

Supplementary Data

Effective extraction and determination of 24 quinolones in water and egg samples by a novel magnetic covalent organic framework combined with UPLC-MS/MS

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Table of contents

Table. S1. The properties of 24 kinds of QNs.

Table. S2. Mass spectrometry conditions of 24 kinds of QNs.

Table. S3. Matrix effects of 24 QNs.

Table. S4. The Recoveries and RSDs of 24 kinds of QNs spiked at three levels in the in water and egg samples (n=5).

Fig. S1. Optimization of MSPE parameters.

Fig. S2. Reusable times of Fe₃O₄@SiO₂@Ah-COF.

Fig. S3. Chromatograms of 24 kinds of QNs.

Table. S1. The properties of 24 kinds of QNs.

Quinolones	Abbreviation	CAS	Molecular formula	Molecular mass	Purity (%)
Lufloxacin	LuFu	101363-10-4	C ₁₇ H ₁₈ FN ₃ O ₃ S	363.41	99.9
Enoxacin	ENO	74011-58-8	C ₁₅ H ₁₇ FN ₄ O ₃	320.32	99.9
Norfloxacin	NOR	70458-96-7	C ₁₆ H ₁₈ FN ₃ O ₃	319.33	99.8
Fleroxacin	FuLuo	79660-72-3	C ₁₇ H ₁₈ F ₃ N ₃ O ₃	369.34	99.9
Ofloxacin	OFL	82419-36-1	C ₁₈ H ₂₀ FN ₃ O ₄	361.37	99.5
Pefloxacin	PEF	70458-92-3	C ₁₇ H ₂₀ FN ₃ O	333.36	99.3
Antofloxacin	ANT	873888-67-6	C ₁₈ H ₂₁ FN ₄ O ₄	376.38	99.5
Ciprofloxacin	CIP	85721-33-1	C ₁₇ H ₁₈ FN ₃ O ₃	331.34	98.0
Lomefloxacin	LOM	98079-57-1	C ₁₇ H ₁₉ F ₂ N ₃ O ₃	351.35	99.8
Rosoxacin	Luosuo	40034-42-2	C ₁₇ H ₁₄ N ₂ O ₃	294.30	99.3
Danofloxacin	DaNuo	112398-08-0	C ₁₉ H ₂₀ FN ₃ O ₃	357.38	99.9
Enrofloxacin	ENR	93106-60-6	C ₁₉ H ₂₂ FN ₃ O ₃	359.39	99.9
Orbifloxacin	ORB	113617-63-1	C ₁₉ H ₂₀ F ₃ N ₃ O ₃	395.38	99.8
Gatifloxacin	GAT	112811-59-3	C ₁₉ H ₂₂ FN ₃ O ₄	375.39	99.6
Sarafloxacin	SAR	98105-99-8	C ₂₀ H ₁₇ F ₂ N ₃ O ₃	385.36	99.5
Difloxacin	DIF	98106-17-3	C ₂₁ H ₁₉ F ₂ N ₃ O ₃	399.39	99.9
Sparfloxacin	SPA	110871-86-8	C ₁₉ H ₂₂ F ₂ N ₄ O ₃	392.40	99.8
Gemifloxacin	GEM	175463-14-6	C ₁₈ H ₂₀ FN ₅ O ₄	389.38	99.6
Moxifloxacin	MOX	86826-86-8	C ₂₁ H ₂₅ ClFN ₃ O ₄	401.43	99.5
Tosufloxacin	TOS	108138-46-1	C ₁₉ H ₁₅ F ₃ N ₄ O ₃	404.34	70.6
Balofloxacin	BAL	127294-70-6	C ₂₀ H ₂₄ FN ₃ O ₄	389.42	99.9
Temafloxacin	TIMA	108319-06-8	C ₂₁ H ₁₈ F ₃ N ₃ O ₃	417.38	99.6
Milofloxacin	MILO	37065-29-5	C ₁₂ H ₉ NO ₆	263.20	95.2
Garenoxacin	Jialei	194804-75-6	C ₂₃ H ₂₀ F ₂ N ₂ O ₄	426.41	99.9

Table. S2. Mass spectrometry conditions of 24 kinds of QNs.

