Electronic Supplementary Information

Phenothiazine-based "turn-on" fluorescent probe for the detection of hydrazine in water, soil, plant and food samples

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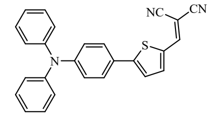
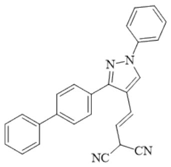
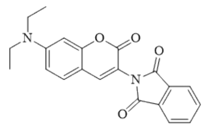
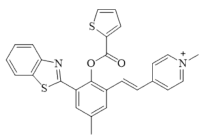
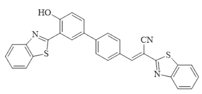
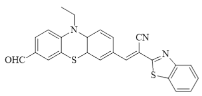
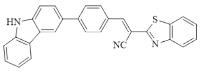
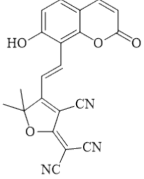
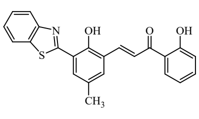
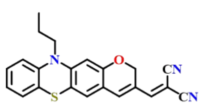
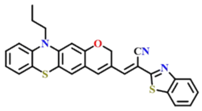
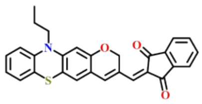
Table S1 Comparison of fluorescent probes for N_2H_4

Probe structures	$\lambda_{ex}/\lambda_{em}$	Detection limit	Stokes shift (nm)	Fluorescence excitation / quenching multiple	Application	Response time
 [1]	λ_{ex} = 286 nm λ_{em} =467 nm	1.51 μM	181	586	live cells ; zebrafish	110 min
 [2]	λ_{ex} =295 nm λ_{em} =484 nm	0.197 μM	189	23	cell imaging; test paper strips; soil samples	18 min
 [3]	λ_{ex} =400 nm λ_{em} =530 nm	0.148 μM	130	28	Water; soil; air; cells; zebrafish; plants	8 min
 [4]	λ_{ex} = 415 nm λ_{em} = 510 nm	23.6 nM	95	-	living cells; zebrafish; plants	<10 s
 [5]	λ_{ex} = 369 nm λ_{em} = 490 nm	0.438 μM	121	6	Water; cells; zebrafish	45 min
 [6]	λ_{ex} = 340 nm λ_{em} = 545 nm	0.08 μM	205	<3	HeLa cells; zebrafish	25 min
 [7]	λ_{ex} = 330 nm λ_{em} = 430 nm	39 nM	100	-	cells	15 s
 [8]	λ_{ex} = 330 nm λ_{em} = 450 nm	0.818 nM	120	-	A549 Cells; real water samples	10 s
 [9]	λ_{ex} = 405 nm λ_{em} = 492 nm	6.7 nM	87	-	Water; cells	12min

 This work	λ_{ex} = 389 nm λ_{em} = 550 nm	7.27 μM	161	5.9	Water; soil	60 s
 This work	λ_{ex} = 360 nm λ_{em} = 550 nm	1.05 nM	190	550	Water; soil	15 min
 This work	λ_{ex} = 365 nm λ_{em} = 550 nm	26.65 nM	185	38.5	Water; soil	30 min

"—" Not mentioned.

