Electronic Supplementary Information

Adsorption and Advanced Oxidation of Diverse Pharmaceuticals and Personal Care Products (PPCPs) from Water Using Highly Efficient rGO-nZVI Nanohybrids

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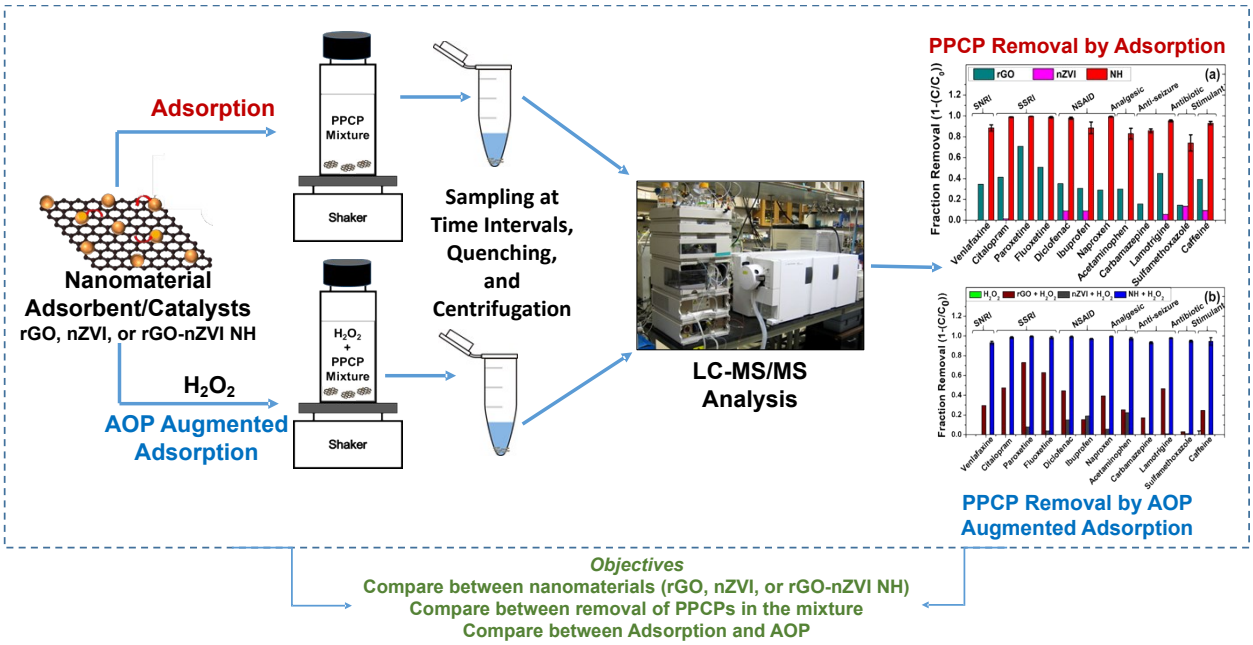

Figure S1. Experimental steps for evaluating the performance of nanomaterial catalyst/oxidant system in removing PPCPs in the mixture.

