

PARTICLE ENGINEERING: A METHOD FOR OPTIMIZATION OF INHALABLE AEROSOLS DELIVERED FROM DRY POWDER INHALERS

K. Jabłczyńska, T. R. Sosnowski

Warsaw University of Technology, Faculty of Chemical and Process Engineering, Waryńskiego 1, 00-645 Warsaw, t.sosnowski@ichip.pw.edu.pl

Successful inhalation therapy accomplished with dry powder inhalers depends on three factors: inhaler construction, powder properties and patient compliance. Optimized DPI should offer easy deagglomeration and aerosolization of drug powders under moderate inhalation effort. Therefore, designing of drug formulation for DPIs must consider minimization of inter-particle interactions which should allow to inhale aerosol characterized by high dose of fine particles. This work reports studies toward obtaining such inhalable particles by powder engineering methodology.

Powder particles were prepared by controlled spray drying. Different characteristics of powders was obtained by changing: flow streams of feed solution and drying air, inlet temperature of air, and composition/concentration of feed solution. Shape and morphology of powder particles were studied with electron microscopy. Powders were aerosolized in cyclohaler-type DPI, while particle size of produced aerosols was determined using aerosol spectrometer and/or cascade impactor.

Results proved that appropriate selection of drying conditions allow to obtain particles with desired morphology and aerosolization properties (i.e. high FPD). It was also demonstrated that proposed method allows to obtain novel types of nanostructured micrometer-size particles for a potential use as carriers for systemic drug delivery via inhalation.

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