

Mobility and transport of nalidixic acid and niflumic acid in saturated soil columns

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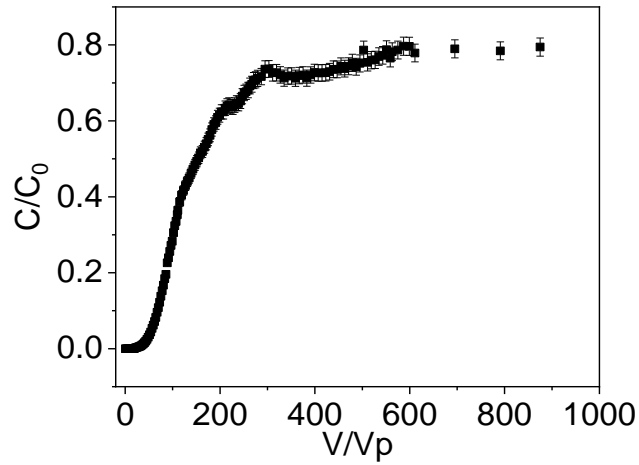


Fig. S1 The breakthrough curves of NA in F soil. Initial condition: 100 mM NaCl, 10 μ M NA, pH 7.1.

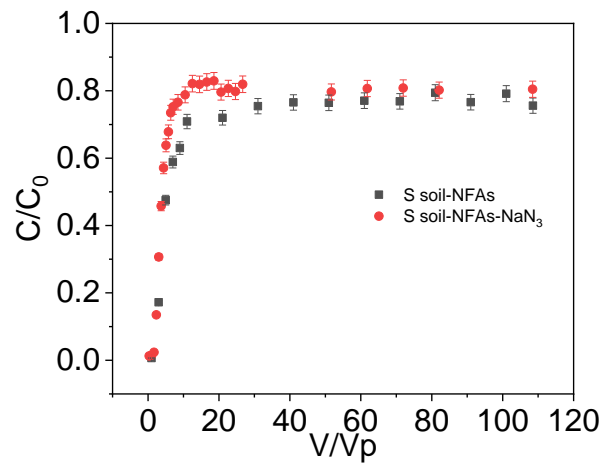


Fig. S2 The breakthrough curves of NFA in S soil with or without NaN_3 . Initial condition: 100 mM NaCl, 10 μ M NFA, 100 mg/L NaN_3 , pH 6.5.

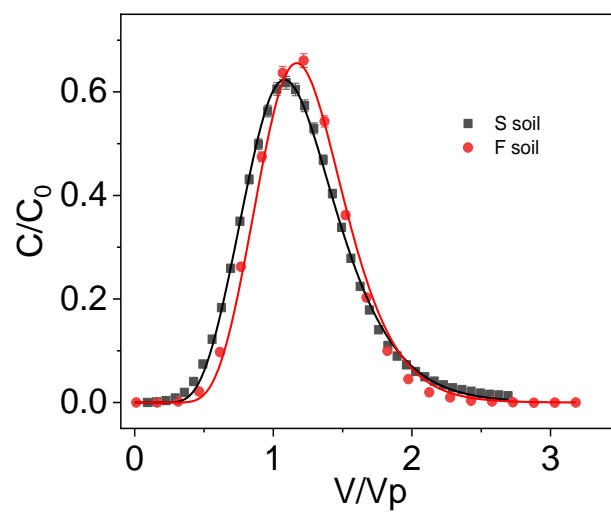


Fig. S3 The breakthrough curves of non-reactive tracer and modeling results. Initial condition: 200 mM NaCl, injection volume = 4 mL.

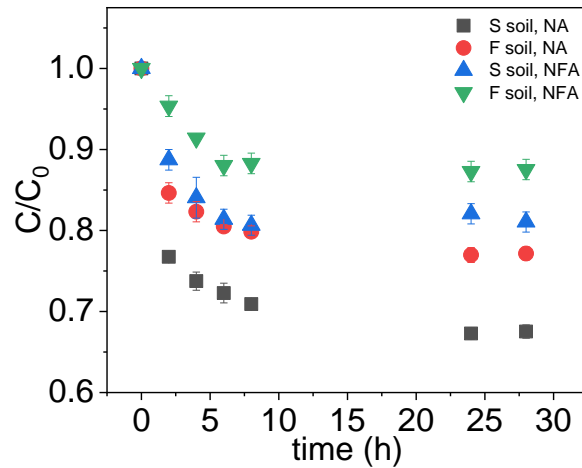


Fig. S4 Sorption kinetics of NA and NFA on two soils. Initial conditions: 2 g/L soil, 20 μ M NA, 20 μ M NFA, 100 mM NaCl, pH 7.

