SUPPLEMENTARY INFORMATION 1. Actinometrical comparison with other systems.

Table 1. Reported actinometrical measurement in other photoreactors.

Type of photoreactor / Source of Light	Actinometrical measurement method	Wavelength (nm)	Photon flux	Ref.
Batch 250 mL / UV Hg Lamp 125W	Hydrogen peroxide	305	0.57 µE s^{-1}	[1]
Batch 1 L / UV Hg Lamp 150W	Potassium ferrioxalate	>300	13,7 µE s^{-1}	[2]
CSTR 1000 mL / Hg Lamp 400 W	Potassium ferrioxalate	370	1,77 µE s^{-1}	[3]
Batch 3 L/ UV Hg Lamp 8W	Potassium ferrioxalate	253	0,8 µE s^{-1}	[4]
Microreactor 0,81 mL / Hg Lamp	Potassium Ferrioxalate	365	4,07 µE s^{-1}	[5]
Microreactor 0,51 mL / LED UV	Potassium Ferrioxalate	365	0,38 µE s^{-1}	
Batch 225 mL / Hg lamp	Potassium Ferrioxalate	365	7,40 µE s^{-1}	
Batch 250 mL / Mercury UVA	Potassium Ferrioxalate	350-400	0,51 µE s^{-1}	[6]
Batch 25 mL / Hg Lamp	Potassium Ferrioxalate	365	0,63 µE s^{-1}	[7]
CSTR 100 mL / LED UV-A	UV Photodetector	375	0,76 µE s^{-1}	[8]
Batch 150 mL / LED UV-A	Potassium Ferrioxalate	365	3,32 µE s^{-1}	[9]
This photoreactor (mini-CPC 500 mL / LED UV-A 30W)	Potassium Ferrioxalate	365	2,41 µE s^{-1}	[10]

SUPPLEMENTARY INFORMATION 2. Photocatalytic information of preliminary degradation.

As it can be seen in Figure 2, Fe elimination was not significant, about 4.27% > 3.45% > 3.44 % > 2.9% for FA+t-ButOH > FA+MetOH > t-ButOH > FA respectively. The largest degradation of the cyanocomplex was obtained for the addition of MetOH (73.7%), followed by the combination of FA+MetOH (72.2%), FA+t-ButOH (65.5%) and with no-scavengers (photocatalysis) (65%). Also, the increase of free cyanide appears in all scavengers combinations. This free cyanide increase is related to the rupture of the complex, and at the beginning of the process, the initial free cyanide was less than 0.5 ppm. So, the largest free cyanide liberation was in the order MetOH > FA+MetOH > photocatalysis > FA+tButOH.

On the other hand, the iron cyanocomplex degradation was significant compared to a typical photocatalytic degradation in anoxic conditions. Some h^+/OH$^\bullet$ scavenger couples combination showed better results in the path change for the photocatalytic degradation. Only methanol as OH$^\bullet$ acceptor, degraded the complex in 74%, meanwhile for the other scavengers, the degradation increases in the order EDTA>Formic Acid>t-ButOH. However, for the scavenger couples h^+/OH$^\bullet$ the cyanocomplex degradation increased in the order FA+t-ButOH>FA+MetOH>EDTA+MetOH.

If it is considered that the removal of Fe from the complex implies a complete decomposition of the cyanocomplex, better result was achieved in the order FA+tButOH>FA+MetOH>t-ButOH>FA. Due to the need of not only degrade the complex, but to remove the metal from solution, the mix of FA + t-ButOH was chosen as the best scavenger coupled for their positive synergistic effect in terms of Fe removal.

SUPPLEMENTARY INFORMATION 3. Electric Efficientcy of Oxidation E_{Eo}.

For a pseudo apparent kinetic analysis of first order, it was considered the Fe removal (Eq – 1, 2), according to the metal photoreductive studies [11–15]:

$$-\frac{dC}{dt} = k'C$$

(Eq – 1)

$$ln(C_0/C) = k't$$

(Eq – 2)

Where k' is the pseudo-first order constant (min^{-1}), C_0 and C the initial and final concentration respectively, of Fe in the solution.

Electric consumption is one of the most important, making the Electric Efficient of Oxidation per order one of the standards by the IUPAC. In the photocatalytic process with artificial light, the cost of illumination may be one of the most relevant [16]. The *Electric energy per order (E_Eo)* is defined as the electric energy required to degrade 90% per unit of volume [17]. It can be estimated by (Eq – 3):

$$E_{E_o} = \frac{1000\,P\,t}{60\,V\,log(C_0/C)}$$

(Eq – 3)

Where P is the Power of the illumination [kW], calculated as voltage x amperes; V the liquid volume treated [L], and t the time [h]. According to the kinetic previously exposed in (Eq – 2), The Eq – 3 can be expressed as:

$$\ln(C_0/C) = 0{,}4343Ln(C_0/C) = 0{,}4343k'\theta t$$

Then:

$$E_{E_o} = \frac{38{,}4P}{Vk'}$$

(Eq – 4)

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