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Formation of fine and encapsulated mefenamic acid form I particles for dissolution improvement via electrospray method

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Abstract

The potential of using electrostatic atomizer or electrospray in producing fine and encapsulated particle of mefenamic acid (MA) form I with -cyclodextrin (CD) was demonstrated in this study. Encapsulated MA-CD with a molar ratio of 1:2 was prepared in water-ethanol suspension, followed by the electrospray process to atomize the droplet into fine dried particles. The working distance (WD) between the electrospray needle tip and the substrate were varied from 15 to 25cm. The sizes of encapsulated MA-CD particles were found to decrease from 91 +/- 26 to 42 +/- 35nm as the WD increased. The dissolution rate of encapsulated particles of MA-CD was found to be higher compared to the particles of as-received MA and the unencapsulated MA. The presence of the encapsulated MA-CD was proven by a thermal analysis with the disappearance of MA peak after the atomization process. The x-ray diffraction and FTIR analysis showed that the encapsulation occurred with the existence of new solid phase that was expected from interaction between MA and CD and the appearance of C=C. Further analysis by transmission electron microscopy showed the size and morphology of MA-CD particles when immersed in water and acetone. Encapsulated MA-CD particles were solubilized in water but suspended as spherical shape in acetone.

Keywords

Author Keywords: Atomization; -cyclodextrin; electrospray; fission and encapsulation; mefenamic acid

KeyWords Plus: BETA-CYCLODEXTRIN; DRUG DISSOLUTION; ELECTROHYDRODYNAMIC ATOMIZATION; SCALING LAWS; TAYLOR CONES; CRYSTALLIZATION; POLYMORPHS; NANOPARTICLES; COMPLEXATION; MICROSPHERES

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