

Supplementary Materials

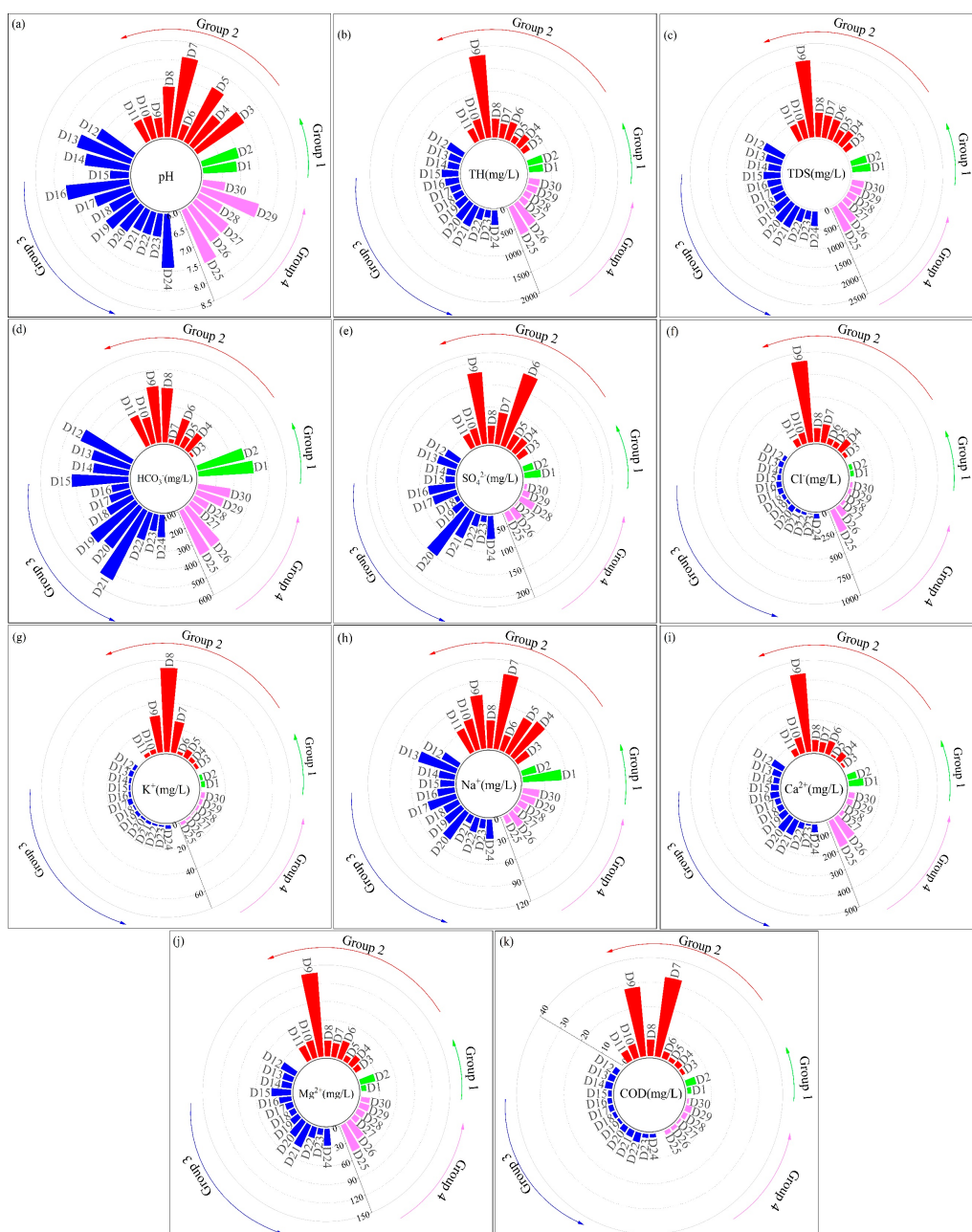


Figure S1. Statistical analysis of chemical parameters in groundwater samples (a–k). (Group 1: samples upstream from the chemical industrial park (CIP); Group 2: samples within the CIP; Group 3: Samples from the periphery of the CIP; Group 4: samples downstream from the CIP).