Compounds	Retention (min)	Precursor ion (m/z)	Declustering potential (V)	Product ion (m/z)	Collision energy (eV)
LuFu	3.44	364.1	125	346.2*, 320.2	18/22
ENO	3.66	321.1	110	330.1*, 234.1	18/22
NOR	4.18	320.1	115	276.0*, 233.0	18/25
FuLuo	4.22	370.1	130	326.1*, 269.1	20/26
OFL	4.28	362.2	130	318.0*, 218.2	22/24
PEF	4.46	334.1	120	316.1*, 290.1	20/18
ANT	4.61	377.1	125	333.3*, 276.0	20/22
CIP	4.63	332.1	125	314.1*, 288.1	18/20
LOM	5.62	352.1	130	265.1*, 308.2	22/20
Luosuo	5.71	294.9	90	277.1*, 217.1	12/22
DaNuo	5.71	358.1	130	340.1*, 314.1	20/22
ENR	6.57	360.1	120	316.2*, 245.0	22/22
ORB	7.32	396.1	130	352.2*, 295.1	20/26
GAT	9.23	376.2	140	332.0*, 261.1	20/22
SAR	9.94	386.1	130	368.1*, 342.1	20/20
DIF	10.56	400.1	135	382.2*, 356.1	20/20
SPA	11.18	393.1	135	349.2*, 292.2	20/25
GEM	13.45	390.1	115	372.2*, 313.1	20/32
MOX	13.51	402.2	135	384.2*, 358.2	22/20
TOS	13.59	405.1	115	387.2*, 344.0	20/28
BAL	13.95	390.1	115	359.2*, 315.2	12/20
TIMA	14.27	418.1	135	400.2*, 374.2	20/20
MILO	13.54	264.0	80	246.0*/215.0	12/20
Jialei	16.22	427.1	120	366.2*, 285.9	20/30

Table. S3. Matrix effects of 24 QNs

Analytes	ME (%)	
	water	egg
LuFu	111.8	93.3
ENO	82.4	112.1
NOR	85.0	99.7
FuLuo	97.9	106.4
OFL	114.4	116.4
PEF	94.7	108.3
ANT	99.3	104.3
CIP	89.0	102.5
LOM	92.8	106.9
Luosuo	104.3	108.4
DaNuo	88.9	110.4
ENR	95.8	83.2
ORB	103.6	98.8
GAT	97.8	108.6
SAR	89.4	95.5
DIF	99.4	88.9
SPA	119.8	92.5
GEM	82.2	113.7
MOX	100.5	97.9
TOS	100.6	113.4
BAL	117.0	97.9
TIMA	80.1	105.5
MILO	80.1	105.5
Jialei	85.4	80.3

Table. S4. The Recoveries and RSDs of 24 kinds of QNs spiked at three levels in the in water and egg samples (n=5)

Analytes	Water			Egg		
	Spiked concentration ($\mu\text{g}\cdot\text{L}^{-1}$)	Recovery (%)	RSD (%)	Spiked concentration ($\mu\text{g}\cdot\text{L}^{-1}$)	Recovery (%)	RSD (%)
LuFu	0.1	84.6	7.84	2	75.1	8.95
	2	94.9	4.35	4	80.6	6.95
	10	94.9	7.60	40	77.6	9.96
ENO	0.1	73.2	9.22	2	116.2	9.10
	2	83.8	8.25	4	97.3	8.25
	10	91.7	7.35	40	91.5	9.27
NOR	0.1	76.6	4.34	2	101.1	4.60
	2	83.7	7.93	4	114.5	9.07
	10	102.1	4.11	40	85.8	6.41
FuLuo	0.1	99.3	4.00	2	70.5	7.73
	2	96.3	3.23	4	72.9	9.39
	10	86.3	4.85	40	79.9	7.90
OFL	0.1	71.6	8.13	2	75.6	8.08
	2	93.8	2.15	4	79.3	8.71
	10	89.7	5.05	40	78.4	2.87
PEF	0.1	77.7	8.17	2	72.8	9.03
	2	87.1	7.54	4	84.4	9.05
	10	91.5	2.25	40	81.5	6.80
ANT	0.1	80.9	0.95	2	83.3	8.88
	2	80.6	8.00	4	97.9	2.46
	10	91.1	5.92	40	79.7	3.47
CIP	0.1	71.1	2.10	2	119.7	8.35
	2	84.8	3.36	4	90.1	7.56
	10	97.6	2.75	40	76.9	7.61
LOM	0.1	70.4	7.02	2	119.2	7.96
	2	87.0	2.87	4	115.7	5.68
	10	86.2	3.73	40	83.1	6.49

