

Aqueous degradation of esculetin (6,7-dihydroxycoumarin) using gamma radiation

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ABSTRACT

The degradation by gamma radiation of esculetin (6,7-dihydroxycoumarin), an emerging contaminant present in olive mill and cork wastewaters, was studied using different irradiation atmospheres (aerated, N₂O and N₂+tert-butanol). The obtained results indicated that the highest degradation of esculetin was achieved in solutions saturated with N₂+tert-butanol, irradiated at 1 kGy. Therefore, these results demonstrated that this technology could be effective for the degradation of phenolic compounds present in industrial wastewaters. A tentative mechanism was proposed for esculetin degradation. From the results, it appeared that the solvated or aqueous electron dominated the removal of esculetin when compared with attack by the hydroxyl radical. These outcomes contribute to a better understanding of how these compounds degrade under radiation treatment and could provide better insight into the reaction mechanisms for other polyphenolic compounds.

Keywords: Esculetin; Fluorescence; Polyphenols; Radiolysis; Recalcitrant compounds

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