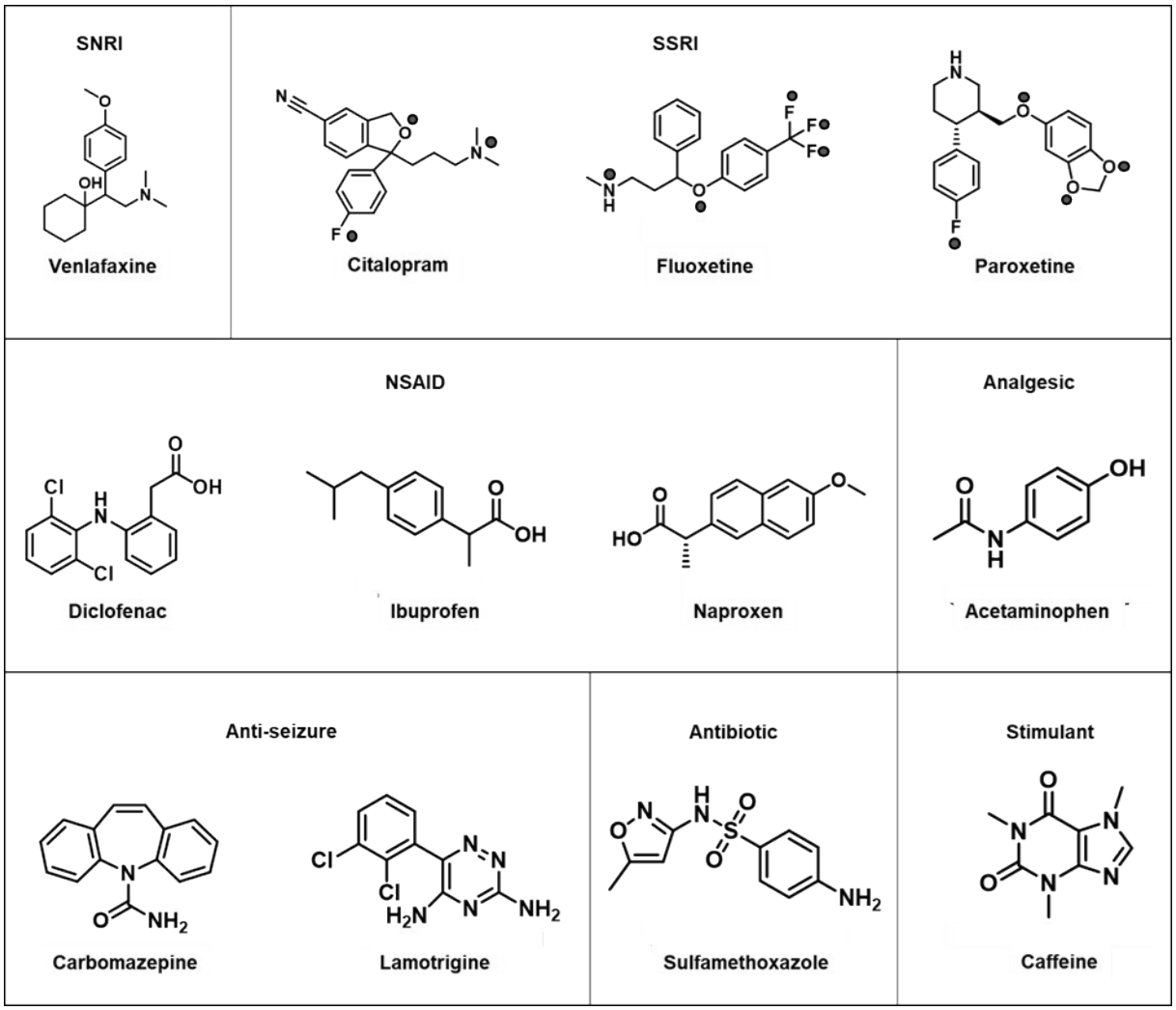

Figure S2: Chemical structures of 12 PPCPs investigated in this study.