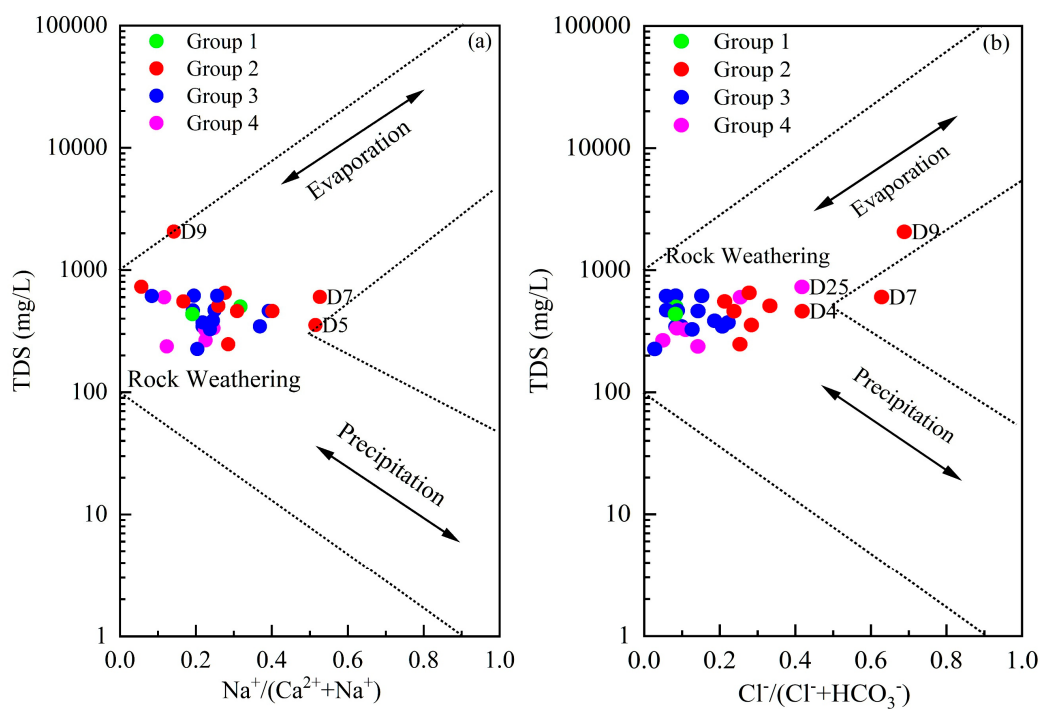
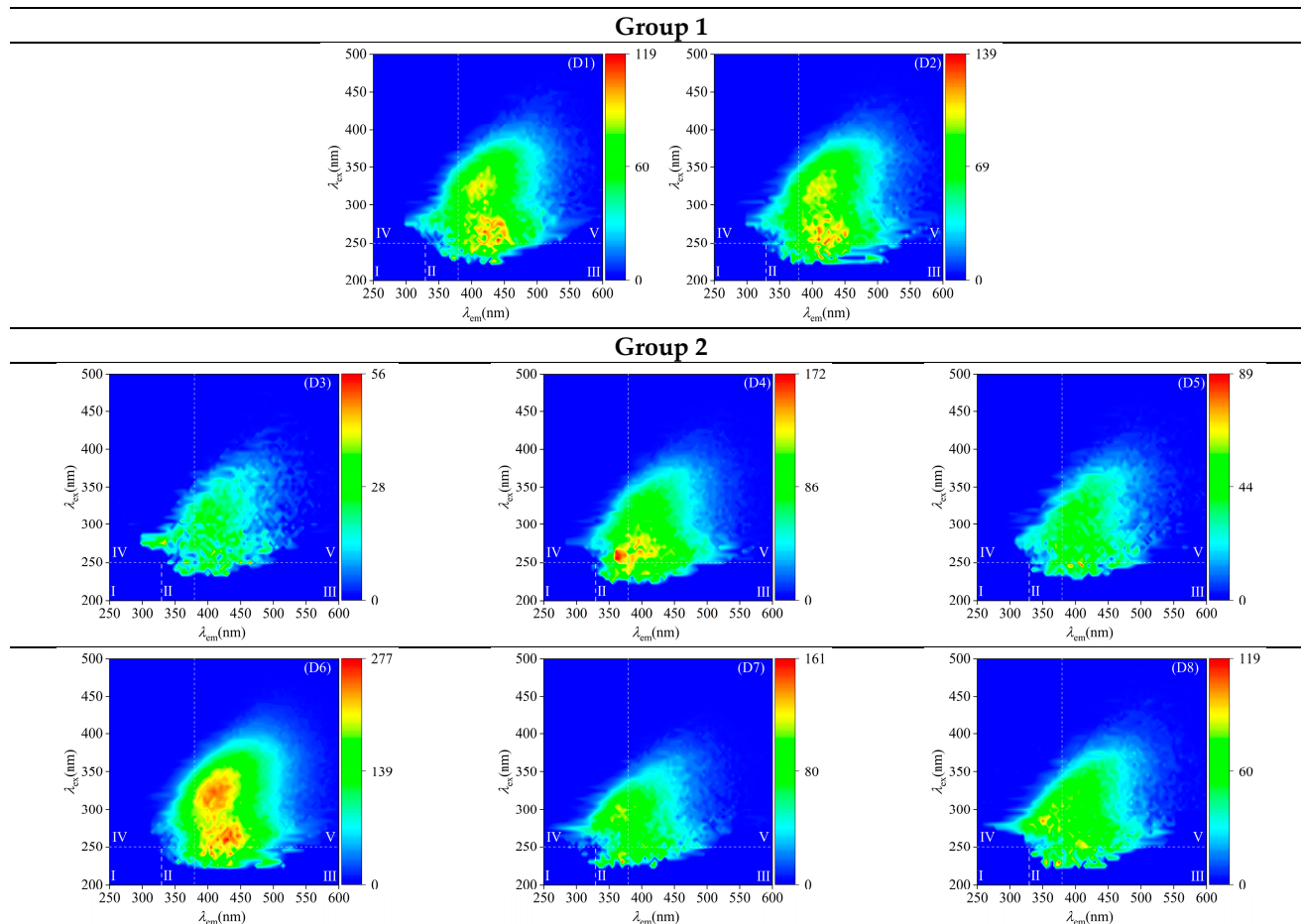
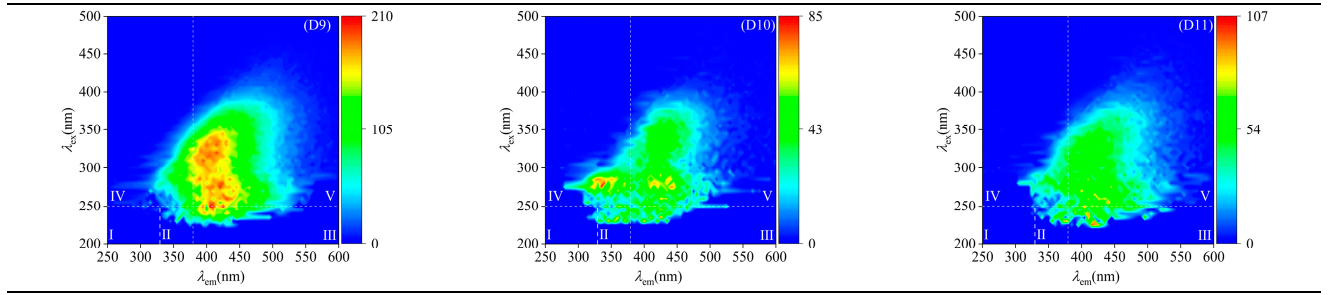
