Photochemical Synthesis of Organic Nanoparticles of Phenothiazine Associated to Poly(ethylene Glycol) Derivatives

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Introduction - The photochemical properties of phenothiazinic compounds (PTZs) are modulated by the aggregation states of these compounds.¹ In the aggregate state, the photochemically-generated cation radical of PTZs is stable and can form nanoparticles.²,³ Objectives - In the present study it was investigated the modulation of the aggregation and oligomerization of the phenothiazine nucleus (PHT) by the interaction with different polyethylene glycol (PEG) derivatives. The PEG derivatives used were: [poly(ethylene glycol) methyl ether (MPEG), poly(ethylene glycol) dithiol (DPEG) and poly(ethylene glycol) tetrahydrofurfuryl ether (TFPEG)]. Methods - The cation radical and the formation of NPs were characterized by electronic absorption (EA), scanning electronic microscopy (SEM) and cyclic voltammetry (CV). Results - PHT irradiated in solution exhibited a structured band peaking at 517 nm assigned to the stable cation radical. When PEG derivatives are present, the structured band appeared in the early times of irradiation but was gradually broadened and red shifted to 538 nm, probably because the stacking of the species. DPEG was unfavorable for the formation of the cation radical and TFPEG and MPEG favored the process. NPs were formed in the presence of the three PEG derivatives. TFPEG formed hexagonal nanostructures (diameter ± 80nm) while DPEG and MPEG formed spherical structures. The redox behavior of PHT with different PEGs obtained by CV revealed the appearance of additional redox pairs. Conclusion – PEG derivatives can modulate the photochemical behavior of PHT to be used for pharmaceutical and technological applications.
Keywords: phenotiazine nucleus, photochemistry, nanoparticle and poly(ethylene glycol) derivatives.

References

