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Synthesis and Characterisation of Starch-PVP as Encapsulation Material for Drug Delivery System

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Abstract : Starch has been widely used as an encapsulation material for drug delivery system. However, starch hydrogel is very easily degraded during metabolism in human stomach. Modification of this material is needed to improve the encapsulation process in drug delivery system, especially for gastrointestinal drug. In this research, three modified starch-based hydrogels are synthesized i.e. Crosslinked starch hydrogel, Semi- and Full- Interpenetrating Polymer Network (IPN) starch hydrogel using Poly(N-Vinyl-Pyrrolidone). Non-modified starch hydrogel was also synthesized as a control. All of those samples were compared as biomaterials, floating drug delivery, and their ability in loading drug test. Biomaterial characterizations were swelling test, stereomicroscopy observation, Differential Scanning Calorimetry (DSC), and Fourier Transform Infrared Spectroscopy (FTIR). Buoyancy test and stereomicroscopy scanning were done for floating drug delivery characterizations. Lastly, amoxicillin was used as test drug, and characterized with UV-Vis spectroscopy for loading drug observation. Preliminary observation showed that Full-IPN has the most dense and elastic texture, followed by Semi-IPN, Crosslinked, and Non-modified in the last position. Semi-IPN and Crosslinked starch hydrogel have the most ideal properties and will not be degraded easily during metabolism. Therefore, both hydrogels could be considered as promising candidates for encapsulation material. Further analysis and issues will be discussed in the paper.

Keywords : biomaterial, drug delivery system, interpenetrating polymer network, poly(N-vinyl-pyrrolidone), starch hydrogel
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