Luosuo	0.1	73.6	6.68	2	71.9	9.25
	2	87.4	9.61	4	73.2	5.96
	10	106.1	4.99	40	83.0	9.30
DaNuo	0.1	95.9	9.03	2	114.4	6.33
	2	77.6	10.44	4	106.5	9.12
	10	86.1	2.86	40	86.7	6.33
ENR	0.1	89.0	9.80	2	75.8	8.06
	2	87.1	4.07	4	79.7	6.12
	10	91.5	3.09	40	86.5	7.05
ORB	0.1	73.4	9.10	2	73.5	7.60
	2	101.8	4.79	4	72.1	5.56
	10	94.1	2.79	40	70.5	4.14
GAT	0.1	91.2	5.58	2	114.8	7.85
	2	91.1	3.08	4	112.7	5.11
	10	91.8	3.85	40	78.9	5.22
SAR	0.1	70.6	5.00	2	108.4	6.15
	2	82.3	6.50	4	72.2	8.88
	10	100.9	4.05	40	76.3	5.11
DIF	0.1	71.2	1.58	2	76.1	8.66
	2	95.1	1.95	4	76.2	7.65
	10	94.7	5.55	40	82.9	6.63
SPA	0.1	73.3	6.44	2	93.0	8.13
	2	91.8	3.28	4	72.6	9.22
	10	95.3	2.66	40	72.9	6.74
MOX	0.1	86.9	9.83	2	93.2	5.30
	2	92.5	3.64	4	107.5	3.86
	10	96.9	5.63	40	92.46	4.00
TOS	0.1	83.4	9.71	2	81.2	5.42
	2	87.3	4.43	4	73.7	9.34
	10	84.5	7.95	40	74.3	1.89
GEM	0.1	84.9	5.83	2	96.4	7.45
	2	76.4	5.05	4	107.5	5.33

	10	79.6	3.90	40	78.1	3.80
BAL	0.1	74.1	8.91	2	105.8	9.05
	2	95.3	2.32	4	114.0	7.20
	10	95.4	3.74	40	89.5	7.64
TIMA	0.1	78.8	4.15	2	72.1	6.68
	2	96.6	2.49	4	72.8	7.00
	10	96.2	3.08	40	77.6	4.48
MILO	0.1	71.9	3.51	2	72.4	3.51
	2	73.6	4.70	4	73.6	4.70
	10	70.3	3.46	40	70.4	3.46
JiaLei	0.1	79.0	3.37	2	72.4	9.48
	2	79.8	1.64	4	71.3	8.59
	10	92.1	2.97	40	72.6	6.38