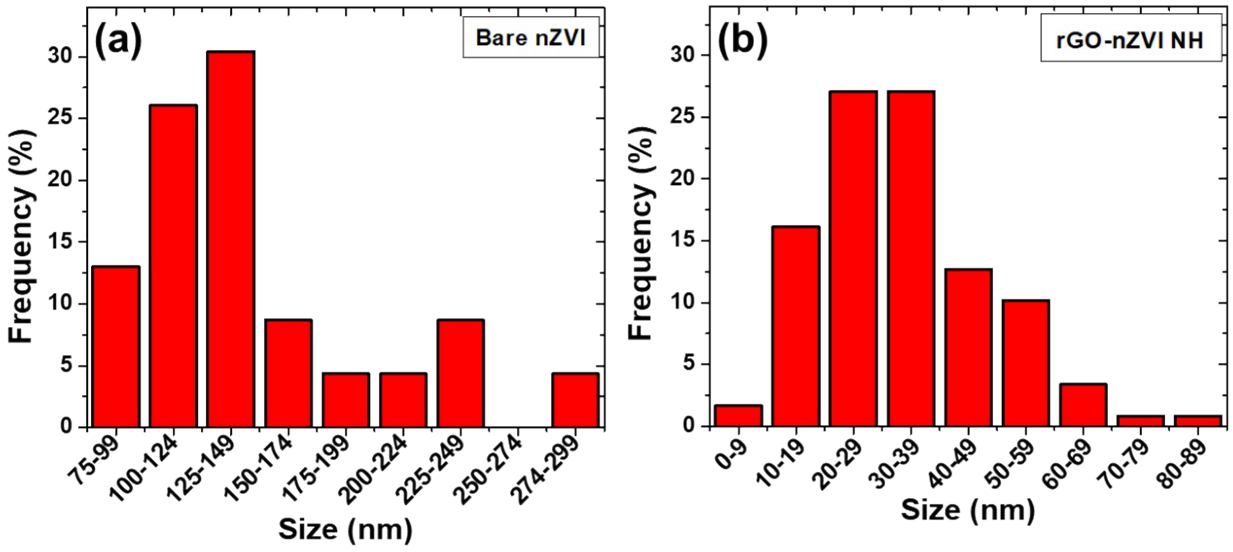

Figure S3: nZVI particle size distribution in bare (a) nZVI and (b) rGO-nZVI NH.

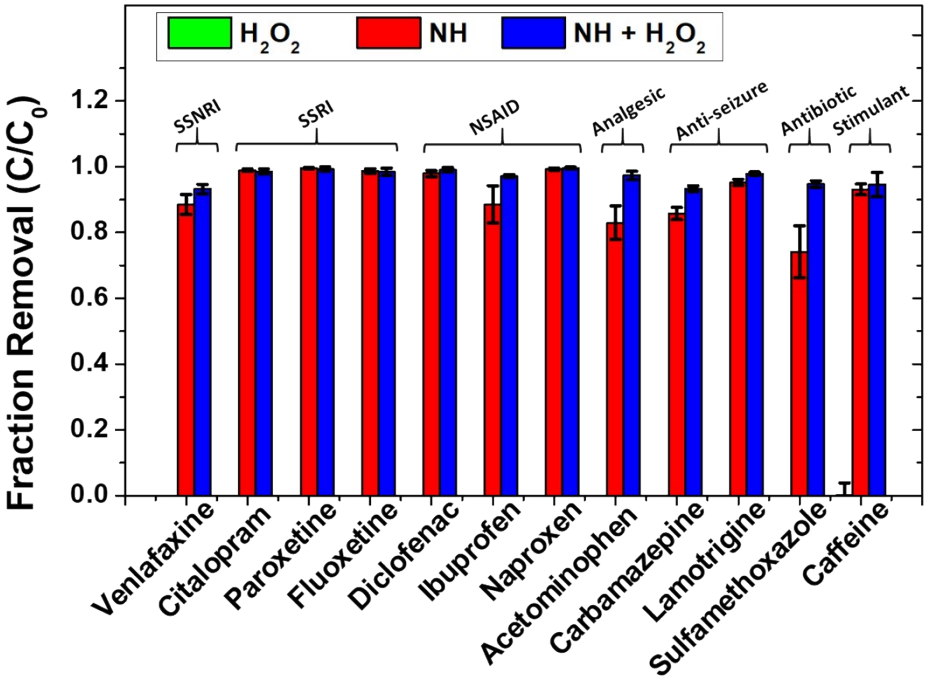

Figure S4: Comparison of adsorptive and AOP augmented adsorptive removal of first set of PPCPs by rGO-nZVI NH.

