

Effect of Surface Modification with Na Lauryl Sulfate on The Water-Uptake and Release Properties of Na Tripolyphosphate-Cross Linked Chitosan Beads

Wasan Alwahsh^{1,2}, Mai Jaber¹, Suha Al Muhaissen¹, Bashar Al-Khalidi¹, Shariza Sahudin², Hatim S. AlKhatib¹

¹ School of Pharmacy, The University of Jordan, Amman, Jordan.

² Department of Pharmaceutics, Faculty of Pharmacy, Universiti Teknologi Mara, Puncak Alam Campus, Malaysia.

DOI: <https://doi.org/10.35516/jjps.v16i2.1543>

ABSTRACT

In this study we evaluated the effect of Na Lauryl sulfate (SLS) on the water-uptake and release properties of Na Tripolyphosphate (TPP)-cross linked chitosan beads. Chitosan beads were prepared by dropping riboflavin-loaded, chitosan (CS) solution into a curing medium composed of either an aqueous solution of TPP, SLS or a combination of these solutes. The resultant beads were characterized in terms of their size, drug encapsulation efficiency, water uptake properties by gravimetry and image analysis. Drug release properties of the prepared beads were studied using USP Apparatus 1 in media with different pH and ionic strength. Composites (CS/TPP, CS/SLS, and CS/TPP/SLS) were also evaluated using DSC, FTIR and contact angle measurements. Encapsulation efficiency was found to be 93%, 93.2% and 93.1% for CS/TPP, CS/SLS, and CS/TPP/SLS beads respectively and did not show any dependence on the composition of the curing medium for riboflavin. FTIR data suggested the presence of electrostatic interactions between positively charged amine group of CS and the negatively charged TPP and SLS. Drug release from the prepared beads was prolonged with CS/SLS beads releasing the drug faster than CS/TPP beads. The slowest drug release was observed in the case of CS/TPP/SLS beads. Drug release from the different types of beads was pH-dependent with the fastest release observed in 0.1 N HCl. Gravimetric water uptake was highest for CS/SLS beads followed by CS/TPP and CS/TPP/SLS respectively. Swelling study using image analysis showed a similar trend to the gravimetric water uptake results. The drug release and water uptake results could be explained by the effect of SLS on the wettability of the beads and the ability of the release medium to hydrate them which was confirmed by the high contact angle between water and CS/TPP/SLS composites.