

Table S2: Reported k_{app} (min^{-1}), Removal used, Dose (g/L) and Capacity (mg/g) of 24 articles							
Reported data (from 24 articles)	Dose (reported) the catalyst amount exactly as the paper wrote	Dose (g/L) amount of catalyst used per liter of solution	C0 used for capacity initial concentration of malachite green before treatment	Removal used	k_{app} (min^{-1})	Capacity (mg/g)	Capacity basis / notes
CTAS@NiFe ₂ O ₄	20 mg in 20 mL	1	70 mg/L	99.05%	0.04–0.06 (k1 at 35/55/70 mg/L)	69.34	Estimated: $q = (C_0 \times \text{removal}) / (\text{dose g/L})$; using 70 mg/L case
ZIF-8/AgNPs/Ag ₂ S	0.020 g in 20 mL	1	7 mg/L	98.60%	0.0701	6.9	Estimated using optimized C0=7 mg/L (present study table/abstract)
FVZ3 (ZnVFeO ₄ -based Fe tri-composite)	1 g/L (dose levels 0.25–1.5 g/L tested)	1	25 ppm (25 mg/L)	98.00%	0.0127	24.5	Estimated from Table 2 (visible light, dose=1 g/L, C0=25 ppm)
CQDs/MXene	6 mg in 10 mL	0.6	75 mg/L	96.1% (table); also 98.6% (text)	0.1382	120.13	Estimated using 96.1% at 75 mg/L; alt using 98.6% gives ~123.25 mg/g
BiVO ₄ /NiFe ₂ O ₄ /ATP (1:7.5:1.5)	1.00 g/L	1	40 mg/L	99.25%	0.03329	39.7	Estimated from abstract: 99.25% at C0=40 mg/L, dose=1.00 g/L
rGO/SnSe	4 mg in 10 mL	0.4	10 mg/L	95.76%	0.01	23.94	Estimated from 10 mg/L case over 180 min; paper also reports SnSe k_{app} =0.009

K5-g-C3N4@ATP-Fe3O4	0.5 g/L (optimal; 0.6 g/L slightly lower)	0.5	50 mg/L	98.84% in 120 min	0.0371	98.84	kapp estimated from endpoint (Ct/C0=1-0.9884); paper states 1st-order kinetics but doesn't print kapp
p-ZnFe2O4/n-TiO2 (10 wt.% ZF-T)	1.0 g/L (dose levels 0.5, 1.0, 2.0 g/L tested)	1	10 mg/L	86.50%	0.00855	8.65	Estimated from 86.5% at 10 mg/L with 10 wt.% ZF-T
TiO2/YMnO3	10 mg in 50 mL (tested 5,10,15 mg)	0.2	6.0×10 ⁻⁶ M (paper units)	95.34%	0.02275		Paper reports capacity as ~0.0286 mmol/g (needs chosen MW to convert to mg/g)
BiV1-xTixO4 (BVO-15) powder	0.25 g in 250 mL	1	10 mg/L	~100% in 180 min (reuse: ~94%, ~92%)	Not reported; est 0.0156 (94%/180min), 0.0140 (92%/180min)	10	Capacity estimated assuming ~100% removal; kapp estimates from reuse cycles (since '100%' gives Ct≈0)
BVO-15 in TPU film (0.10 g BVO-15 per 1 g TPU)	0.10 g BVO-15 in 250 mL (as film)	0.4	10 mg/L	~96% in 180 min	0.0179	24	kapp estimated from 96% endpoint (Ct/C0=0.04) over 180 min
Ag2S/MoS2@ZnPc (Z-scheme heterojunction)	125 mg/L (optimal); also used 100 µg/mL for antibacterial tests	0.125	15 mg/L	96.3% at 100 min	0.026	115.56	Capacity estimated from photodegradation test; paper also reports dark adsorption capacity 64.95 mg/g (at 30 min, C0=15 mg/L).
Cr-doped ZnO nanorods (Zn(90)Cr(10)O NRs)	0.050 g in 0.050 dm ³ (50 mL) (⇒ 1 mg/mL)	1	25 ppm (~25 mg/L)	99.604% (UV, 9W; 60–90 min)	0.0919	24.9	kapp from Table 7 for MG with 10% Cr doping; conditions pH 10; dark adsorption 30 min before irradiation.

