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## DEVELOPMENT PVP HYDROGELS FOR DRUG DELIVERY SYSTEM VIA ELECTRON BEAM RADIATION

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In the realm of hydrogel synthesis, conventional methods often rely on chemical initiators, which can introduce cytotoxic residues into the final product, posing significant concerns for biomedical applications. This limitation has spurred intense research into alternative, cleaner, and more efficient polymerization techniques. The hydrogel's swelling behavior is critical, as it dictates the diffusion rate of the encapsulated drug. A higher swelling capacity often leads to faster release, while a more tightly crosslinked hydrogel can achieve a sustained or prolonged release profile. Among these, electron beam radiation stands out as a highly advantageous method for hydrogel synthesis. Poly(N-vinyl-2-pyrrolidone) (PVP) is a well-established biocompatible and water-soluble polymer widely used in pharmaceutical and biomedical fields, renowned for its low toxicity, good complexing ability, and excellent film-forming properties. PVP-K-90 was prepared with ultra-pure water at room temperature and constant stirring, after that, the solution prepared was submitted to electron beam radiation at 10 kGy of total dose, under inert atmosphere. After radiation processes, the drug was added to this solution at different concentration. In this study, chloroquine was incorporated, which is a synthetic 4-aminoquinoline derivative, and a well-known antimalarial drug that has also found applications in treating autoimmune conditions like rheumatoid arthritis and lupus erythematosus. The characterization was carried out before and after the drug incorporated to determine the changes in the hydrogel. The techniques used were dynamic light scattering, thermal analysis, microscopy and FTIR. As concentration decreased, DLS showed a corresponding reduction in particle size, measuring 60 nm at 25  $\mu\text{g}$  and 48 nm at 10  $\mu\text{g}$ . The drug incorporation was successfully achieved after the hydrogel was produced by ionizing radiation and with a reduction in a particle size revealing the formation of nanogel.

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