

OPTIMAL REMOVAL OF TOLPERISONE FROM WATERS BY PHOTOCATALYSIS, NANOTECHNOLOGY AND CHEMOMETRICS

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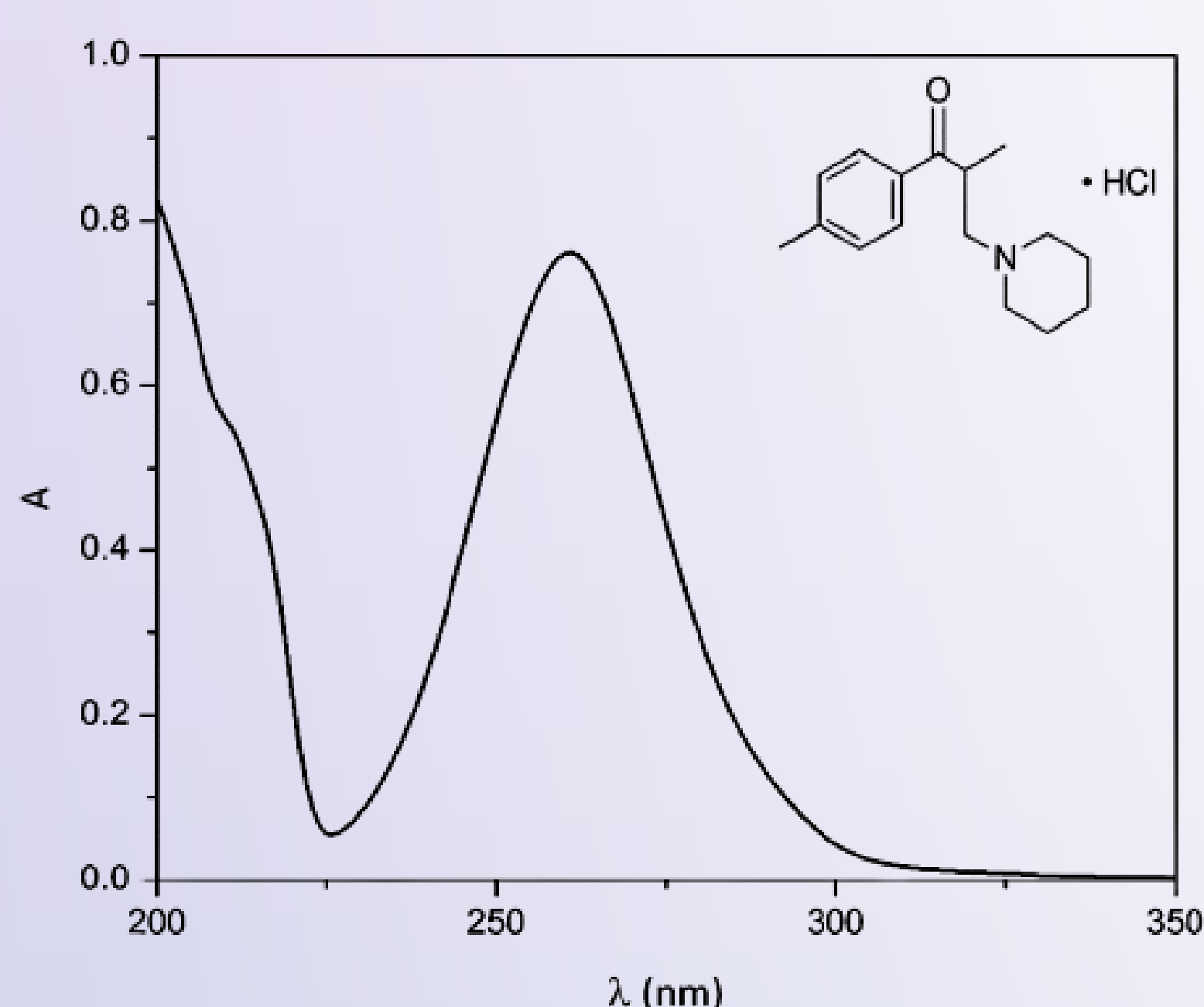
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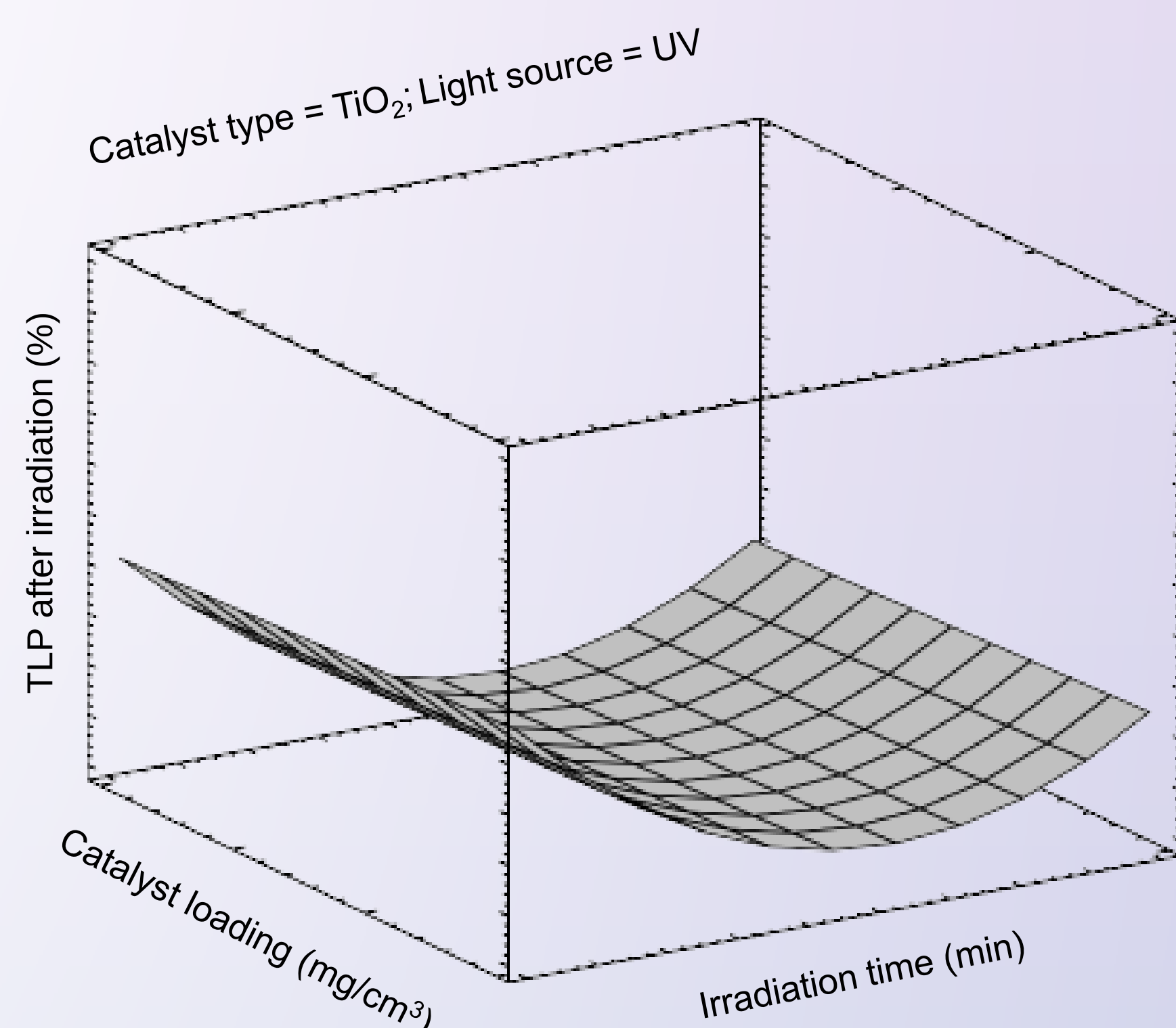
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Tolperisone hydrochloride (TLP) is a piperidine derivative and belongs to the group of muscle relaxant drugs. The toxicological effects of this drug on the environment and living beings have not been thoroughly studied. According to the 1907/2006/ EEC/ Article 31 TLP belongs to water hazards class 3 (German Regulation), which means that it is extremely hazardous and should not be allowed even in small quantities to reach the drinking water ground waters, water courses or sewage systems. Moreover, it is dangerous to the general environment and especially for plants.