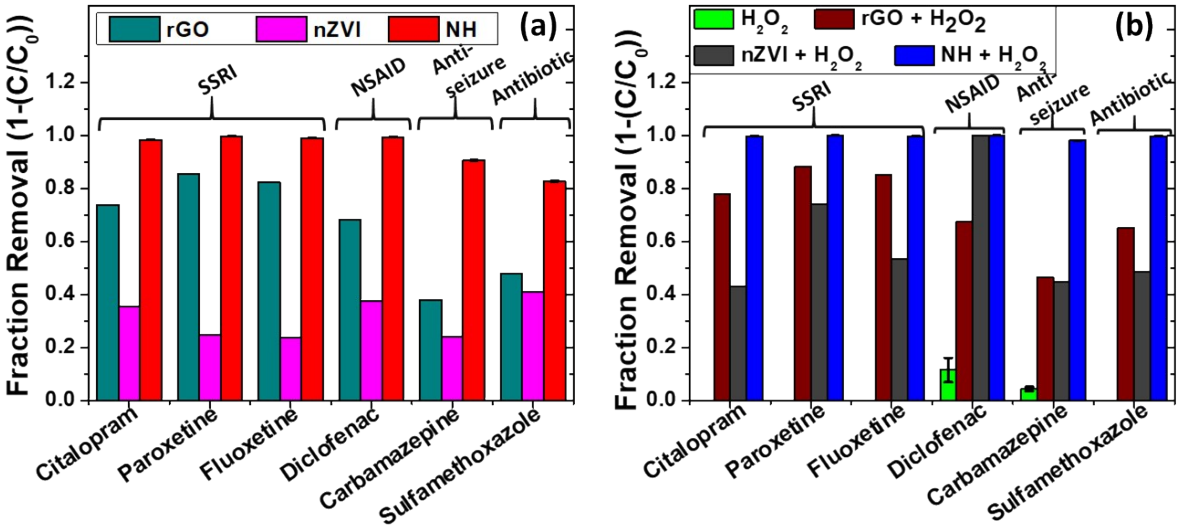

Figure S5: Adsorptive (a) and advanced oxidation augmented adsorptive (b) removal of second set of PPCPs by rGO-nZVI NH and parent nanomaterials after 30 minutes.

