catalysts

MDPI

Supplementary Materials

Abatement of 1,2,4-Trichlorobencene by Wet Peroxide Oxidation Catalysed by Goethite and Enhanced by Visible LED Light at Neutral pH

David Lorenzo [1,*], Aurora Santos [1], Andrés Sánchez-Yepes [1], Leandro Óscar Conte [1,2] and Carmen María Domínguez [1]

[1] Chemical Engineering and Materials Department, Facultad de Ciencias Químicas, Universidad Complutense de Madrid, Ciudad Universitaria S/N, 28040 Madrid, Spain; aursan@quim.ucm.es (A.S.); andsan28@ucm.es (A.S.-Y.); lconte@ucm.es (L.Ó.C.); carmdomi@ucm.es (C.M.D.)

[2] Instituto de Desarrollo Tecnológico para la Industria Química (INTEC), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Universidad Nacional del Litoral (UNL), Ruta Nacional N° 168, 3000 Santa Fe, Argentina

* Correspondence: dlorenzo@quim.ucm.es; Tel.: +34-913944106

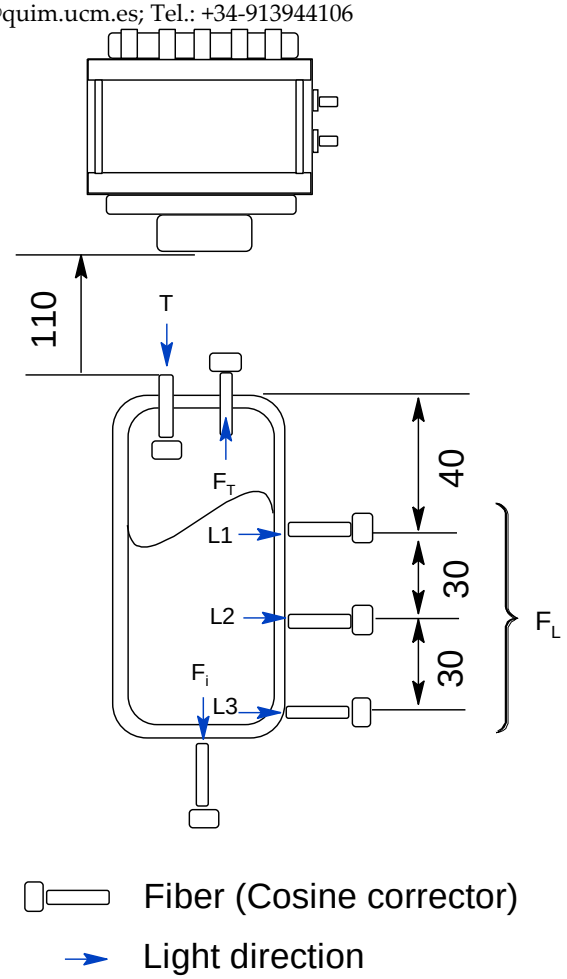

Figure S1. Measuring points (distances in mm) of the average absolute irradiance using to calculate the scattering out of photons by: the reactor window (FT), the reactor walls (L1, L2 and L3) and bottom (Fi). T represents the fiber position to measure the irradiance emitted by the lamp in the window of the reactor.