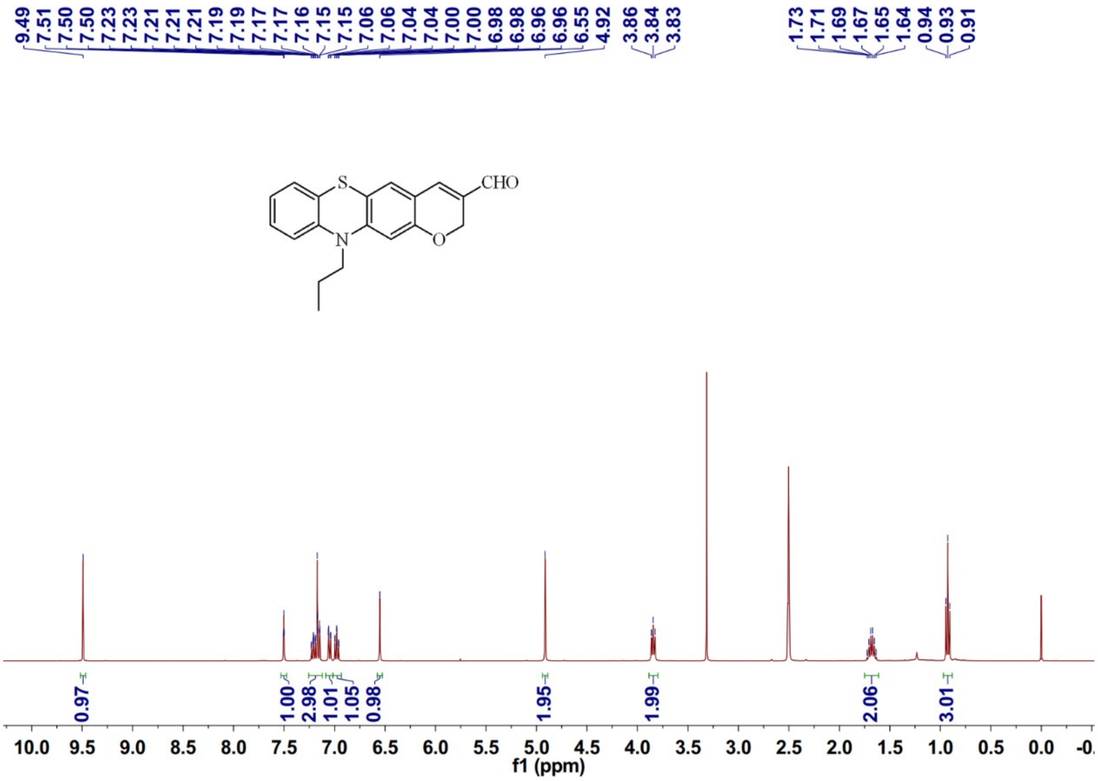


Fig. S1. ^{1}H NMR of compound **1** in DMSO-d_6.

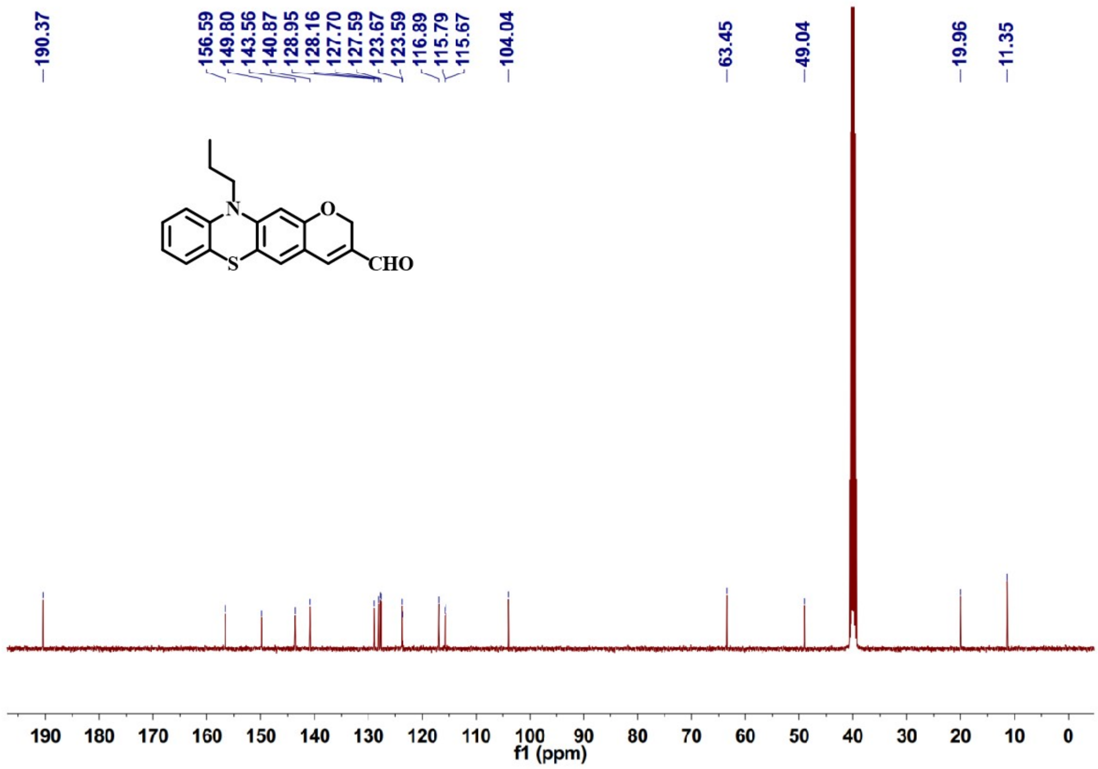


Fig. S2 ^{13}C NMR of compound **1** in DMSO-d_6

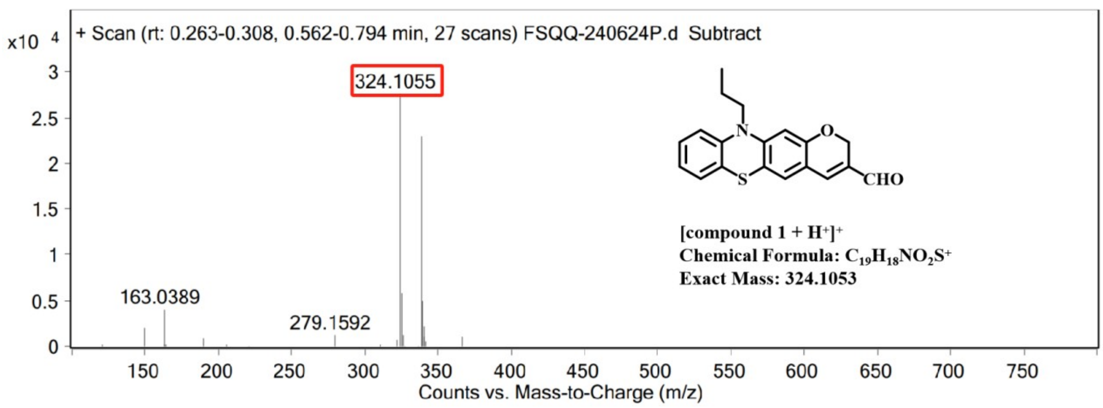


Fig. S3 HR MS of compound **1**.

