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A Novel Approaches in Pharmaceutical Formulations: Hydrogels

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The availability of large molecular weight protein- and peptide-based drugs due to the recent advances in the field of molecular biology has given us new ways to treat a number of diseases. Synthetic hydrogels offer a possibly effective and convenient way to administer these compounds. Hydrogels are hydrophilic, three-dimensional networks, which are able to imbibe large amounts of water or biological fluids, and thus resemble, to a large extent, a biological tissue. They are insoluble due to the presence of chemical (tiepoints, junctions) and/or physical crosslinks such as entanglements and crystallites. These materials can be synthesized to respond to a number of physiological stimuli present in the body, such as pH, ionic strength and temperature. The aim of this article is to present a concise review on the applications of hydrogels in the pharmaceutical field, hydrogel characterization and analysis of drug release from such devices. These recent developments are the subject of this review, which addresses the use of water-swollen, crosslinked biomedical materials as carriers for the development of novel pharmaceutical formulations and for the delivery of drugs, peptides and proteins, as targeting agents for site specific delivery, or as components for the preparation of protein or enzyme conjugates.