SnO ₂ /g-C ₃ N ₄ flowerlike composite (Sn/CN-3, SnO ₂ :g-C ₃ N ₄ = 3:1)	30 mg in 30 mL (dark 0.5 h; 500 W mercury lamp UV)	1	10 mg/L	95.09% at 80 min (UV)	0.03589	9.51	k _{app} from Table 2; experiment uses 10 mg/L MG, 80 min irradiation; adsorption equilibrium 0.5 h in dark.
Ge–Ce–CuS (Gelatin-assisted cerium-loaded CuS)	1.5 g/L (optimal); tested 0.5–2.5 g/L	1.5	3×10 ⁻⁴ M MGO (278.1 mg/L; MW=927 g/mol)	98.5% at 120 min (UV-A)	0.035	182.62	k _{app} estimated from 98.5%/120 min endpoint (Ct/C0=0.015). Paper notes kinetics in Table S1 (SI), but k _{app} value not printed in main text.
rGO/CuS-7 (reduced graphene oxide-supported CuS)	0.3 g/L (minimum effective dose; also tested 0.5 g/L; typical procedure 100 mg/100 mL)	0.3	10 mg/L	97.6% at 90 min (direct sunlight, pH 5)	0.04245	32.53	k _{app} from Table 4 at 0.3 g/L, 10 ppm MG, pH 5 under direct sunlight.
Cu(Pima) (Cu-based aliphatic dicarboxylate MOF)	100 mg/L in 150 mL (Photo-Fenton/CWPO with 1.0 mL H ₂ O ₂ , pH 4.0, 50°C, 350 W halogen lamp)	0.1	25 mg/L	76% at 400 min	0.00357	190	k _{app} estimated from endpoint assuming pseudo-1st-order: $k = -\ln(Ct/C0)/t$ with Ct/C0=1-removal.
Cu(Suba) (Cu-based aliphatic dicarboxylate MOF)	100 mg/L in 150 mL (Photo-Fenton/CWPO with 1.0 mL H ₂ O ₂ , pH 4.0, 50°C, 350 W halogen lamp)	0.1	25 mg/L	84% at 400 min	0.00458	210	k _{app} estimated from endpoint assuming pseudo-1st-order: $k = -\ln(Ct/C0)/t$ with Ct/C0=1-removal.
Cu(Azla) (Cu-based aliphatic dicarboxylate MOF)	100 mg/L in 150 mL (Photo-Fenton/CWPO with 1.0 mL H ₂ O ₂ , pH 4.0, 50°C, 350 W halogen lamp)	0.1	25 mg/L	96% at 400 min	0.00805	240	k _{app} estimated from endpoint assuming pseudo-1st-order: $k = -\ln(Ct/C0)/t$ with Ct/C0=1-removal.

Cu(Seba) (Cu-based aliphatic dicarboxylate MOF)	100 mg/L in 150 mL (Photo-Fenton/CWPO with 1.0 mL H ₂ O ₂ , pH 4.0, 50°C, 350 W halogen lamp)	0.1	25 mg/L	97% at 400 min	0.00877	242.5	kapp estimated from endpoint assuming pseudo-1st-order: $k = -\ln(C_t/C_0)/t$ with $C_t/C_0=1$ -removal.
Zn _{0.67} Mg _{0.33} Dy _x Fe _{2-x} O ₄ — ZM1 (undoped Zn–Mg nanoferrite)	0.03 g catalyst (per experiment; solution volume not stated) MG=15 mg/L, pH 7, sunlight		15 mg/L	87.11% at 60 min (sunlight)	0.0341		kapp estimated from 60-min endpoint using pseudo-1st-order: $k=-\ln(C_t/C_0)/t$; $C_t/C_0=1$ -removal. Capacity not computed because solution volume (for g/L dose) not specified.
Zn _{0.67} Mg _{0.33} Dy _x Fe _{2-x} O ₄ — ZM2 (Dy-doped Zn–Mg, x=0.01)	0.03 g catalyst (per experiment; solution volume not stated) MG=15 mg/L, pH 7, sunlight		15 mg/L	89.60% at 60 min (sunlight)	0.0377		kapp estimated from 60-min endpoint using pseudo-1st-order: $k=-\ln(C_t/C_0)/t$; $C_t/C_0=1$ -removal. Capacity not computed because solution volume (for g/L dose) not specified.
Zn _{0.67} Mg _{0.33} Dy _x Fe _{2-x} O ₄ — ZM3 (Dy-doped Zn–Mg, x=0.02)	0.03 g catalyst (per experiment; solution volume not stated) MG=15 mg/L, pH 7, sunlight		15 mg/L	94.23% at 60 min (sunlight)	0.0475		kapp estimated from 60-min endpoint using pseudo-1st-order: $k=-\ln(C_t/C_0)/t$; $C_t/C_0=1$ -removal. Capacity not computed because solution volume (for g/L dose) not specified.
Ba _{1-x} CoxDy _y Fe _{12-y} O ₁₉ HF1 (x=y=0.02)	0.04 g in 0.1 L (optimal dose); tested 0.02–0.1 g in 0.1 L; pH 7.5; natural sunlight	0.4	10 mg/L	89.85% at 90 min (sunlight)	0.023	22.46	kapp reported (pseudo-1st-order). Capacity estimated using C ₀ =10 mg/L and dose=0.4 g/L.