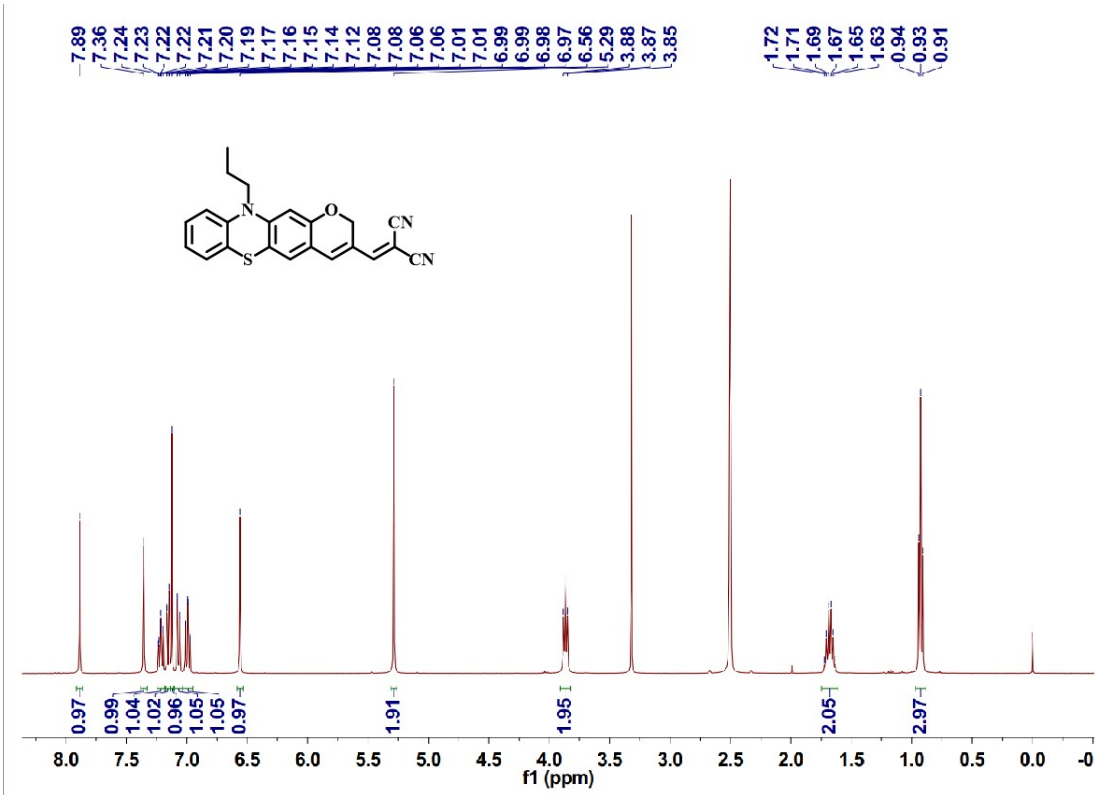


Fig. S4 ^{1}H NMR of **ZWQ-1** in DMSO-d_6.

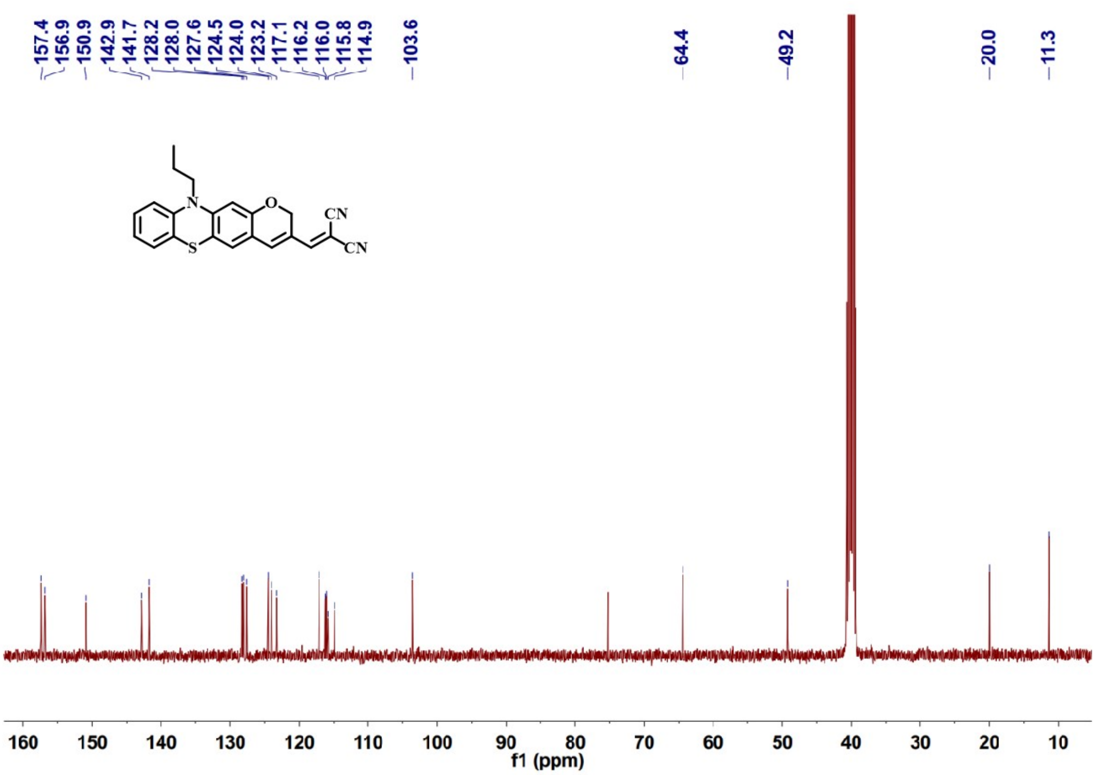


Fig. S5 ^{13}C NMR of probe **ZWQ-1** in DMSO-d_6.