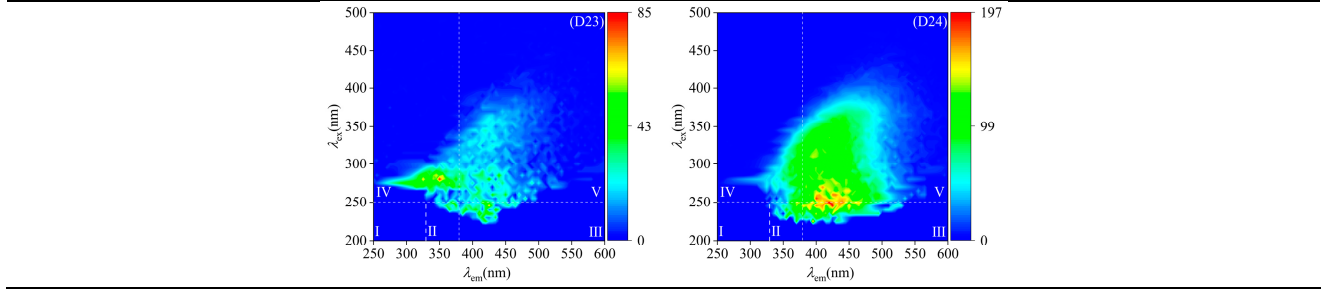
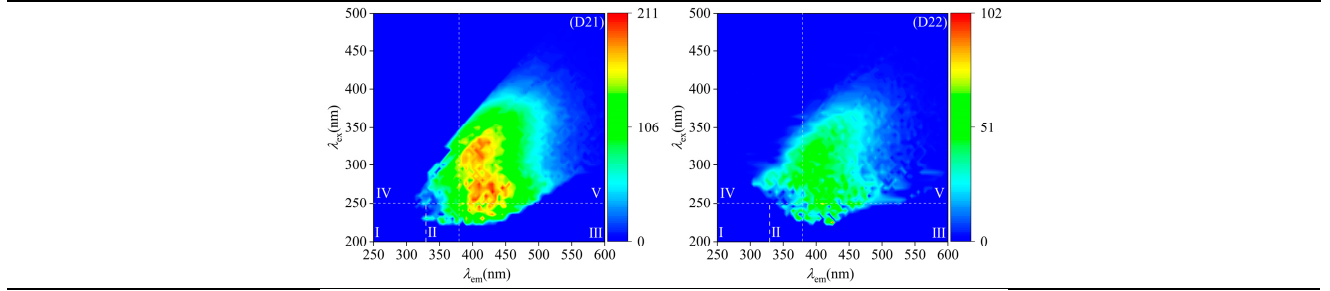