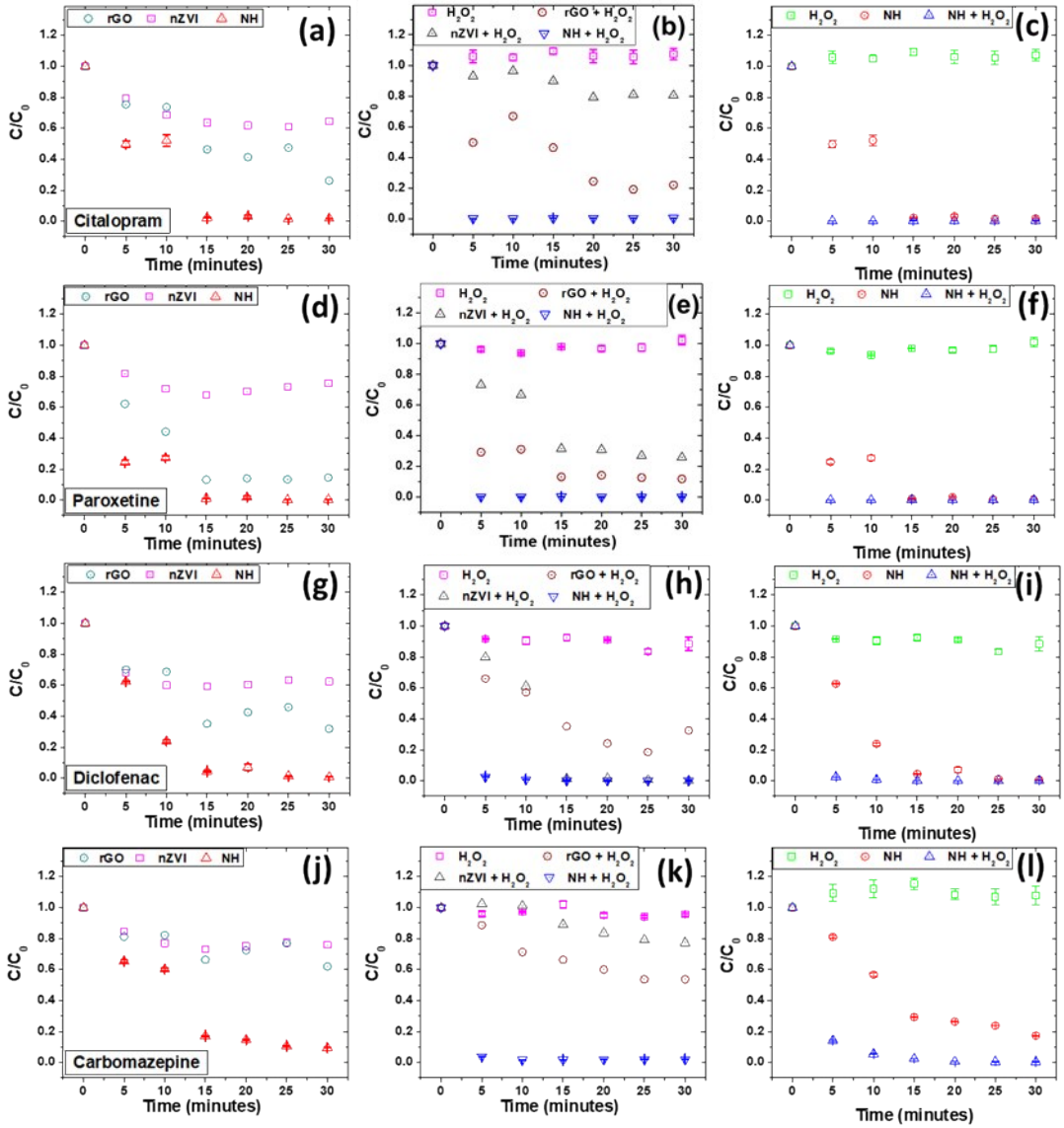

Figure S6: Kinetics of (a, d, g, j) adsorptive and (b, e, h, k) combined adsorption and AOP based removal by rGO-nZVI NH and parent nanomaterials rGO and nZVI, (c, f, i, l) comparative adsorptive and combined adsorption and AOP based removal for rGO-nZVI NH for citalopram, paroxetine, diclofenac, and carbamazepine respectively.