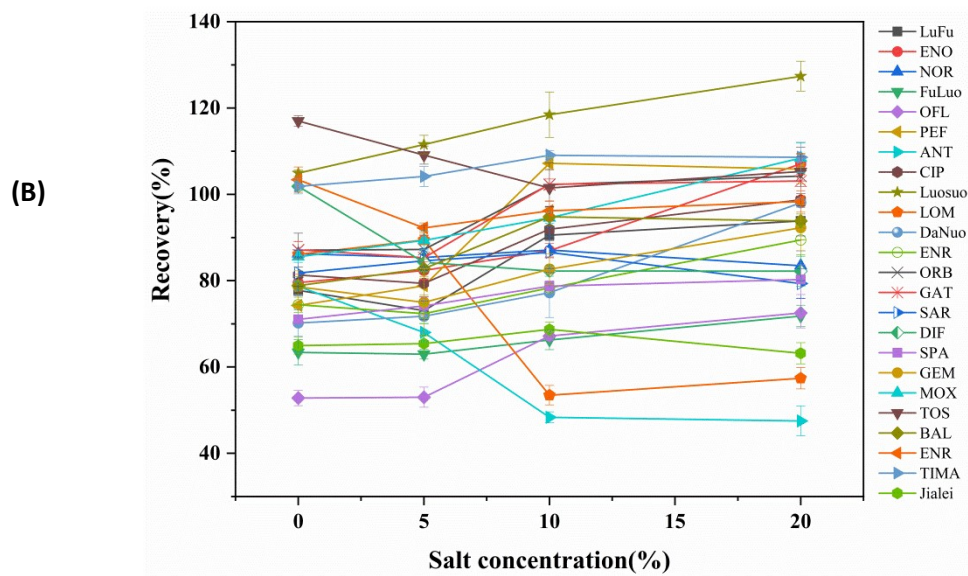
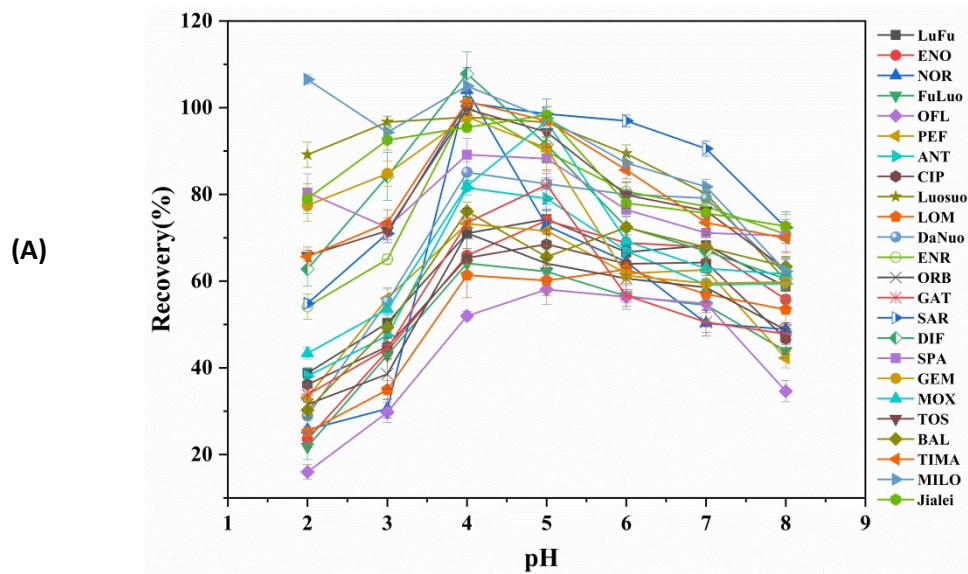


Fig. S1. Optimization of MSPE parameters: (A) pH, (B) salt concentration.