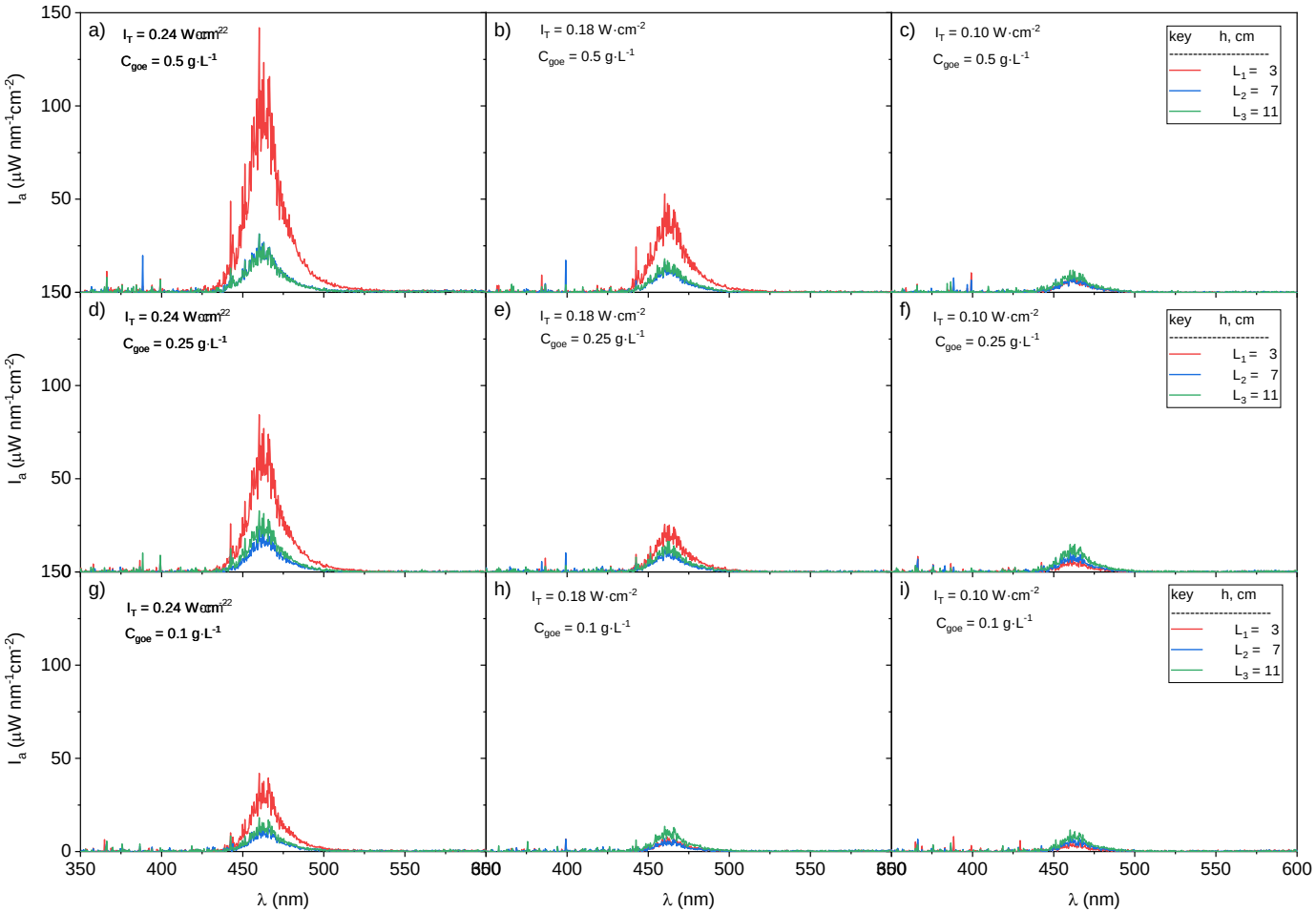

Figure S2. Average absolute irradiance vs. wavelength measured in the point marked in Figure S1, to study the scattering out of the light through the walls of the reactor, L1, L2 and, L3. At different values of the incident irradiance and catalyst concentration: (**a**) I_T=0.24 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**b**) I_T=0.18 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**c**) I_T=0.10 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**d**) I_T=0.24 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**e**) I_T=0.18 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**f**) I_T=0.10 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**g**) I_T=0.24 W·cm^{-2} and C_{goe} = 0.1 g·L^{-1}, (**h**) I_T=0.18W·cm^{-2} and C_{goe} = 0.1 g·L^{-1}, (**i**) I_T=0.10W·cm^{-2} and C_{goe} = 0.1g·L^{-1}.