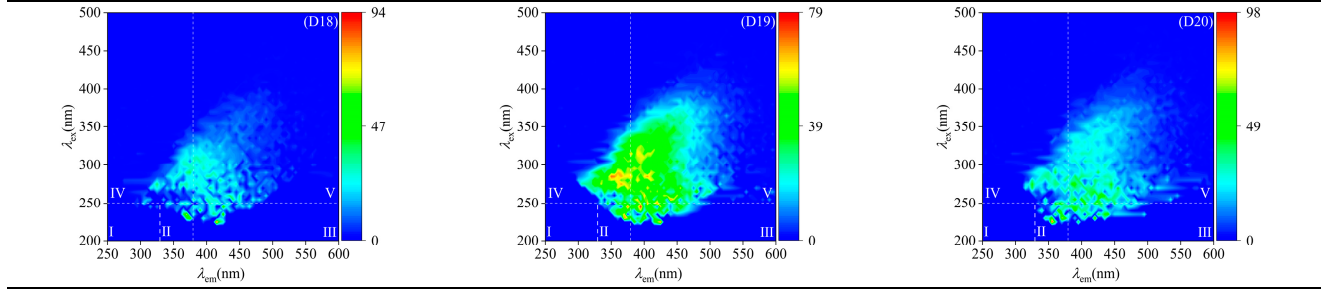
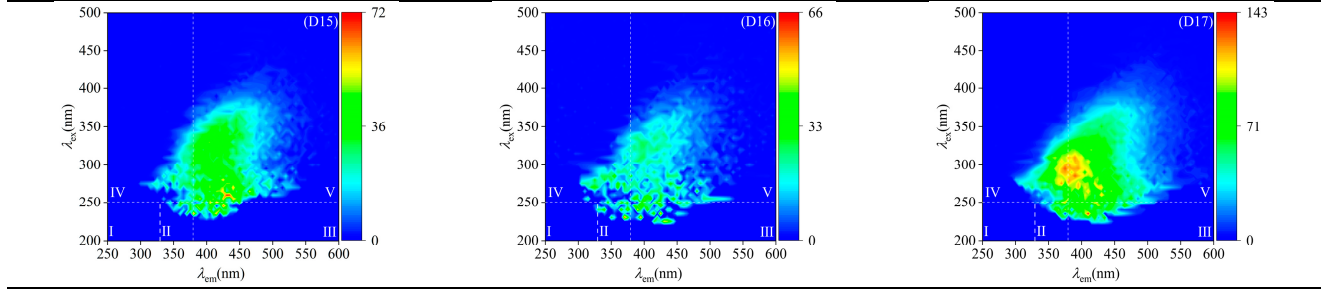
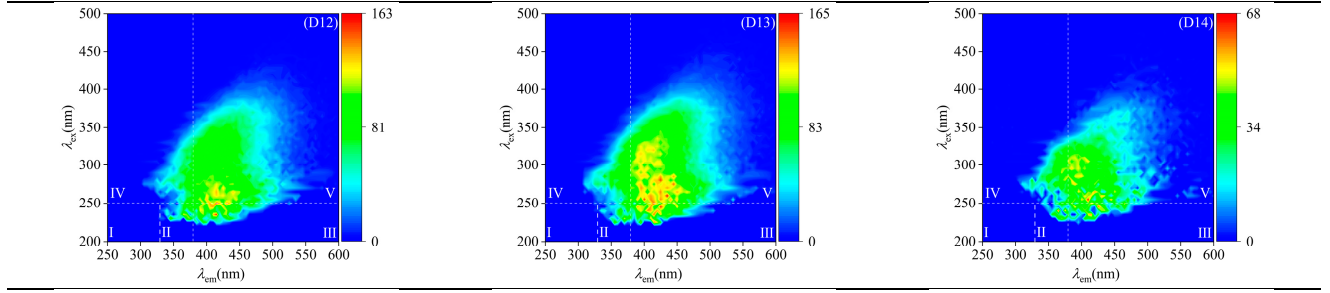


