



Titre: Comparison of aerosol spectrometers: Accounting for evaporation and sampling losses
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Settings for the PDA

The settings (Table 1), were selected to ensure that the maximum number of particles were measured by the PDA, without saturating the detectors. Lasers were set to the maximum power of 300 mW and the gain was set to 20 dB for both detectors. The sensitivity of the detectors, which is adjusted with voltage, was the driving factor in the number of particles measured. The detector voltage was set to 1300 V when using DEHS aerosols and to 900 V when using the larger water-based aerosols. When salt was added and the particles dried to their nuclei, the sensitivity was set to 1100V. Repetitive measurements were taken every 60 seconds for 5 minutes and averaged in a single size distribution profile.

Table 1: Settings used on the PDA system

Receiver focal length	300 mm
Scattering angle	30 deg
Aperture mask	Mask A for DEHS and Mask B for water-based
Particle refractive index	1.454 for DEHS and 1.334 for water

Comparative table

The results demonstrate the challenges and opportunities of combining aerosol size distributions obtained from different instruments. In the context of airborne transmission, the critical, potentially dangerous, size range for transmission can be characterized by combining multiple instruments. Table 2 compares multiple characteristics of the size distribution measurement instruments as well as their advantages and limitations.

Table 2: Comparison of measurement size range, measurement time, sampling volume rate, evaporation coefficients, advantages and limitations of the size distribution measurement instruments

	Size range (mu m)	Measurement time (s)	Sampling volume rate (L/min)	Advantages	Limitations
PDA	0.5 - 8000	300	N/A	<ul style="list-style-type: none"> - No sampling line - Large measurement range - Punctual measurement - High resolution 	<ul style="list-style-type: none"> - Calculated number concentrations - Loss of precision under 0.5 mu m
OAS	0.25 - 32	6	1.2	<ul style="list-style-type: none"> - Portable - High measurement frequency 	<ul style="list-style-type: none"> - Losses in sampling line - Limited precision in submicron range
SMPS	0.022 - 0.671	76	1.2	<ul style="list-style-type: none"> - Gold standard in submicron range - High measurement frequency 	<ul style="list-style-type: none"> - Limited size range
Cascade impactor	0.16 - 10	1800	10	<ul style="list-style-type: none"> - Portable - Allows for microbial analysis 	<ul style="list-style-type: none"> - Mass-based measurement - Losses in sampling line - Limited resolution