Highly porous deposits of flame-made aerosol nanoparticles were formed by filtration through a porous substrate (α-
alumina, average pore diameter 3.7 μm). The aerosol was characterized by transmission electron microscopy (TEM) and
scanning mobility particle sizer (SMPS) showing average primary and agglomerate particle sizes of 4.1 and 30 nm,
respectively. The analysis of the cake structure (determination of pore-size, dec, and porosity, εc) was carried out by two
non-destructive permeance methods. The first (“method I”) was based solely on the dusty gas model (DGM) for mass-
transfer. Thereafter, an expression (“method II”) for the calculation of the cake porosity was derived for Knudsen numbers
N10. Permeance analysis revealed poresizes (equivalent cylindrical diameter) of the deposited cakes of approximately
200 nm, independent of mass deposited (wd=0.7–36.8 mg). Calculation of the porosity by method I was prone to large
errors due to any anisotropy of the porosity and resulted in unrealistically high εc values at low deposited mass (e.g.
εc=0.99 at wd=0.7 mg). In contrast, the porosities (average εc=0.947–0.949) calculated by method II were independent of
deposited mass and in excellent agreement to scanning electron microscopy (SEM) analysis (εc=0.94–0.97), as well as to
previous studies at comparable experimental conditions (εc=0.95).