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Hydrogels as a carrier agent for Cu(II)-based crystalline complex

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Hydrogels are polymeric materials with a three-dimensional matrix capable of high water absorption. Their porous structure and ability to retain substances in the liquid phase make hydrogels attractive for various biomedical applications, including tissue engineering, cell therapy, and controlled drug release. This study aims to synthesize hydrogels using sodium alginate and cellulose to load a crystalline Cu(II) complex containing 1,10-phenanthroline and L-glutamine as ligands. In addition, the hydrogels were characterized to determine their structural properties and thermal stability for potential pharmaceutical and biological applications. X-ray diffraction analysis revealed an amorphous profile while TG/DTA curves showed water loss from the polymer matrices in the range of 25–200 ºC. Above this temperature interval, the process of decomposition of materials and possible partial oxidation of the metal began were observed. These results suggest the application of hydrogels incorporated with Cu(II)-based crystalline complex in controlled drug release systems and biological activity. The use of these hydrogels represents an important contribution to the development of new medical therapies targeting cancerous and bacterial diseases, as well as advancing biomedical, biochemical, and pharmaceutical research.