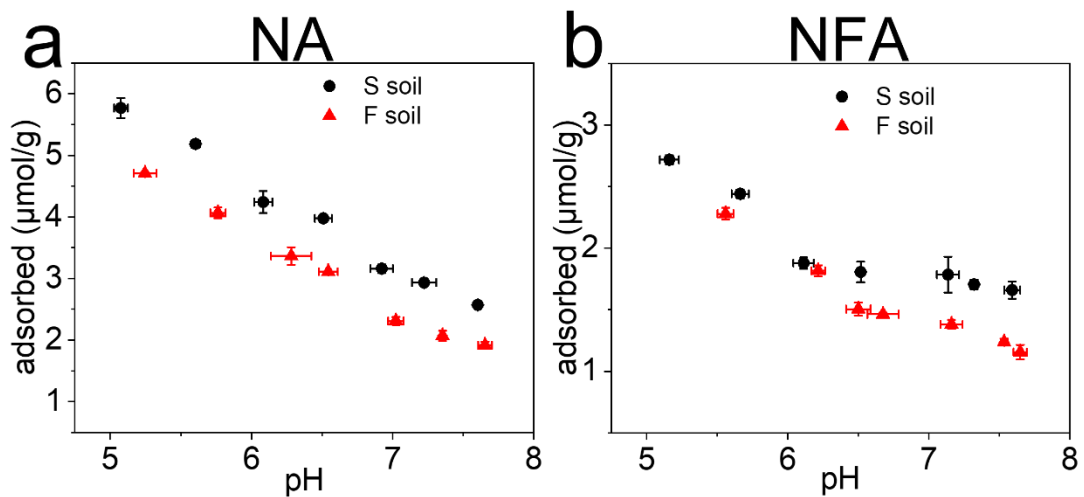


Fig. S5 pH edges of NA or NFA sorption on two soils using NaCl as electrolyte in single system. Initial condition: 2 g/L soil, 100 mM NaCl, 20 μ M NA, 20 μ M NFA.

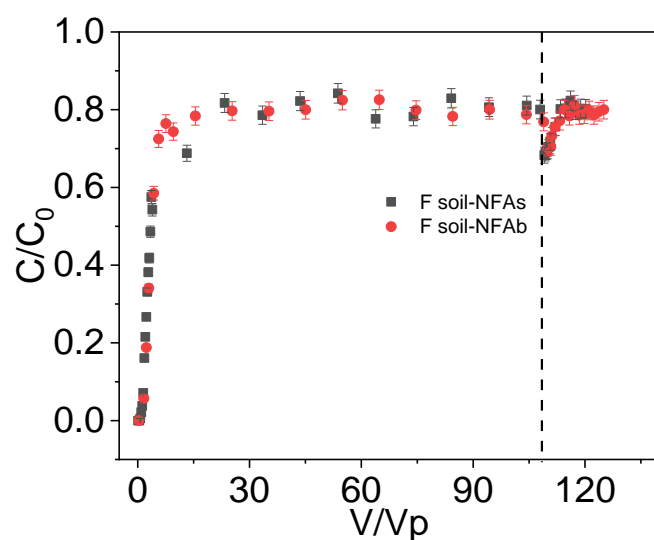


Fig. S6 The breakthrough curves of NFA in F soil. Initial condition: 100 mM NaCl, 10 μ M NFA, pH 7.1. The subscript 's' and 'b' indicated NFA existed in the single and binary system, respectively. The vertical dash lines indicated the period of 24 h interruption.