Figure S2. Gibbs diagram of groundwater samples in the Chemical Industrial park.





Group 3



Group 4

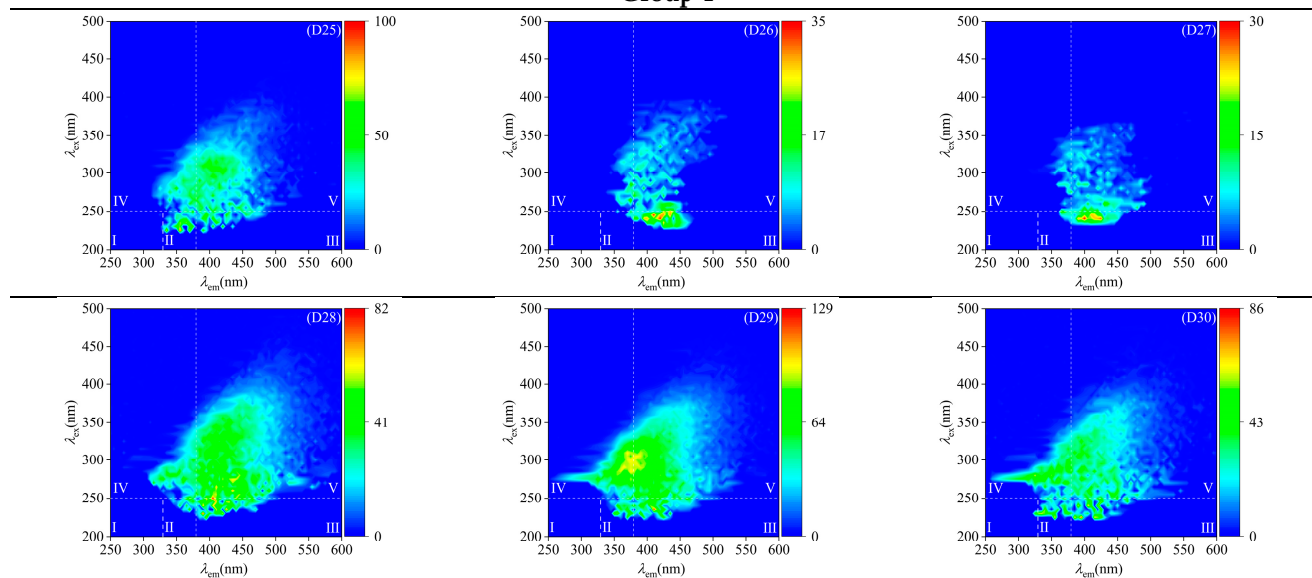


Figure S3. Excitation-emission fluorescence spectra of groundwater samples .

