Multi-stage theoretical approach to predict spray characteristics, issued from pMDI, from first principles

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Summary

Over years the pharmaceutical community has aimed to conquer asthma and COPD by paying particular attention to novel formulation development through clinical experimentation. These new formulations may alter atomisation characteristics and device functionally. In order to maintain level of pMDI functionality, fundamental understanding of the underlying physical phenomena that governs the aerosol source characteristics is highly necessary. In this work we describe a CFD simulation of the pMDI spray using a two-phase flow and atomisation model for formulation with 10:90 % w/w ethanol/HFA134 in 25 µl valve and actuator nozzle with a diameter of 0.3 mm. The model is implemented within a CFD simulation of the resulting aerosol plume in a USP-IP linking the flow conditions inside the actuator to the plume source characteristics. The CFD result shows how plume velocity slows down over a relatively short distance due to high rate of interaction with inhaled air.