

# Effect of Inhaler Shaking and Ambient Temperature on Dose Uniformity Determination of a Salbutamol Pressurized Metered-dose Inhaler <sup>†</sup>

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**Abstract:** Dose uniformity is a critical quality property of metered dose inhalers (pMDI). Suspension products exhibit high variability, which may influence the determination of particle size distribution in impactors when multiple actuations are required. This work evaluates the influence of agitation and temperature on the dose uniformity of a pMDI containing a salbutamol suspension used for asthma treatment. The assays were performed based on the United States Pharmacopeia (USP) at 28.3 L/min using the dose uniformity sampling apparatus (DUSA). Salbutamol was recovered and quantified by UV-Visible spectrophotometry (276 nm). Experiments were performed with and without shaking between actuations, at controlled temperature ( $19\pm 1^\circ\text{C}$ ) and at room temperature. The results show high variability (above 200%) of the drug dose concerning the nominal concentration if the inhaler is not shaken between actuations, which was attributed to drug sedimentation. It was found that at controlled temperature, the emitted dose was  $116.0\pm 5.1\ \mu\text{g}$ , while at room temperature, it was  $121.9\pm 8.9\ \mu\text{g}$ . It is concluded that the dose variability is lower at controlled temperatures and the emitted dose is within the acceptable variability ranges according to USP. Furthermore, inhaler agitation is an essential step to ensure dose uniformity of suspension formulations of inhaled products.

**Keywords:** uniformity of delivery dose; pMDI; suspension; salbutamol.

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## Conflicts of Interest

The authors declare no conflict of interest.