium with 300GA-BC. A very small peak at 1.431 min indicates that desorption of GA from 300GA-BC was negligible.
- Chromatogram of propanil in solution in equilibrium with 300TA-BC. A very small peak at 1.427 min indicates that desorption of TA from 300TA-BC was negligible.

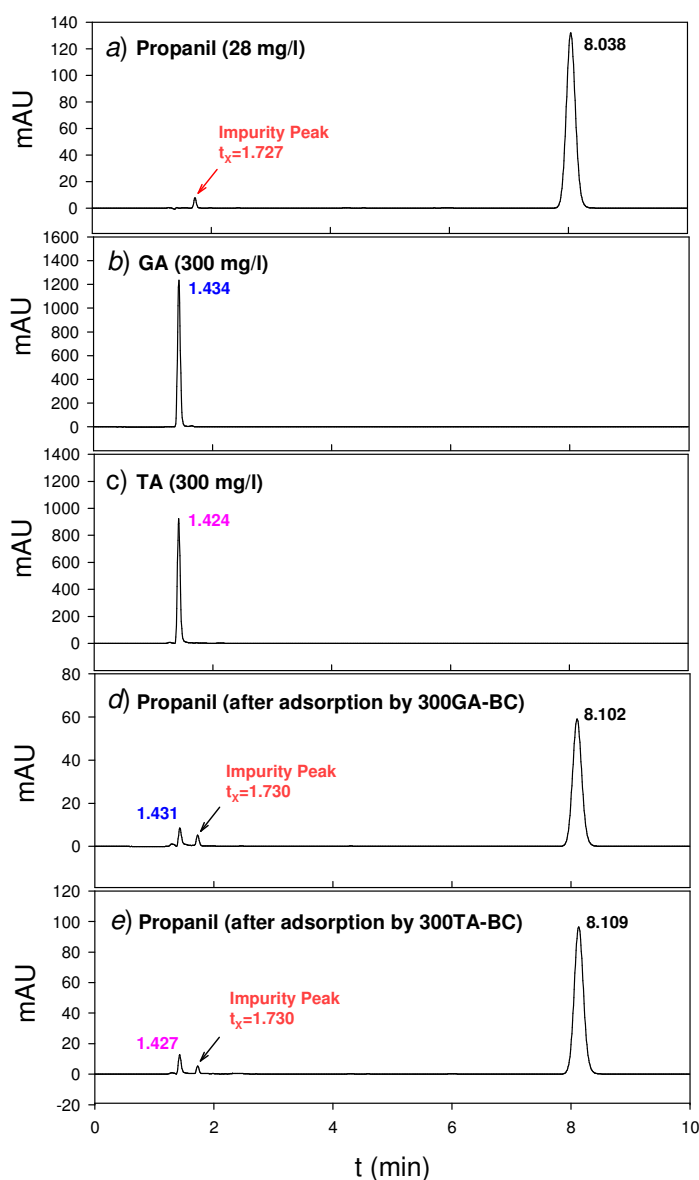


Figure S2. Adsorption of TA and GA from aqueous solution containing 0.01 mol/l NaCl and 1.5 mmol/l NaN₃