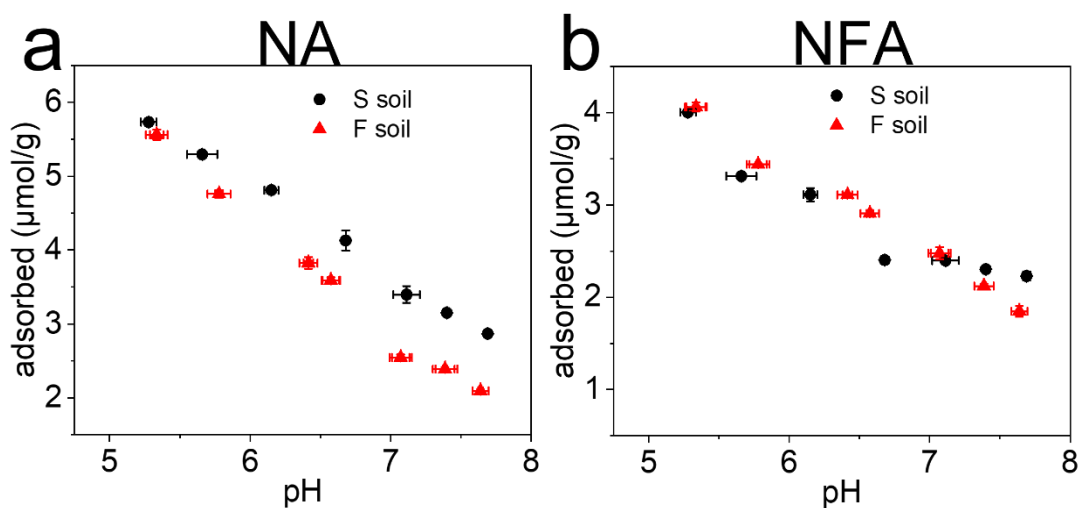


Fig. S7 pH edges of NA and NFA co-sorption on two soils using NaCl as electrolyte in binary system. Initial condition: 2 g/L soil, 100 mM NaCl, 20 μ M NA, 20 μ M NFA.

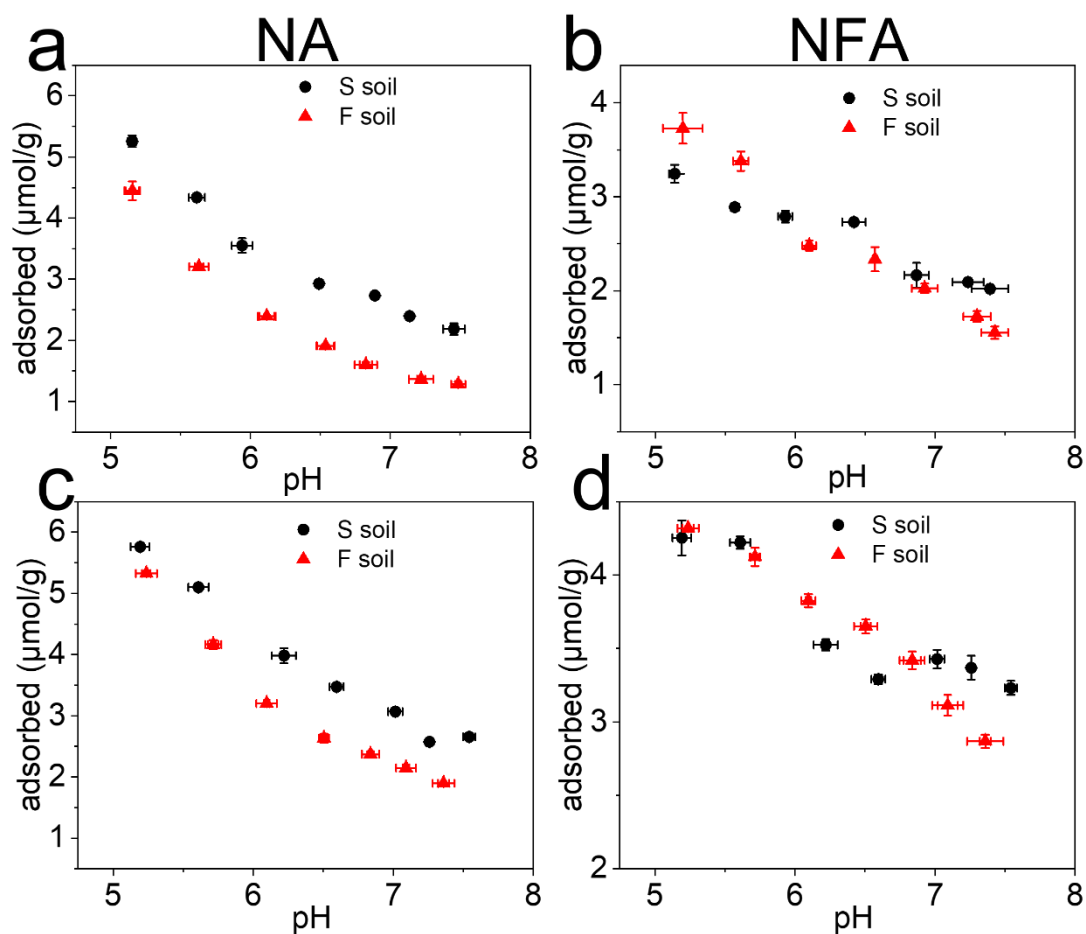


Fig. S8 pH edges of NA and NFA sorption on two soils using CaCl_2 as electrolyte in a, b) single and c, d) binary system. Initial condition: 2 g/L soil, 35 mM CaCl_2 , 20 μM NA, 20 μM NFA.

