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EFFECT OF ALIFATIC CARBOXILIC ACIDS ON THE PHOTOCATALYTIC DEGRADATION OF P-NITROPHENOL

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Abstract

Photocatalyst behaviour can be modified depending on the affinity of the studied molecules for the adsorption centres. Additionally, photoactive centers can be far from adsorption centers or determined chemical species, thus modifying the catalytic behaviour [1, 2]. In previous studies, we observed that at certain concentrations of acetic acid, catechol and resorcinol photocatalytic degradations were improved [3.]. Also, our results indicated that surface distribution modifications could modify the photocatalytic process. To obtain a better picture of the effect of the presence of carboxylic acids on photodegradability, we studied p-nitrophenol degradation at different concentrations of formic, oxalic and acetic acids.
Adsorption and FTIR studies indicated that the presence of such acids modifies p-nitrophenol interaction with TiO_2 surface, which is more rapidly degraded (Figure 1). The higher degradation rate constants have been correlated with interaction changes and radicals generated in the carboxylic acids degradation.

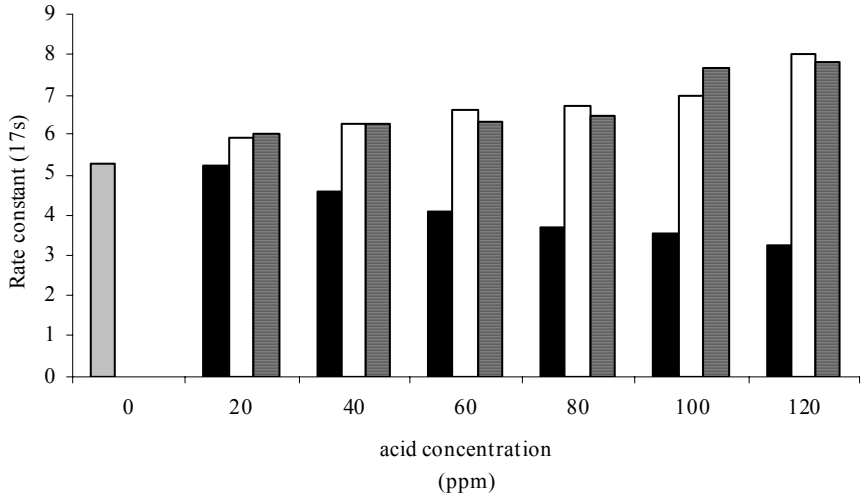

Figure 1. p-nitrophenol rate constant in presence of different concentrations of formic acid ■, oxalic acid □, acetic acid ▒ and without these ■.

The presence of H2O2 does not affect the mechanism responsible for the faster p-nitrophenol degradation in presence of acetic and oxalic acids. However, formic acid seems to hamper the production of OH· radicals from H2O2 degradation.

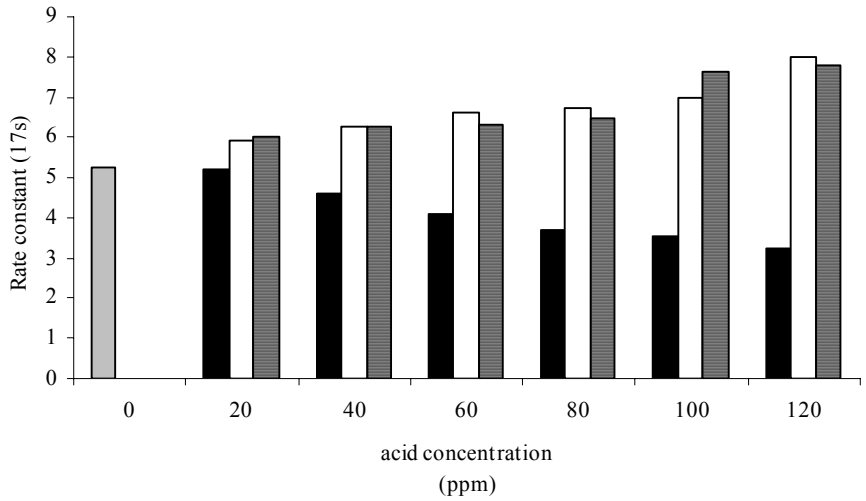

Figure 2. p-nitrophenol rate constant in presence of H2O2 and different concentrations of formic acid ■, oxalic acid □, acetic acid ▒ and without these ■.

References

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