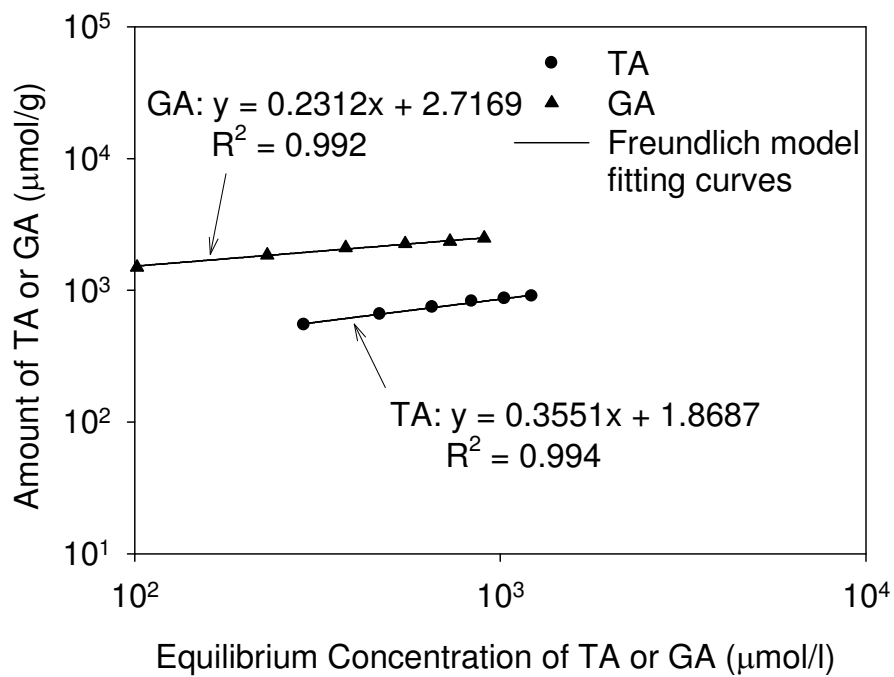


Figure S3. Kinetics of adsorption of propanil, 2,4-D and prometon from water on BC and 300TA-BC at given pH values

To evaluate adsorption kinetics of pesticides on BC and DOM-loaded BCs, the adsorption of propanil, 2,4-D and prometon, all 50 ml with an initial concentration of 40 mg/l, on BC and 300TA-BC was determined at various sampling times. Detailed pesticide-BC-pH combinations were:

- A. Propanil: BC 5.0 mg, pH 5.90; 300TA-BC 9.8 mg, pH 5.90
- B. 2,4-D: BC 20.0 mg, pH 5.90; 300TA-BC 20.0 mg, pH 5.90
- C. Prometon: BC 9.8 mg, pH 1.25; 300-TA-BC 9.8 mg, pH 1.25

Because 2,4-D at pH 1.25 and prometon at pH 5.90 are present in solution mostly as neutral species, their adsorption kinetics was presumed to be similar to that of propanil. The adsorption kinetics of the pesticides on 100TA-BC, 100GA-BC and 300GA-BC was not determined because loading GA showed no influence on adsorption and loading 100 $\mu\text{mol/g}$ TA had a much smaller influence as compared to 300TA-BC.

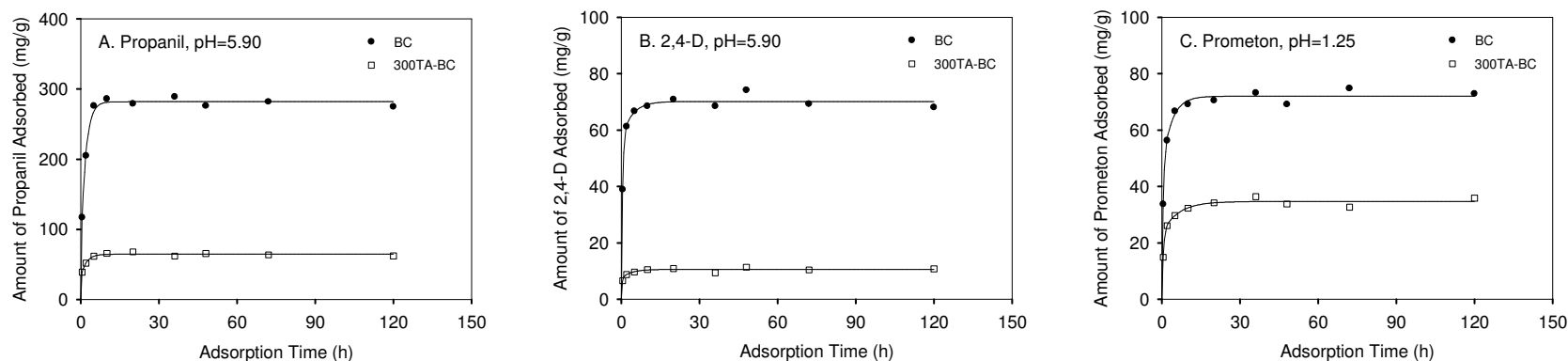


Figure S4. Zeta potentials of BCs as a function of solution pH, and the determined points of zero charge.