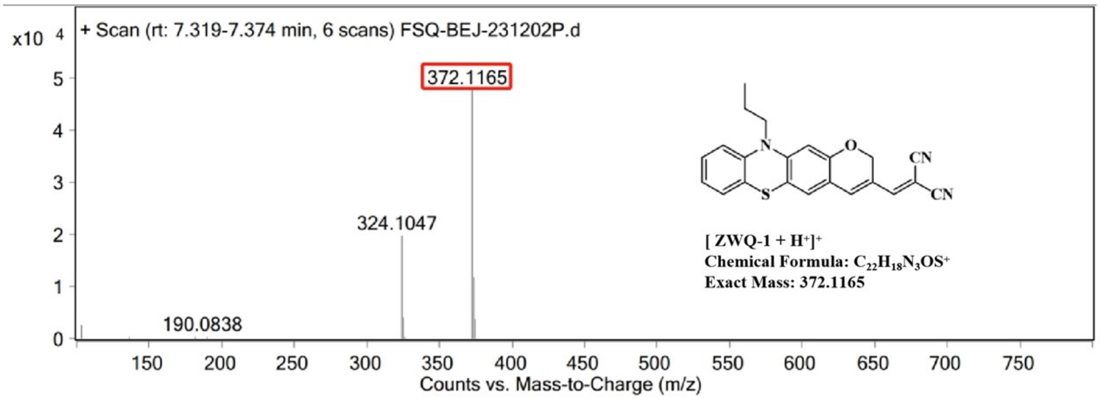


Fig. S6 HR MS of **ZWQ-1**.

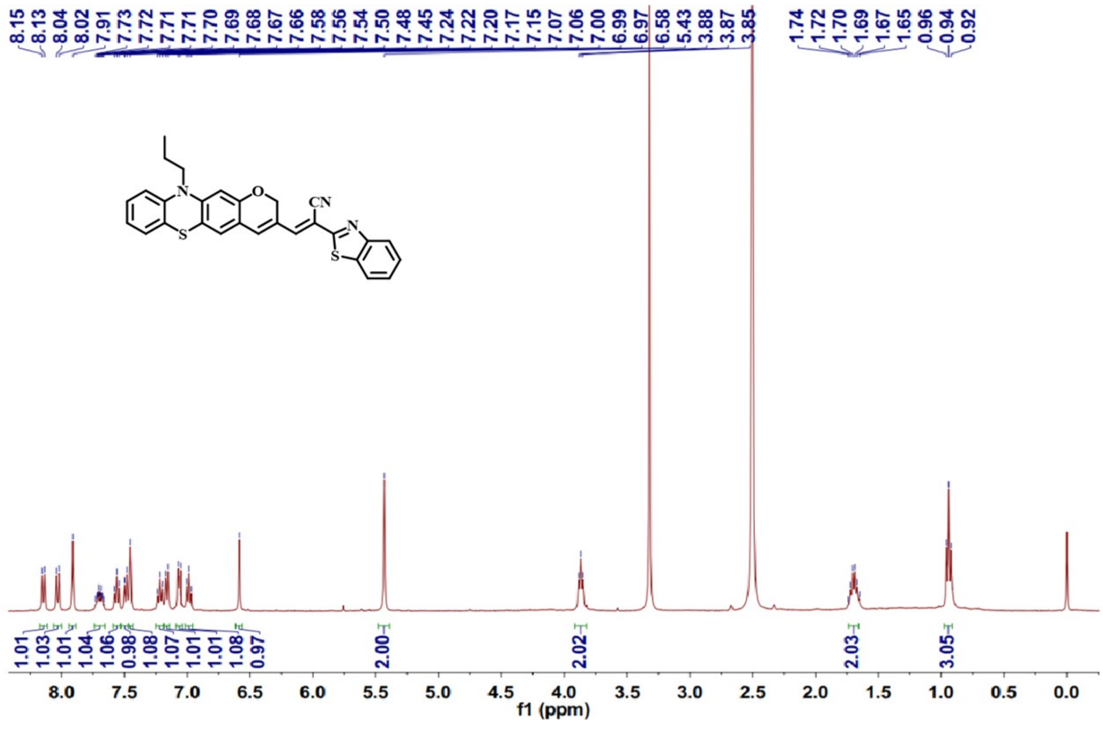


Fig. S7 ^{1}H NMR of **ZWQ-2** in DMSO-d_6.

