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ADSORPTION EFFECT OF URIC ACID IN MCM-41 IN PHOTODYNAMIC ACTIVITY EVALUATION OF CHEMISTRY

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RESUMO

Photodynamic Therapy (PDT) is a modality based on the incidence of light, at a certain wavelength, in photosensitive compounds (FS), triggering photophysical processes that generate reactive oxygen species, such as singlet oxygen, inducing apoptosis, the technique is used in the treatment of diseases such as cancer. With a short lifespan, the radius of action of singlet oxygen is short, providing high selectivity. The determination of the quantum yield of singlet oxygen is one of the main parameters to evaluate the efficiency of the photodynamic action of an FS. Direct quantification involves phosphorescence measures, an infrared spectrofluorimeter is used, an expensive and difficult to access equipment. A solution found by many research groups is the use of indirect methodologies that use singlet oxygen scavengers, such as uric acid (AU). This indirect technique presents results consistent with the yields obtained via phosphorescence. Most of the FS used in TFD have the formulation process fundamental to the success of the technique, since if aggregates lose their capacity to generate singlet oxygen. In this sense, the use of silica nanoparticles (MCM-41) as a carrier agent for FS has been extensively explored, avoiding the problem of aggregation. However, the short radius of action of singlet oxygen and the use of indirect methodologies for the evaluation of the formation efficiency of this species can lead to failures. As MCM-41 has a huge surface area, the adsorption of uric acid must be carefully evaluated, since its location is essential. The adsorption in the internal pores of the silica can cause underestimated results of the generation of singlet oxygen. In this way, the adsorption in the silica nanoparticles was evaluated, simulating the concentrations used in the tests of Chemical Photodynamic Activity (AFQ). The nanoparticles were synthesized by the “one-pot” methodology, where the reagents are added in a single step. Samples of MCM-41 and aminofunctionalized MCM-41 were obtained. The functionalization of the silica surface is performed for interaction of the FS. The samples went through the structural template extraction process, carried out by calcination and reflux system, evaluated by FTIR. For the adsorption tests, the degradation of AU in the medium was evaluated, being not significant in a period of 6 hours. AU solutions were prepared in PBS buffer, with physiological pH, adding silica and evaluating the spectra at intervals of up to 6 hours. The results indicate an inexpressive AU adsorption to the nanoparticles, in the evaluated range. This fact does not compromise the tests of indirect determination using AU for the evaluation of FS incorporated in the silica.

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PALAVRAS-CHAVE: ADSORPTION, NANOPARTICLES, PHOTODYNAMIC THERAPY

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