

## RELATION BETWEEN INTERACTION AND PHENOLIC COMPOUNDS PHOTOCATALYTIC DEGRADATION

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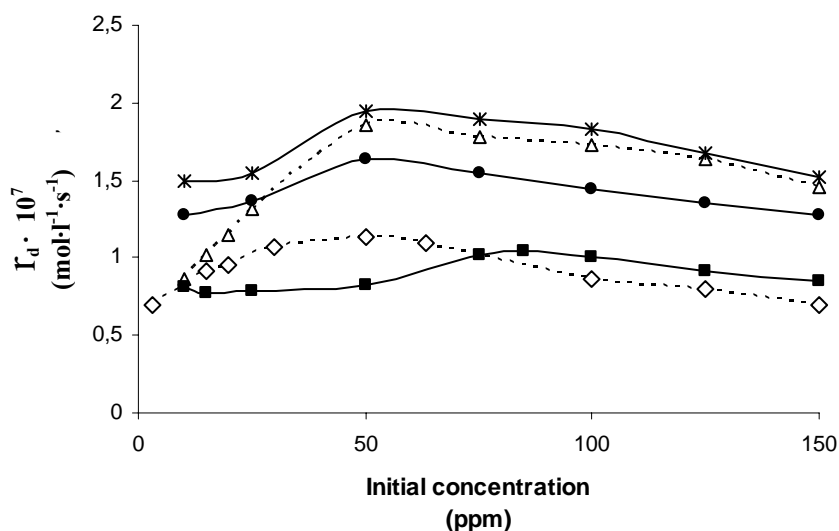
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### Abstract

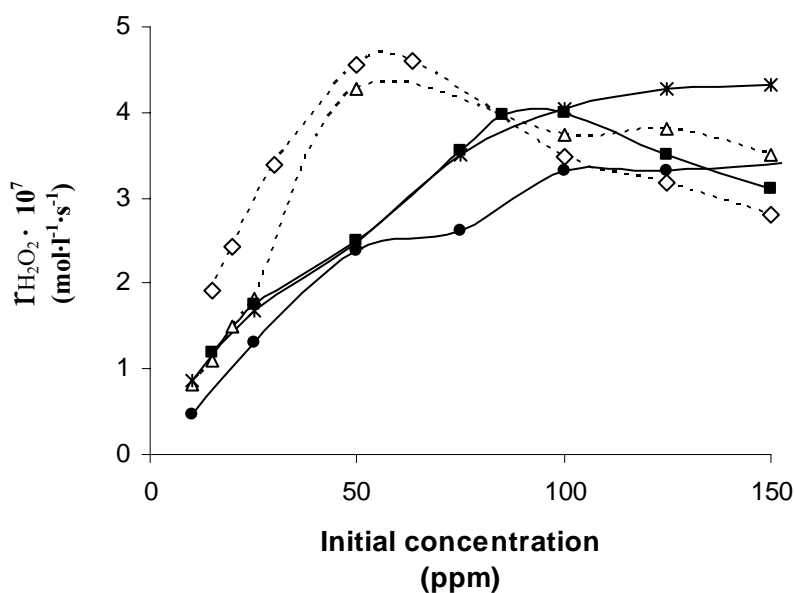
The TiO<sub>2</sub>-photocatalytic degradation process starts with the formation of h<sup>+</sup>/e<sup>-</sup> charge carriers which can react with hydroxyl group or dissolved oxygen to give ·OH and O<sub>2</sub><sup>-</sup> radicals [1]. Organic pollutants can be degraded either by reacting with these radicals or by direct reaction with electrons or holes [2-4]. The process result is determined by different factors, particularly the presence of nearby reactive adsorption centres. The organic pollutant interaction with TiO<sub>2</sub> surface can result in the re-arrangement of photoactive hydroxyl group or dissolved oxygen adsorption centres, thus determining degradation mechanism.

In this work, the obtained results with individual phenolic compounds, their binary mixtures among them or with carboxylic acids and the effect of H<sub>2</sub>O<sub>2</sub>, are studied.

The observed degradation behaviours of individual compounds are different with respect to their mixtures or the presence of H<sub>2</sub>O<sub>2</sub>. Thus, individual degradation of catechol and phenol are slower than those of resorcinol, m-cresol and o-cresol. Nevertheless, the opposite is found in presence of H<sub>2</sub>O<sub>2</sub> or in mixtures (Figure 1).



**Figure 1.** Initial degradation rate of catechol ◇, phenol ■, m-cresol ●, o-cresol ⋈ and resorcinol Δ at different initial concentration.



**Figure 2.** Initial degradation rate of catechol ◇, phenol ■, m-cresol ●, o-cresol ✱ and resorcinol △ at different initial concentration in presence of  $H_2O_2$ .

In addition to this, the presence of carboxylic acids can notably modify degradation of these phenolics by changing acid-base centres surface distribution and consequently the pollutants interaction [5].

These studies have indicated that:

1.- Isolated hydroxyl radicals, considered by some authors to be the most photoactive ones [6], are the main but not the only  $\cdot OH$  radical producers.

2.- The presence of other species and adsorption centres are necessary, in addition to  $\cdot OH$  radicals to complete degradation.

3.- Individual degradation rate of the studied phenolics are mostly determined by the ability of the substituents at generating activating positions in the aromatic ring. However, in mixtures other factors seem to be more important.

## Referencias

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