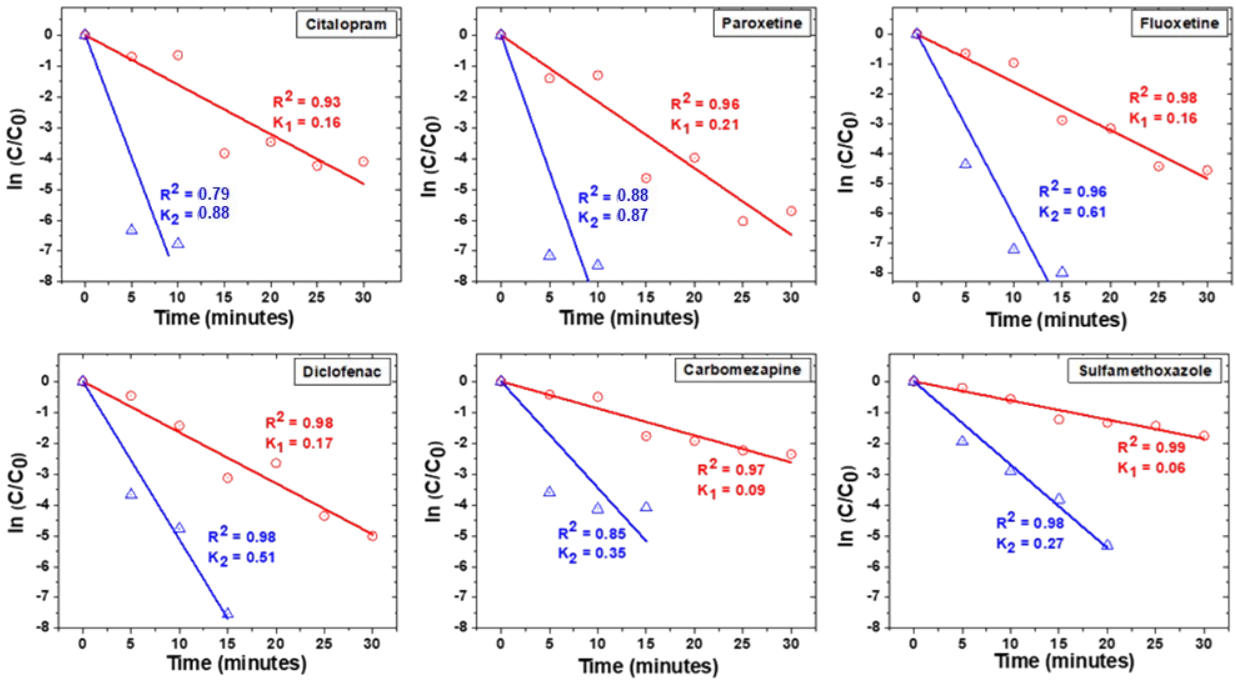

Figure S7: Reaction rate constants for adsorptive (red) and AOP augmented adsorptive (blue) removal of PPCPs by rGO-nZVI NH.

