

Optimizing the Spray-Drying Parameters of a Formulation of Nanoparticles-In-Microparticles System (NiMS) of Acetazolamide

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Abstract:

In the current research, spray-dried nanoparticles-in-microparticles system (NiMS) of Acetazolamide (ACZ) was formulated. The objective behind the research was to examine the consequence of spray-drying parameters that are inlet temperature and feed rpm on the entrapment efficiency, loading capacity, percentage yield, and particle size on formulating NiMS of ACZ. The prepared NiMS were evaluated for entrapment efficiency, loading capacity, percentage yield and particle size, and it was found that NiMS-5 (formulated using an inlet temperature of 160°C and feed rpm 30) has a maximum entrapment efficiency 17.94% (w/w), loading capacity 33.20% (w/w), percentage yield 25.80% (w/w) and smallest particle size of 763 nm out of all the five formulations (NiMS-1 to NiMS-5). The DSC analysis of NiMS-5 suggested that the entrapment of the nano and microparticles and spray-drying generate a noticeable crystallinity of ACZ and confers a nearly amorphous state to this drug. Infrared analysis of NiMS-5 showed no interaction between drug and polymer during the formulation process. The SEM of NiMS-5 found that the particles are of irregular shape, typically in the range of 2.5 to 3.5 μm . Therefore, NiMS of ACZ have been successfully formulated as it was observed there was an effect of inlet temperature and feed rpm of the spray dryer on the entrapment efficiency, loading capacity, percentage yield and particle size. Thus, it can be concluded this study can be beneficial for the formulation of NiMS of ACZ by spray drying.

Keywords: Acetazolamide, chitosan, central composite design, spray dryer.