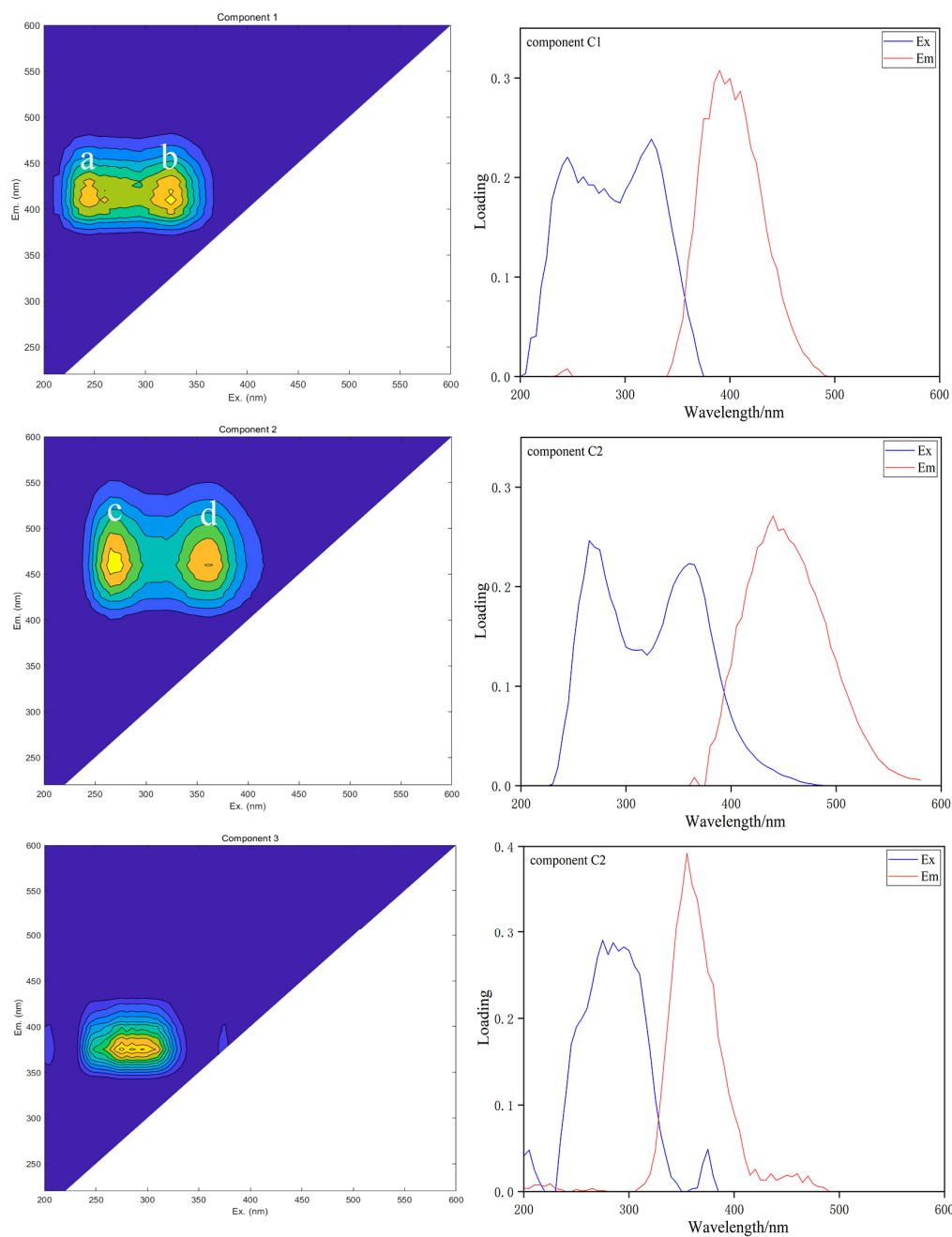


Figure S4. The excitation-emission matrix spectra of fluorescence components, including component 1 (C1, fulvic-like substance), component 2 (C2, humic-like substance) and component 3 (C3, tryptophan-like substances), identified by PARARAC model.