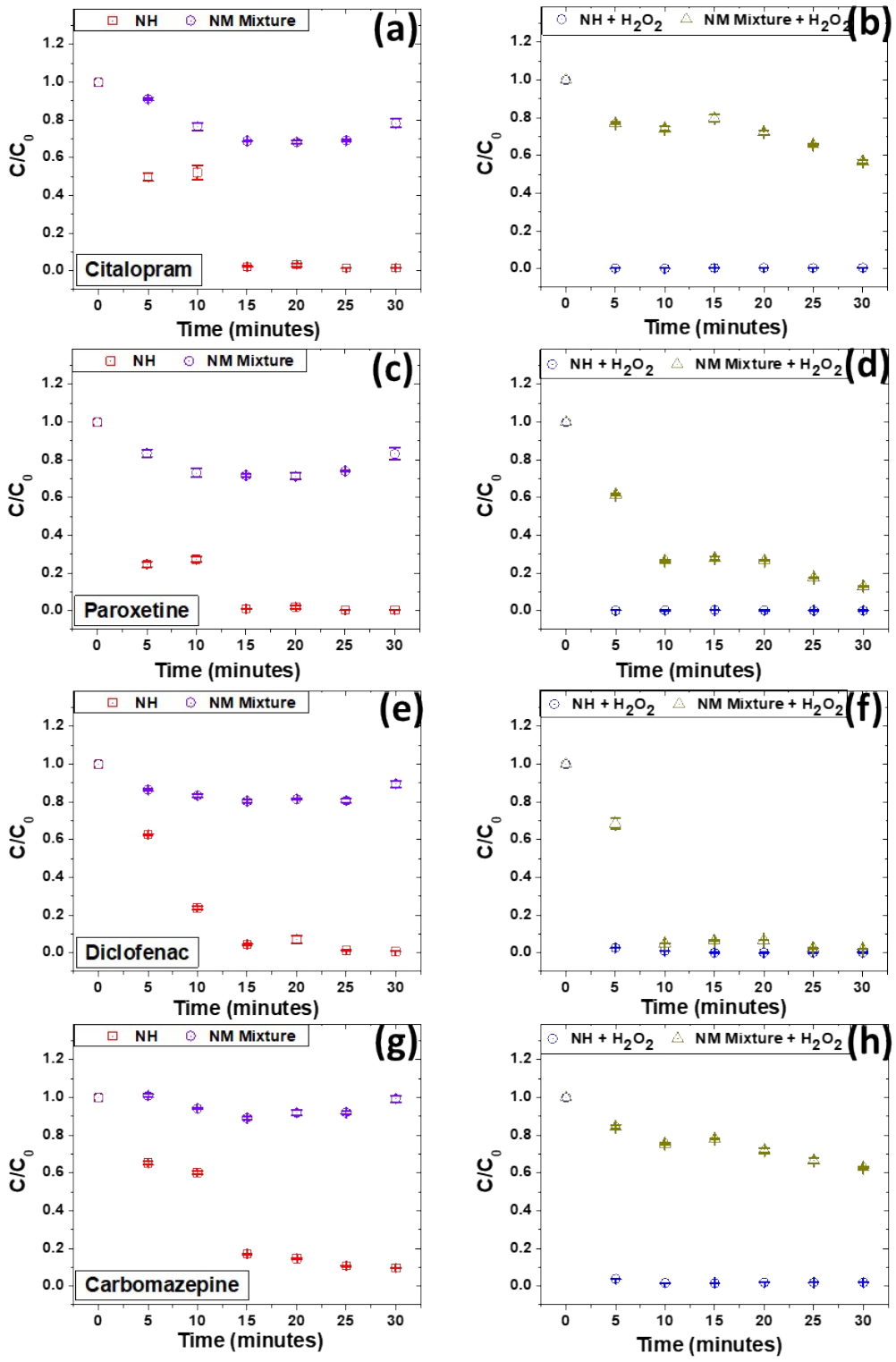

Figure S8: Comparative kinetics of (a, c, e, g) adsorptive, and (b, d, f, h) combined adsorptive and AOP based removal by NH and mixture of parent nanomaterial for citalopram, paroxetine, diclofenac, and carbamazepine respectively.

Table S1: Removal efficiency (%) of different PPCPs by parent nanomaterials and NH

PPCP	rGO	nZVI	NH	H_2O_2	rGO + H_2O_2	nZVI + H_2O_2	NH + H_2O_2
Venlafaxine	34.60	0.00	88.50	0.00	29.47	0.00	93.20
Citalopram	41.23	1.41	98.92	0.00	47.60	0.00	98.51
Paroxetine	71.07	0.00	99.58	0.00	73.27	7.86	99.34
Fluoxetine	50.87	0.00	98.71	0.00	62.84	3.99	98.43
Diclofenac	35.07	9.00	97.92	0.00	44.46	14.86	99.06
Ibuprofen	30.68	8.94	88.55	0.00	15.35	18.93	97.15
Naproxen	29.04	0.00	99.25	0.00	39.30	5.55	99.56
Acetaminophen	30.14	0.00	82.97	0.00	25.30	22.38	97.37
Carbamazepine	15.67	0.00	85.75	0.00	17.19	0.70	93.33
Lamotrigine	45.10	5.83	95.23	0.00	46.72	0.92	97.90
Sulfamethoxazole	14.51	13.46	74.13	0.00	3.08	1.09	94.77
Caffeine	39.24	9.47	93.12	0.05	24.56	0.00	94.60

Table S2. Removal efficiency (%) of different PPCPs by parent nanomaterials and NH at 10 minute

PPCP	rGO	nZVI	NH	H_2O_2	rGO + H_2O_2	nZVI + H_2O_2	NH + H_2O_2
Citalopram	26.30	31.41	47.90	0.00	33.16	3.64	99.89
Paroxetine	55.88	28.01	72.81	6.18	68.92	33.36	99.94
Sulfamethoxazole	33.15	23.99	61.99	3.21	42.79	41.50	99.93
Diclofenac	31.19	39.90	76.23	9.49	42.80	38.88	99.15
Carbamazepine	17.72	22.97	39.80	2.62	28.66	0.00	98.40
Sulfamethoxazole	21.54	31.85	43.21	0.00	41.25	1.74	94.56