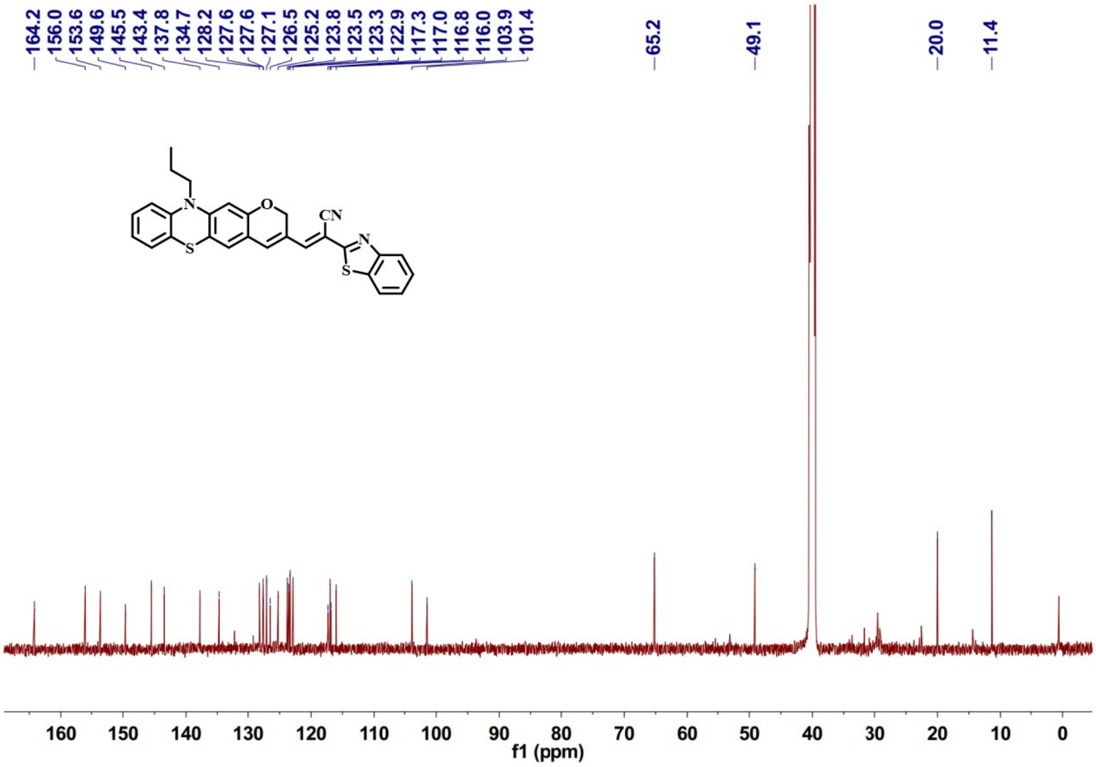


Fig. S8 ^{13}C NMR of **ZWQ-2** in DMSO-d_6.

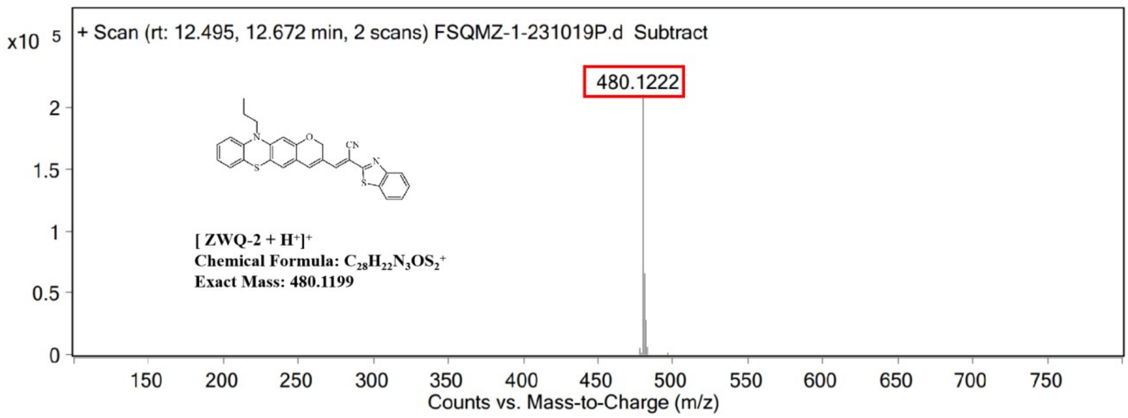


Fig. S9 HR MS of **ZWQ-2**.