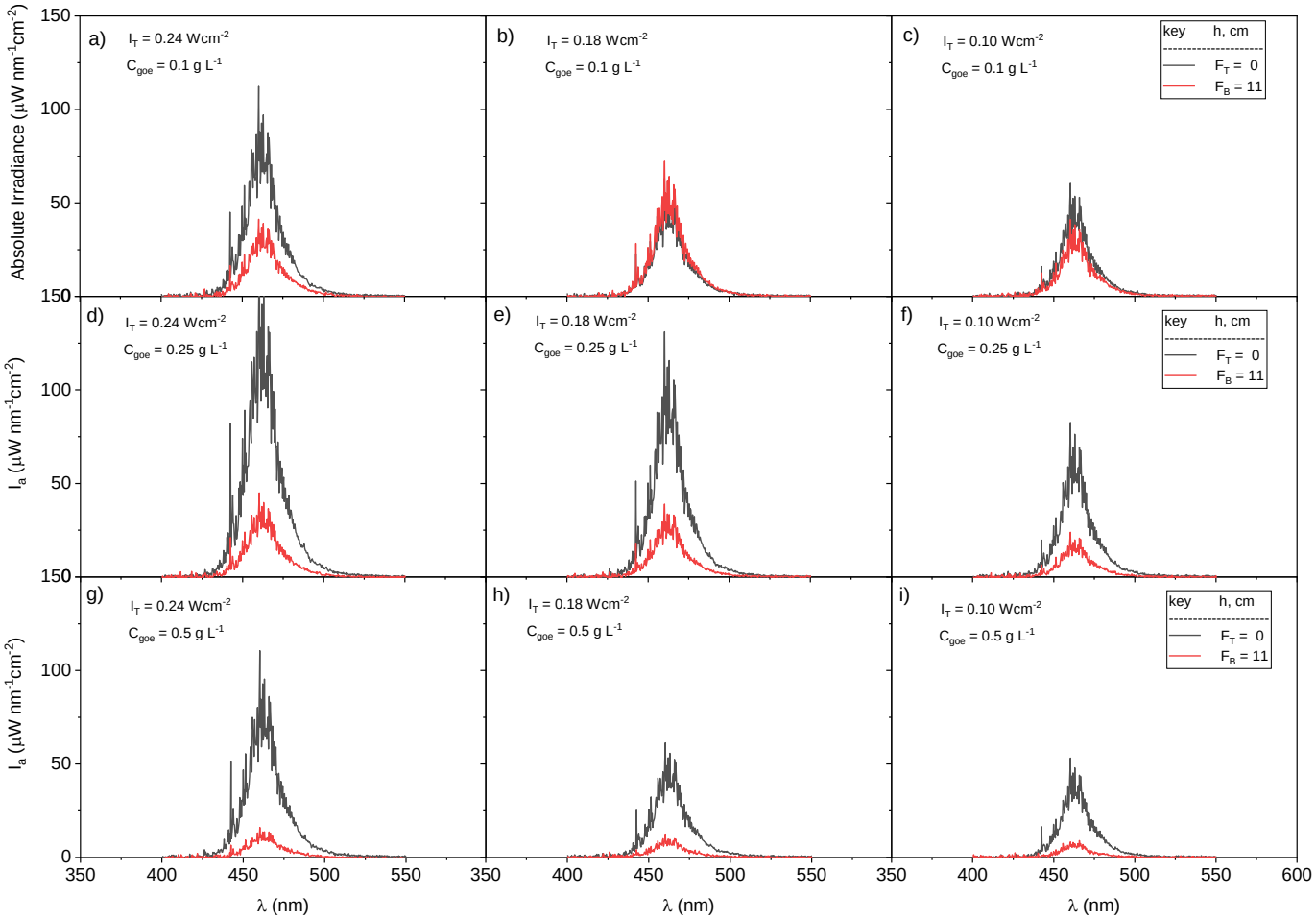

Figure S3. Average of absolute irradiance vs. wavelength measured in the point marked in Figure S1, to study the scattering out of the light through the bottom of the reactor (Fb) and the surface of the reaccion mixture (Ft). At different values of the incident irradiance and catalyst concentration: (**a**) I_T = 0.24 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**b**) I_T = 0.18 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**c**) I_T = 0.10 W·cm^{-2} and C_{goe} = 0.5 g·L^{-1}, (**d**) I_T = 0.24 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**e**) I_T = 0.18 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**f**) I_T = 0.10 W·cm^{-2} and C_{goe} = 0.25 g·L^{-1}, (**g**) I_T = 0.24 W·cm^{-2} and C_{goe} = 0.1 g·L^{-1}, (**h**) I_T=0.18 W·cm^{-2} and C_{goe} = 0.1 g·L^{-1}, (**i**) I_T = 0.10 W·cm^{-2} and C_{goe} = 0.1 g·L^{-1}.

Table S1. Experimental conditions of runs carried out to study the effect of the variables on 124-TCB abatement at 25 °C and neutral pH (the reactor being schematized in Figure 9).

RUN	$C_{124\text{-}TCB}$	$C_{H2O2,0}$	C_{goet}	Power	I	RC_{H2O2}:$C_{H2O2,stq}$
	$mg \cdot L^{-1}$	mM	$g \cdot L^{-1}$	W	$W \cdot cm^2$	-
B1	28	0	0	3.13	0.24	0
B2	0	1.89	0.5	3.13	0.24	-
R1	28	18.1	0.10	3.13	0.24	10
R2	28	9.1	0.10	3.13	0.24	5
R3	28	1.8	0.10	3.13	0.24	1
B3	28	0	0.5	3.13	0.24	0
R4	28	18.1	1.00	3.13	0.24	10
R5	28	18.5	0.50	3.13	0.24	10
R6	28	18.1	0.25	3.13	0.24	10
B4	28	18.1	0	3.13	0.24	10
R7	28	18.3	0.10	2.09	0.18	10
R8	28	18.3	0.10	1.04	0.10	10
B5	28	18.5	0.10	0	0	10
R9	28	18.3	0.51	1.04	0.10	10
R10	28	17.6	0.25	1.04	0.10	10
R11	28	18.4	1.02	2.09	0.18	10
R12	28	18.3	1.01	1.04	0.10	10

Table S2. Photonic efficiency calculated using the photons flow irradiated through the reactor window.

I, Wcm^{-2}	$C_{goethita}$, gL^{-1}	$F_E \cdot 10^6$, Einstein s^{-1}	$C_{TCB,0} \cdot 10^5$, $molL^{-1}$	$X_{124\text{-}TCB}$	$\eta_P \cdot 10^4$, mol Einstein^{-1}
0.24	0.1	9.09	1.54	0.66	1.56
	0.25	9.09	1.54	0.59	1.39
	0.5	9.09	1.54	0.54	1.27
0.18	0.1	6.78	1.54	0.55	1.74
	0.25	6.78	1.54	0.59	1.86
	0.5	6.78	1.54	0.54	1.71
0.10	0.1	3.82	1.54	0.31	1.74
	0.25	3.82	1.54	0.52	2.91
	0.5	3.82	1.54	0.54	3.03