Ba _{1-x} CoxDyyFe _{12-y} O ₁₉ HF2 (x=y=0.04)	0.04 g in 0.1 L (optimal dose); tested 0.02–0.1 g in 0.1 L; pH 7.5; natural sunlight	0.4	10 mg/L	91.12% at 90 min (sunlight)	0.025	22.78	kapp reported (pseudo-1st-order). Capacity estimated using C ₀ =10 mg/L and dose=0.4 g/L.
Ba _{1-x} CoxDyyFe _{12-y} O ₁₉ HF3 (x=y=0.06)	0.04 g in 0.1 L (optimal dose); tested 0.02–0.1 g in 0.1 L; pH 7.5; natural sunlight	0.4	10 mg/L	94.36% at 90 min (sunlight)	0.029	23.59	kapp reported (pseudo-1st-order). Capacity estimated using C ₀ =10 mg/L and dose=0.4 g/L.
Ni _{0.4} Fe _{2.6} O ₄ /(Fe,Ni)@carbon (NFO@C) core-shell magnetic mesoporous	Photocatalysis: 20 mg/L (365 nm LED, dark adsorption 23 min). Adsorption tests used 200 mg/L (20 mg in 100 mL).	0.02	100 mg/L	>99% after ~450 min (365 nm LED-UV)	0.01023	403.92	kapp estimated from endpoint assuming pseudo-1st-order (C _t /C ₀ ≈0.01 at 450 min). Capacity value is reported equilibrium adsorption capacity (mg/g), not normalized photodegradation.
AC/TiO ₂ composite (AC:TiO ₂ = 3:1)	2.5 g/L (halogen lamp; 50°C; C ₀ =10 mg/L)	2.5	10 mg/L	96.3% in 7.5 min	0.4396	3.85	kapp estimated from endpoint (C _t /C ₀ =0.037 at 7.5 min) assuming pseudo-1st-order.
BC-TiO ₂ -ZnO (TiO ₂ & ZnO impregnated fecal sludge biochar)	50 mg in 50 mL (optimal) => 1.0 g/L; UV lamp 8 W, λ _{max} =340 nm; pH 8; 35°C; 150 rpm; 30 min	1	100 mg/L	≈98% in 30 min	0.087	98	kapp reported as 0.087 min ⁻¹ (close to experimental 0.09 min ⁻¹). Capacity estimated from 98% at C ₀ =100 mg/L and 1 g/L dose.

ZnO/ZnS core-shell nanocomposite (1:1)	0.2 g/L (optimal); MG=20 ppm; pH 10; UV 8 W mercury lamp; dark adsorption 1 h	0.2	20 ppm (~20 mg/L)	100% in 20 min (pH 10, optimal)	Two-stage kinetics reported: $k_1=0.0122 \text{ min}^{-1}$, $k_2=0.010 \text{ min}^{-1}$ (for ZnO/ZnS 1:1); at 20 ppm: $k_1=0.011$, $k_2=0.016$	100	Capacity estimated using complete removal at $C_0=20 \text{ mg/L}$ and dose=0.2 g/L => 100 mg/g. Paper reports pseudo-1st-order with two linear regions (intermediate formation).
MG-MI (Bi ₂ O ₃ -doped TiO ₂ on molecularly imprinted powdered activated carbon) [Bi/Ti/AC]	Not stated in the 3-page letter (experimental details in Supplementary Materials)				0.0543	75.23	k_{app} and adsorption capacity reported in abstract; photocatalyst shows selectivity coefficient 5.17 vs CV. Dose/conditions not provided in main letter.
Fe ₃ O ₄ @BC/APTES (biochar-capped Fe ₃ O ₄ functionalized with APTES)	Optimal MG: 7.5 mg in 6 mL (=> 1.25 g/L); BBD range 2.5–12.5 mg in 6 mL	1.25	50 ppm	99.94% in 105 min (Hg lamp 70 W), pH 9	0.0255	39.98	k_{app} reported for MG (pseudo-1st-order). Capacity estimated using $C_0=50 \text{ mg/L}$ and dose computed from 6 mL reaction volume.