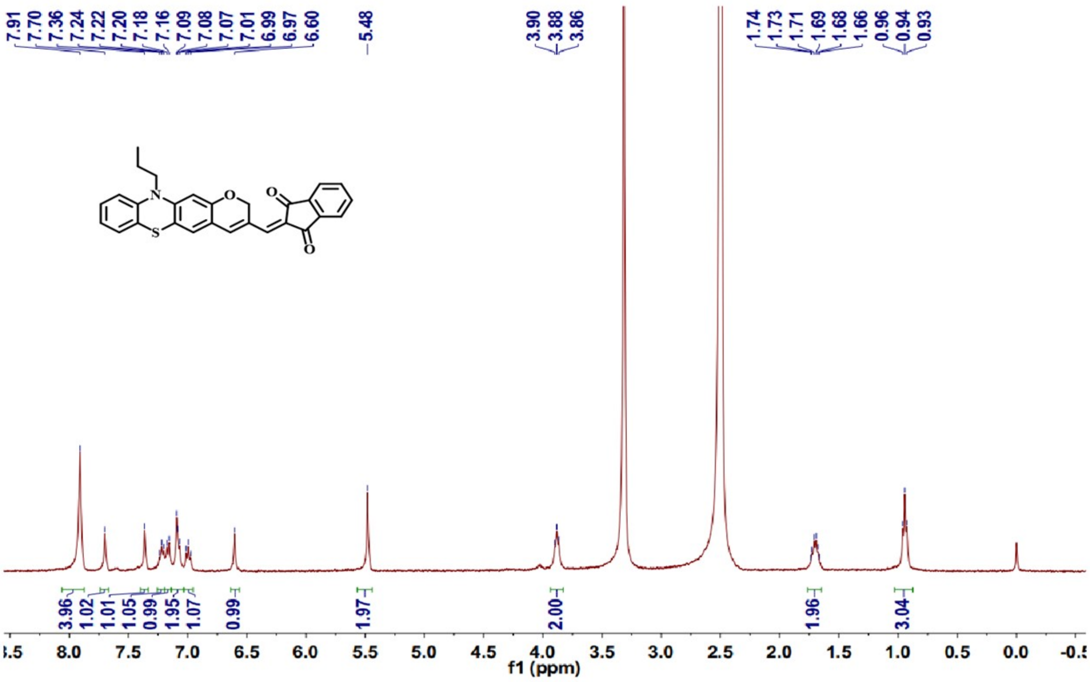


Fig. S10 ^{1}H NMR spectrum of **ZWQ-3** in DMSO-d_6.

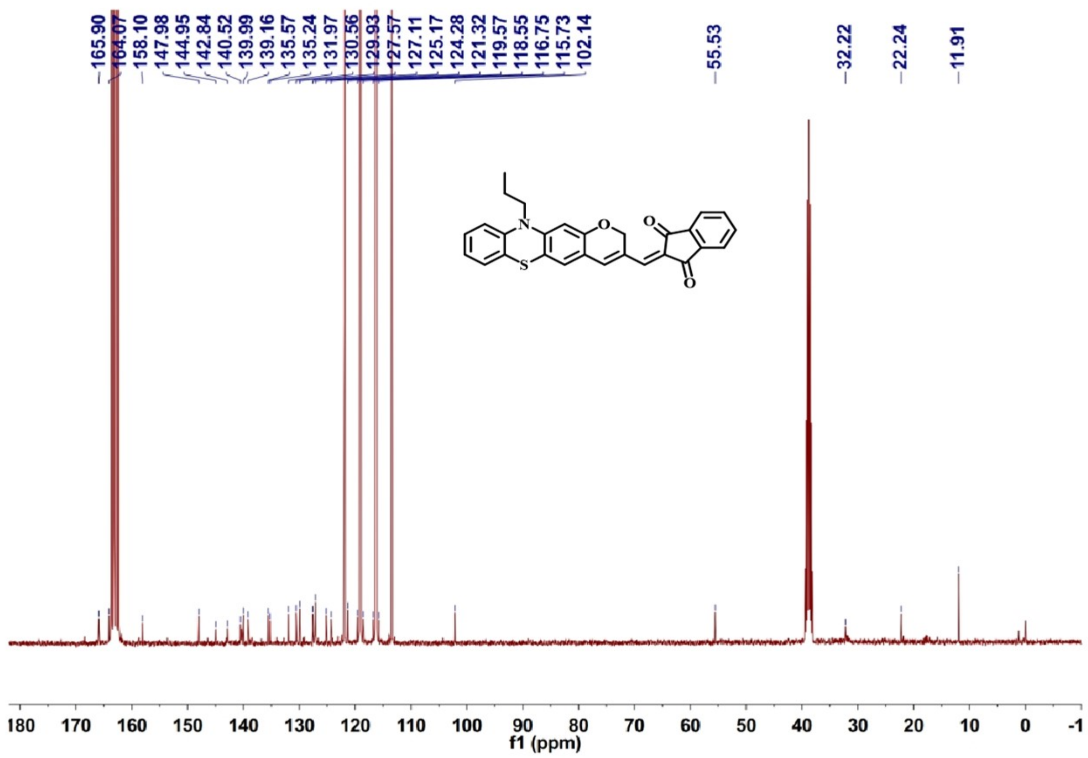


Fig. S11 ^{13}C NMR of **ZWQ-3** in DMSO-d_6.

