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The influence of light in systems using porphyrins as catalysts: a study for the degradation of pantoprazole

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The proton pump inhibitor pantoprazole (PPZ) is one of the most consumed medicines worldwide, acting as an inhibitor of hydrochloric acid secretion in the stomach. Although its extensive use, the concentration of PPZ that is found in wastewater is very low. Recently the presence of one PPZ's metabolite was detected in concentrations 30 times higher than the PPZ concentration in wastewater[1,2]. The environmental impacts of the presence of the PPZ and its metabolites are not completely known yet. Because of that, it is necessary to eliminate them from the environment. In this work, we studied the catalytic activity of 5,10,15,20-tetrakis(4-carboxyphenyl)porphyrin (**H_2P**) and its Zn(II) complex (**ZnP**) for the degradation of PPZ in the dark and under sunlight. The reactions were performed for 150 minutes, using Oxone® as oxidant and the degradation of PPZ was analyzed by High Performance Liquid Chromatography with a UV-Vis detector. As shown in Fig. 1, systems using free base porphyrin as catalysts presented higher PPZ degradation, compared to **ZnP**, in the dark (43% for **H_2P** and 42% for **ZnP**) and under sunlight (61% for **H_2P** and 42% for **ZnP**). The three reactions performed in the dark show the same pattern for chromatograms indicating that, in this condition, the products formed, with absorbance in 290 nm, are the same. Meanwhile, the reactions performed under sunlight using each studied porphyrins showed different products formation, which can indicate that the light has some influence in the reaction's mechanism. Phytotoxicity tests were performed using the germination rate (GR) and root growth of seeds of *Lactuca sativa L.* incubated for 7 days at 25 °C[3]. PPZ presented high phytotoxicity. In general, all systems under sunlight led to a decrease in the phytotoxicity, with the system with **H_2P**+sunlight (associated with the best PPZ degradation) being non-phytotoxic. In view of the obtained results, it is possible to conclude that **H_2P** and **ZnP** play an important role in PPZ degradation and the sunlight contributes for a different reaction mechanism and formation of less toxic products. More results will be discussed at the panel.

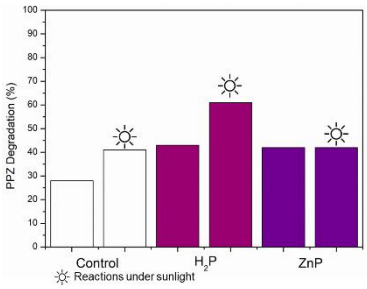

Fig. 1. PPZ degradation reactions. Control system: no presence of catalyst. Molar ratio catalyst:PPZ:Oxone® = 1:10:100.

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