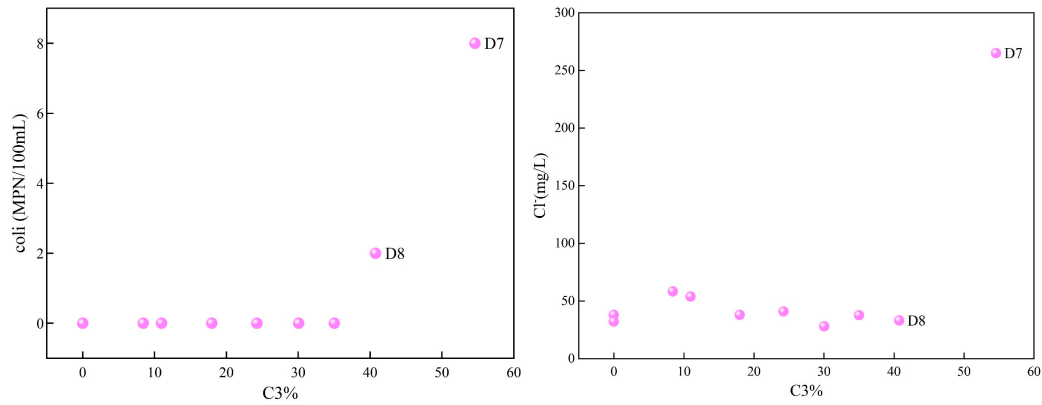


Figure S5. The correlation between the proportion of C3 component and Escherichia coli and the concentrations of Cl⁻.

Table S1. A statistical summary of groundwater chemical composition.

Index	Unit	Upstream					Within the Park					Around the Park					Downstream				
		Min	Max	Mean	SD	CV	Min	Max	Mean	SD	CV	Min	Max	Mean	SD	CV	Min	Max	Mean	SD	CV
pH	-	6.90	7.00	6.95	0.07	0.01	6.40	8.10	7.07	0.59	0.08	6.50	7.70	6.98	0.39	0.06	6.60	7.60	7.10	0.40	0.06
TH	mg/L	312.4	340.0	326.2	19.52	0.06	152.0	1810	480.3	508.5	1.06	161.0	474.0	309.3	92.14	0.30	166.0	662.0	344.7	218.6	0.63
TDS	mg/L	436.0	501.0	468.5	45.96	0.10	247.0	2060	655.7	540.8	0.82	226.0	618.0	430.5	124.7	0.29	237.0	729.0	415.0	200.5	0.48
COD _{Mn}	mg/L	1.58	4.15	2.87	1.82	0.63	1.41	32.5	9.60	12.0	1.25	1.09	3.82	2.17	0.81	0.37	0.77	2.66	1.55	0.71	0.45
HCO ₃ ⁻	mg/L	372.7	413.1	392.9	28.55	0.07	111.8	410.0	244.0	107.4	0.44	192.6	530.0	318.9	105.7	0.33	186.4	369.6	276.3	79.77	0.29
SO ₄ ²⁻	mg/L	42.70	56.60	49.65	9.83	0.20	44.60	187.0	86.84	55.67	0.64	29.80	147.0	63.01	31.05	0.49	21.40	55.80	38.38	13.13	0.34
Cl ⁻	mg/L	33.60	37.60	35.60	2.83	0.08	38.00	907.0	200.1	270.4	1.35	5.56	68.60	40.45	17.03	0.42	10.00	265.0	81.52	98.54	1.21
Na ⁺	mg/L	20.20	53.41	36.81	23.48	0.64	20.12	101.2	49.16	25.87	0.53	10.97	54.91	26.91	12.58	0.47	8.03	23.09	16.22	6.38	0.39
K ⁺	mg/L	1.99	2.97	2.48	0.69	0.28	2.25	68.60	16.20	22.32	1.38	1.13	3.85	2.16	0.88	0.41	0.51	3.08	1.89	0.94	0.50
Ca ²⁺	mg/L	85.60	115.0	100.3	20.79	0.21	50.40	436.0	124.6	119.2	0.96	47.60	128.0	84.68	22.02	0.26	44.30	184.0	98.97	60.65	0.61
Mg ²⁺	mg/L	7.98	25.30	16.64	12.25	0.74	10.40	138.0	34.82	39.37	1.13	10.30	39.80	21.62	9.14	0.42	11.00	46.50	22.72	14.15	0.62

CV coefficient of variation, SD standard deviation, TH total hardness, TDS total dissolved solid.

Table S2. Statistical table of Escherichia coli in Groundwater

Samples		Escherichia coli (MPN/100 mL)
upstream	D2	0
	D3	0
	D4	0
	D5	0
	D6	0
	D7	8
within the CPI	D8	2
	D9	0
	D10	0
	D11	0