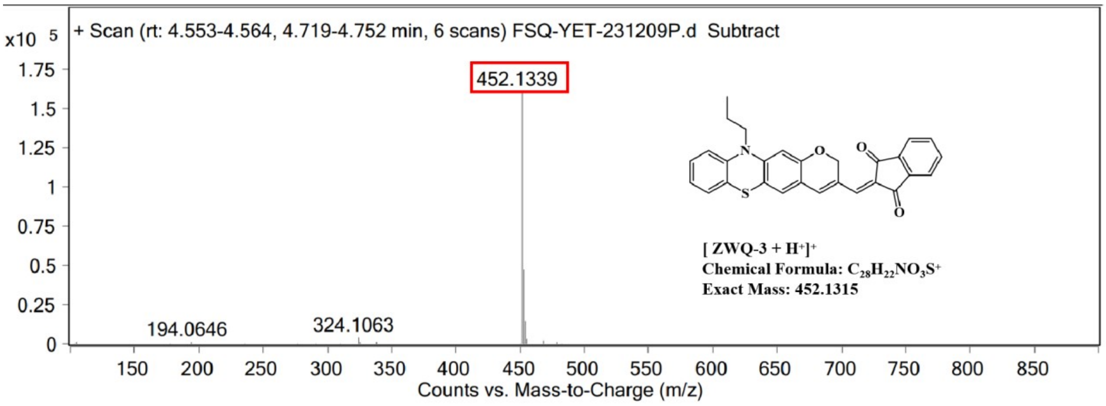


Fig. S12 HR MS of **ZWQ-3**.

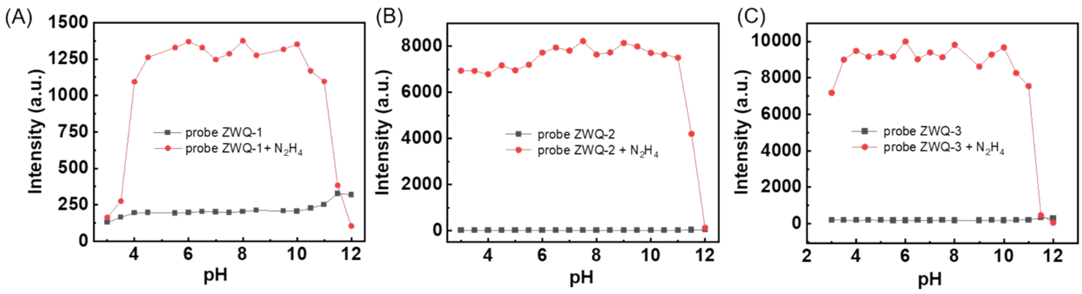


Fig. S13 pH-dependent fluorescence responses of (A) **ZWQ-1**, (B) **ZWQ-2** and (C) **ZWQ-3** to N_2H_4

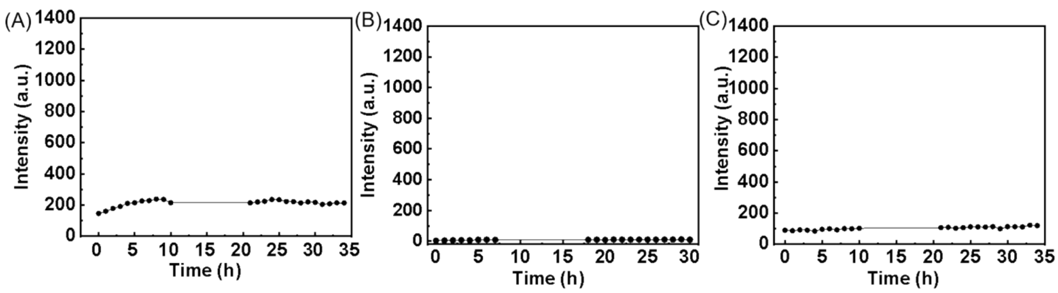


Fig. S14 Stability of (A) **ZWQ-1**, (B) **ZWQ-2** and (C) **ZWQ-3**

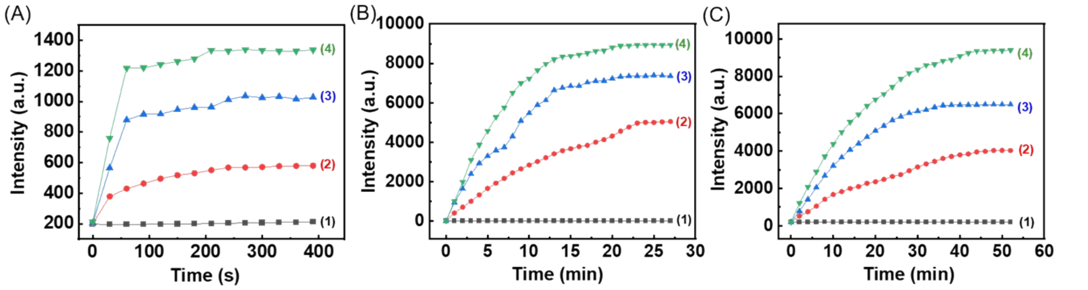


Fig. S15 Time-dependent fluorescence responses of (A) **ZWQ-1**, (B) **ZWQ-2** and (C) **ZWQ-3** to N_2H_4