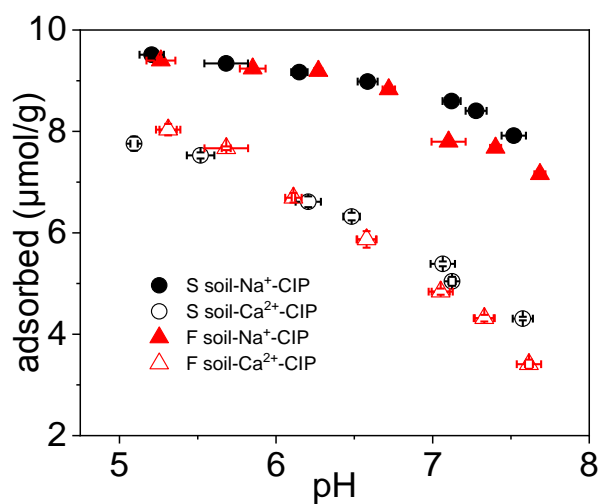


Fig. S9 pH edges of CIP sorption in soil. Initial condition: 2 g/L soil, 20 μM CIP.

Table S1 soil properties

	S soil	F soil	
pH	6.5	7.1	
Humidity, %	2.0	1.4	
CEC, m _{eq} /100g	13.4	13.2	
OC, %	2.9	2.2	
Sand, wt %	10.8	20.5	
Silt, wt %	66.9	59.8	
Clay, wt %	22.3	19.7	
TN, g/kg N	2.2	2.3	
	P ₂ O ₅	16	241
Exchangeable elements, mg/kg	CaO	2364	3243
	MgO	61	321
	K ₂ O	31	529
	Cd	<0.5	<0.5
	Al	26000	21000
Total elements, mg/kg	Co	13	13
	Cu	35	37
	Fe	34829	25182
	Mn	688	593
	Zn	76	128

Table S2 Parameters of NA and NFA transport under flow condition

		F soil										S soil								
		NFA+NA				NFA+NA+Ca ²⁺				NA		NFA		NFA+NA						
		NA		NFA		NA		NFA		NA	NFA	NA		NFA						
pH		7.1										6.5								
^a θ		0.68										0.645								
^b q		0.24868										0.24868								
^c λ		0.2639										0.398								
^d Stage	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
^e f	0.76	0.23	0.03	0.13	0.76	0.23	0.01	0.17	0.76	0.23	0.03	0.05	0.48	0.40	0.04	0.07	0.48	0.40	0.02	0.04
^f K	115	115	64	381	115	115	137	889	115	115	93	135	329	135	82	95	329	135	101	98
^g β	1.2	1.2	1.47	0.12	1.2	1.2	1.3	0.1	1.2	1.2	1	0.1	1.2	0.69	1.3	0.36	1.2	0.69	1.2	0.35
^h α	7.2E ⁻⁴	1.3E ⁻³	2.4E ⁻⁴	3.7E ⁻⁴	7.2E ⁻⁴	1.3E ⁻³	9.8E ⁻⁴	3.1E ⁻⁴	7.2E ⁻⁴	1.3E ⁻³	1E ⁻⁴	1.6E ⁻⁴	8.6E ⁻⁷	7E ⁻⁴	2.4E ⁻⁴	2.4E ⁻⁴	8.6E ⁻⁷	7E ⁻⁴	1.3E ⁻⁴	1E ⁻⁴
R ²	0.99	0.97	0.99	0.94	0.99	0.97	0.99	0.95	0.99	0.97	0.99	0.99	0.99	0.95	0.99	0.99	0.99	0.95	0.99	0.99

^aθ is water content.

^bq is Darcy velocity.

^cλ is the dispersivity.

^dStage 1, 2 are the two stages of injection solution. Stage 1 is the injection of reactive solute from 0-110 PV. Stage 2 is the injection of background solution from 110 PV-end.

^ef is the fraction of equilibrium sites.

^fK is the empirical distribution coefficient in freundlich isotherm. Unit: g⁻¹ cm³.

^gβ is the index of freundlich isotherm.

^hα is the adsorption rate.

Table S3 Freundlich fitting results of NA and NFA sorption isotherm.

	Equation	k_f^a	n	R ²
S soil, NA	Freundlich	0.647	0.59	0.99
S soil, NFA	Freundlich	0.703	0.337	0.98
F soil, NA	Freundlich	0.345	0.678	0.99
F soil, NFA	Freundlich	0.609	0.234	0.87

^a unit: g⁻¹ L.