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Fragrance aerosol comparison: particle size and chamber concentration

ARE Labs evaluated an anonymized fragrance aerosol product group and three comparator groups using two distinct methods. Laser diffraction measured volume-based spray particle-size distributions for 10 products. A fast mobility particle sizer measured one-hour chamber counts for one representative product from each group. Group-average D[4,3] was 31.49 µm for Test Article A and 75.03-89.77 µm for Comparator groups B-D. Because chamber actuation durations and starting counts were unequal, the raw concentration curves are not normalized persistence measures. Particle residence in this chamber does not establish odor longevity, safety, exposure, lung deposition, or clinical performance.

Study purpose and design

The study characterized differences among the tested fragrance aerosols in spray particle-size distribution and time-resolved chamber counts under defined conditions.

The PSD phase included 10 products: three each in A, B, and C, and one in D. Each product was measured after at least four actuations. The chamber phase used one representative product from each group in a one-hour trial. Product identities are withheld, and the alias structure remains fixed throughout this brief.

Equipment used in this study

Equipment	Role in the measurement
Malvern Spraytec laser-diffraction system	Measurement of volume-based spray particle-size distribution at six inches from the detection laser
TSI Fast Mobility Particle Sizer model 3091	Measurement of time-resolved number concentration across the 5.6-560 nm electrical-mobility range
16 m³ controlled aerosol chamber	One-hour comparison at approximately 22 °C, 35% relative humidity, and two air changes per hour

Methods in brief

Laser-diffraction particle-size distribution. Ten product samples were evaluated: three A products, three B products, three C products, and one D product. Each product was hand-actuated at least four times at a measurement distance of six inches. D10, D50, and D90 are volume percentiles, while D[4,3] is the volume-weighted mean diameter.

Chamber counts over time. One representative product from each group was dispersed into the chamber. FMPS counts were recorded at 30-second intervals throughout the one-hour trials. The instrument measured number concentration and electrical-mobility size; it could not identify particle or droplet composition.

Non-equivalent chamber inputs. A3 was actuated for approximately 750 ms, while B1, C2, and D1 were each actuated for one second. Starting counts differed by orders of magnitude, and the report does not provide emitted-mass or equivalent-dose normalization.

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Displayed group-average particle sizes

The table reports volume-based group-average D[4,3] and D50 values alongside the number of PSD products represented. The values retain the source report's displayed precision.

Product group	PSD products	D[4,3]	D50
Test Article A	3	31.49 µm	28.49 µm
Comparator B	3	75.03 µm	69.72 µm
Comparator C	3	77.91 µm	69.26 µm
Comparator D	1	89.77 µm	80.64 µm

D50 is the diameter below which 50% of measured spray volume falls. D[4,3] is the volume-weighted mean diameter.

The group sizes are unequal: A, B, and C each represent three products; D represents one. The values are descriptive and are not inferential estimates of all products in a category.

The chamber starting counts were A3 1.62E+05, B1 4.46E+02, C2 6.71E+03, and D1 2.93E+02 particles/cm³ in the 5.6-560 nm range. These are not normalized to emitted mass or equivalent dose.

What the measurements show

Under the reported conditions, A had the lowest displayed group-average D[4,3] and D50 values. The A3 chamber trace began higher than the comparator traces and remained above them throughout the reported hour.

The chamber comparison does not report normalized decay constants, half-lives, equivalent-dose comparisons, confidence intervals, or statistics from replicated chamber trials. It describes observed counts over time, not an intrinsic retention advantage.

Limits on interpretation

Particle residence in this chamber does not establish odor longevity, safety, exposure, lung deposition, or clinical performance. The study did not measure sensory duration, breathing-zone exposure, chemical composition, toxicology, or biological response.

The source contains conflicting regulatory references in its GLP statements and multiple dates, none of which has been adjudicated as a publication date. This brief makes no claim of current certification, accredited scope, or publication timing. The confidential source remains private; this two-page summary does not replace the detailed technical report.

Scope an aerosol study to match the claim

Define the intended claim before selecting methods. Particle-size distribution can characterize spray fineness, while controlled chamber measurements can track concentration under stated conditions. Sensory, exposure, deposition, or safety claims require additional endpoints designed to address those questions.

Particle size distribution testing at ARE Labs | Request a testing scope

ISO 13320 public standard page for laser-diffraction particle-size analysis