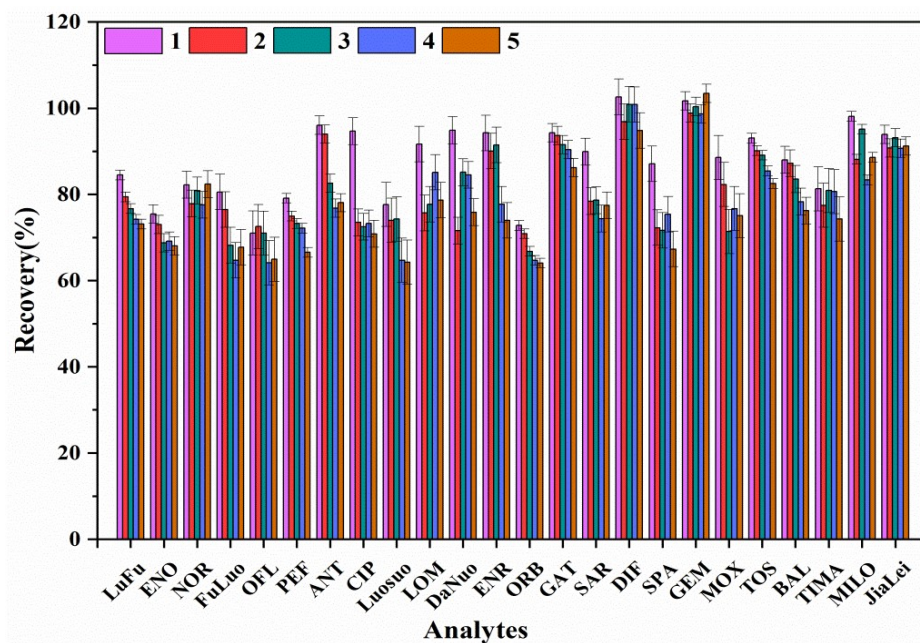


Fig. S2. Reusable times of $\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{Ah-COF}$.

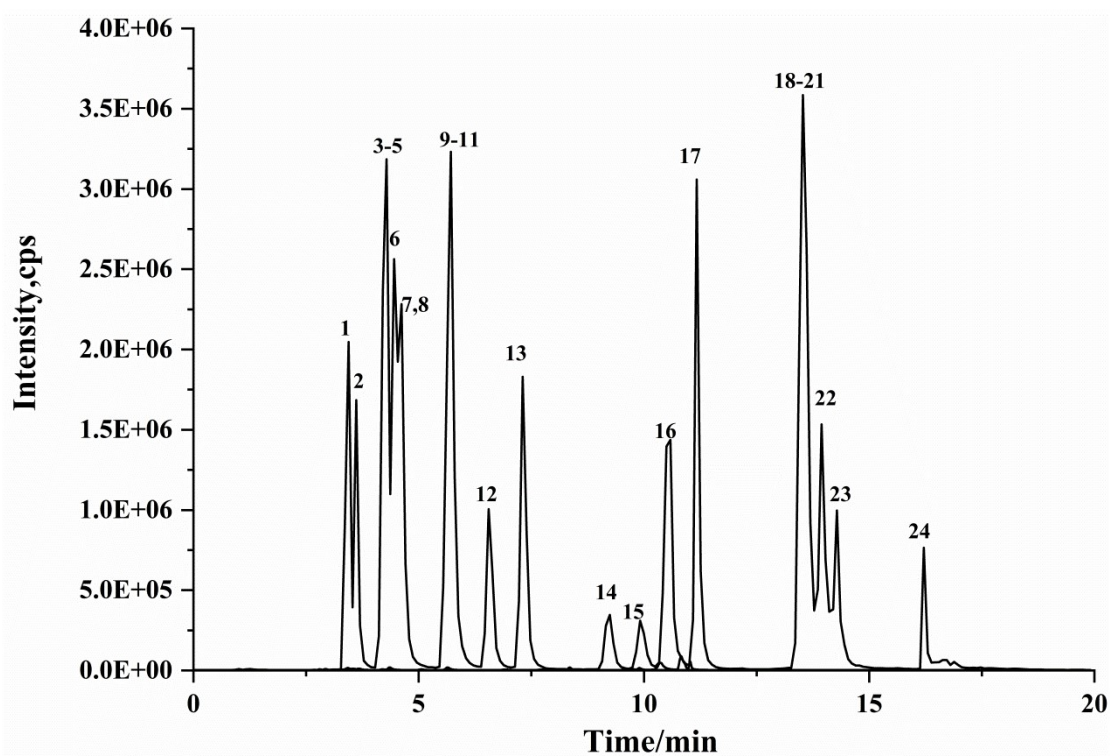


Fig. S3 Chromatograms of 24 kinds of QNs 1. LuFu 2. ENO 3. NOR 4. FuLuo 5. OFL 6. PEF 7. ANT 8. CIP 9. LOM 10. Luosuo 11. DaNuo 12. ENR 13. ORB 14. GAT 15. SAR 16. DIF 17. SPA 18. GEM 19. MOX 20. TOS 21. BAL 22. TIMA 23. MILO 24. JiaLei