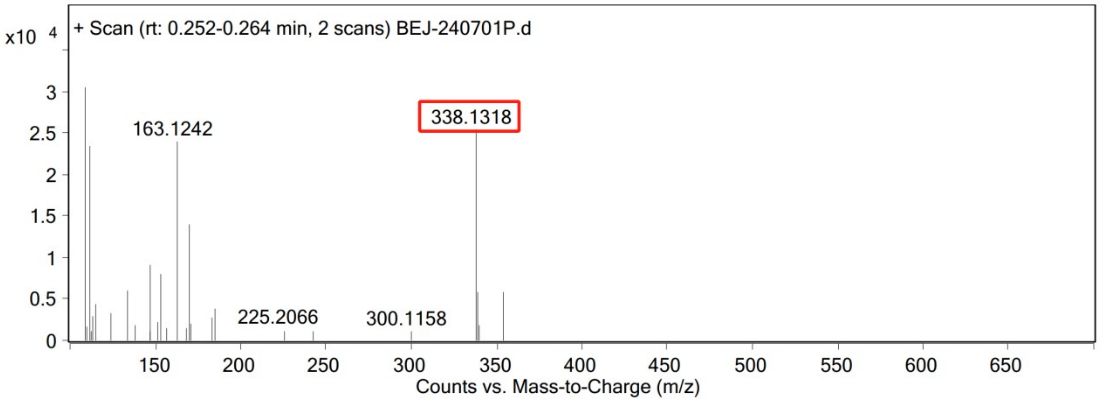


Fig. S16 HR MS of **ZWQ-1** in the presence of N_2H_4

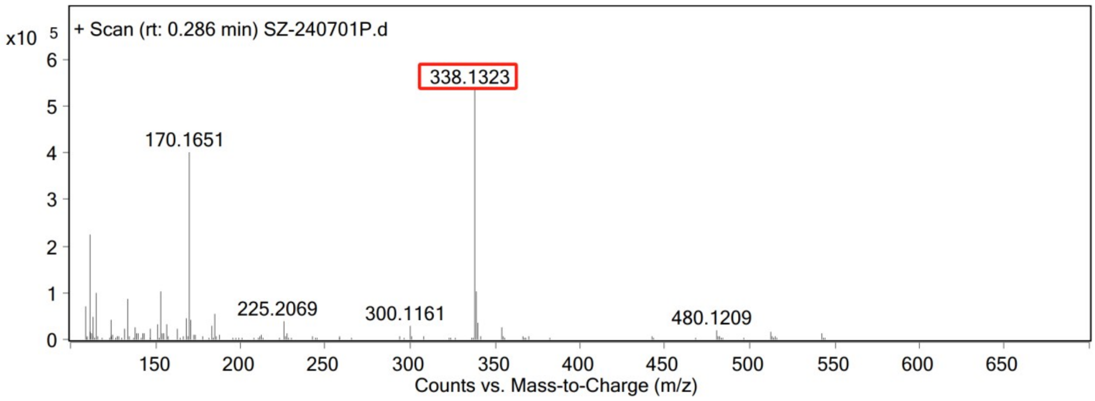


Fig. S17 HR MS of **ZWQ-2** in the presence of N_2H_4

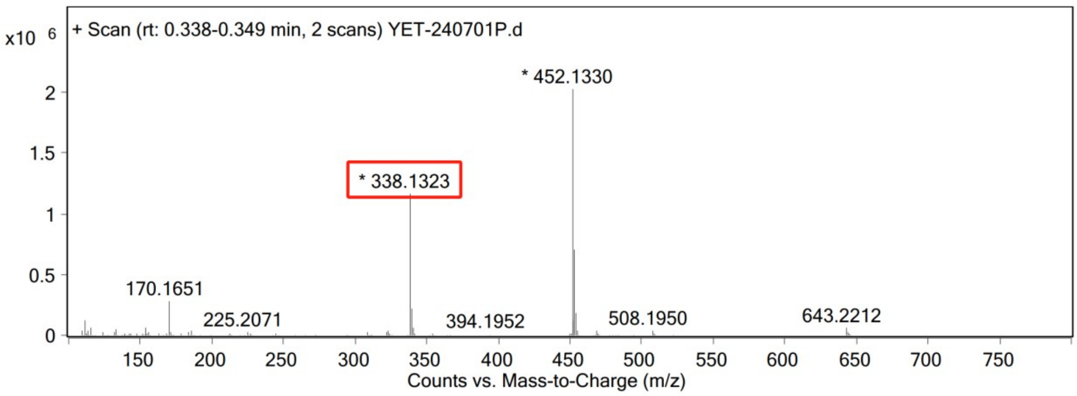


Fig. S18 HR MS of **ZWQ-3** in the presence of N_2H_4

Table S1 Probe **ZWQ-1** validates the N_2H_4 detection method in real water samples.

Water sample	Added (μL)	Founded (μL)	Recovery (%)
Tap water	5	4.947	98.9
	10	10.06	100.6
	15	14.985	99.9
Lake water	5	5.125	102.5
	10	9.993	99.9
	15	15.045	100.3
River later	5	4.945	98.9
	10	9.934	99.3
	15	14.955	99.7

Table S2 Probe **ZWQ-2** validates the N_2H_4 detection method in real water samples.

Water sample	Added (μL)	Founded (μL)	Recovery (%)
Tap water	5	4.935	98.7
	10	10.151	101.5
	15	15.122	100.8
Lake water	5	4.931	98.6
	10	9.936	99.3
	15	15.03	100.2
River later	5	5.054	101.1
	10	10.152	101.5
	15	14.737	98.2

Table S3 Probe **ZWQ-3** validates the N_2H_4 detection method in real water samples.

Water sample	Added (μL)	Founded (μL)	Recovery (%)
Tap water	5	4.935	98.7
	10	9.87	98.7
	15	15.012	100.1
Lake water	5	4.818	96.4
	10	9.748	97.5
	15	15.007	100
River later	5	4.85	97.0
	10	9.844	98.4
	15	14.923	99.5

References

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