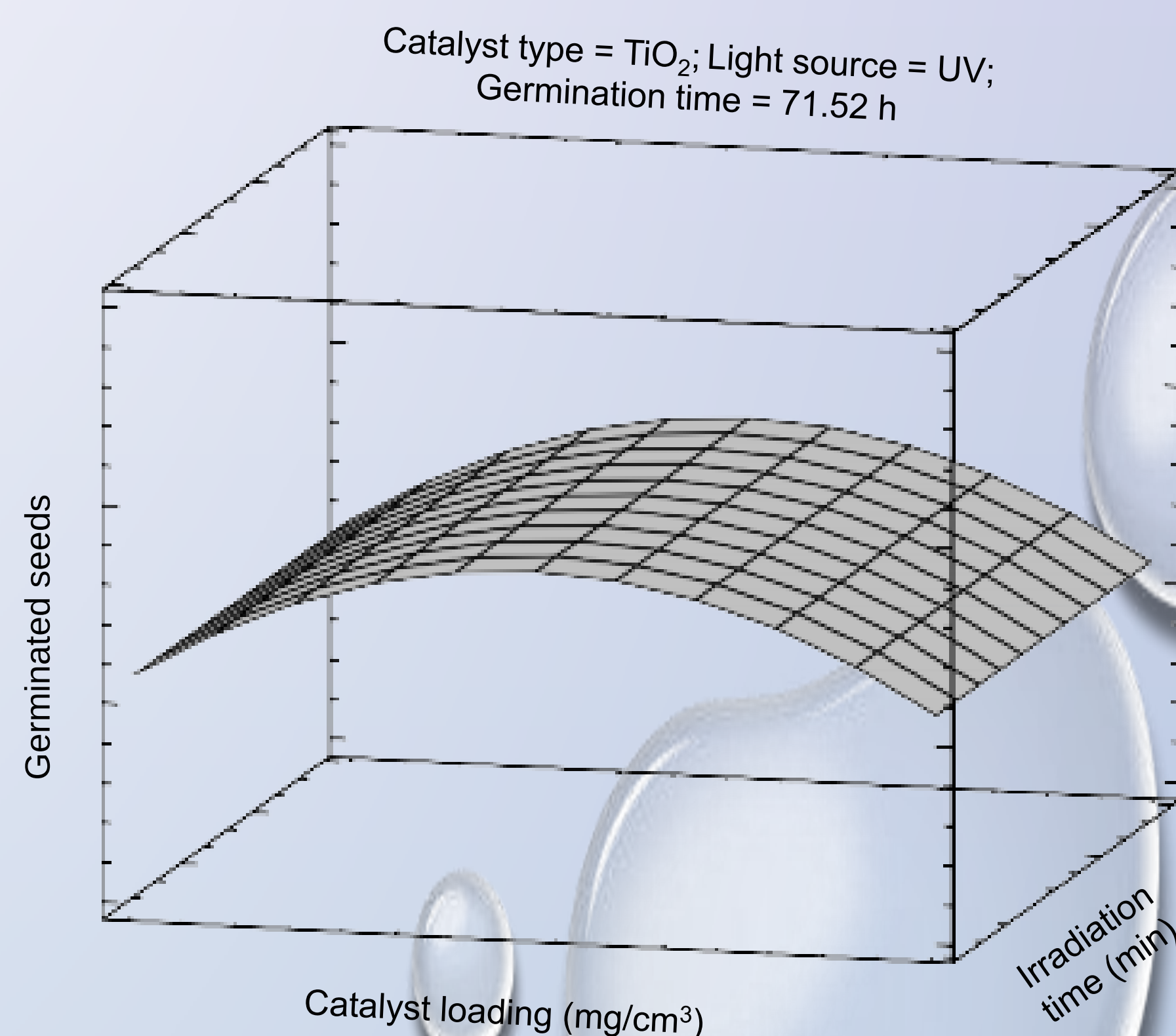
Absorption spectrum and structural formula of TLP.

This research employed the photodegradation of the TLP with two photocatalysts, TiO₂ and ZnO under simulated solar and UV irradiation. Evaluated parameters included catalyst loading, length of irradiation, type of light, and degradation of TLP that was monitored by the UFLC–DAD and LC–ESI–MS.



Optimal degradation of TLP after irradiation.

Environmental toxicity of TLP in plants was experimentally examined in wheat by evaluating germination, biomass production and photosynthetic pigments of the plant. Chemometric analysis was used to evaluate experimental relations in results. Data showed that the best removal of TLP was with TiO₂, at optimal catalyst loading of 1.0 mg/cm³ after 60.83 min of irradiation under UV light. Moreover, it was detected that germination, biomass production, and chlorophyll b (Chl b) were not related with percentage of TLP after irradiation. Whereas, chlorophyll a (Chl a) ($r=-0.61$, $p\leq 0.05$), Chl a+b ($r=-0.56$, $p\leq 0.05$), and carotenoid (car) ($r=-0.57$, $p\leq 0.05$) were strongly inversely (negatively) correlated with TLP concentration, while Chl a+b/car ($r=0.36$, $p\leq 0.05$) was positively moderately related.



Optimal parameters for germination of wheat seeds.

Acknowledgements

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