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A novel methodology for assessing the hygroscopicity of aerosol filter samples

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Table S1. Air density and mass obtained for room and measured relative humidities (RHs) from Psychrometric Chart

	1st Day	**2nd day**	**3rd day**	**4th day**	**5th day**
T (^{0}C) - ***Observed***	20.5	21.2	20.3	19.7	19.5
RH (%) - ***Observed***	41.4	63.9	52.4	37.2	49.8
P (mm Hg) **- *Observed***	767.6	764.3	762.5	767.8	764.5
From Online Psychrometric Chart	**Specific volume (m^3/kg)**				
Room	0.832	0.843	0.839	0.828	0.833
84.3%	0.840	0.847	0.845	0.837	0.840
90.8%	0.842	0.848	0.847	0.838	0.841
97.5%	0.843	0.850	0.848	0.840	0.842
Inverse of specific volume	**Air density (kg/m^3)**				
Room	1.202	1.186	1.192	1.207	1.200
84.3%	1.190	1.181	1.183	1.195	1.190
90.8%	1.188	1.179	1.181	1.193	1.189
97.5%	1.186	1.176	1.179	1.190	1.188
Mass (in µg)	**Change in the mass (µg) of air from measured RHs to room RH**				
	1st Day	**2nd day**	**3rd day**	**4th day**	**5th day**
84.3%	233	114	172	264	204
90.8%	245	120	193	247	196
97.5%	293	183	237	323	240

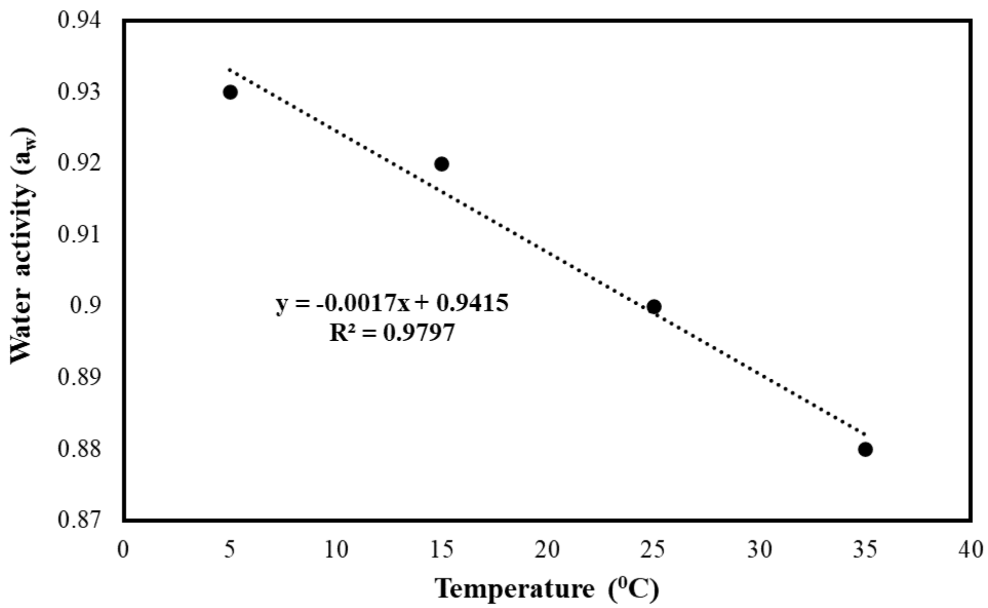

Figure S1. Water activity of saturate $BaCl_2.2H_2O$ at different temperatures (Source: Wang et al., 2013)

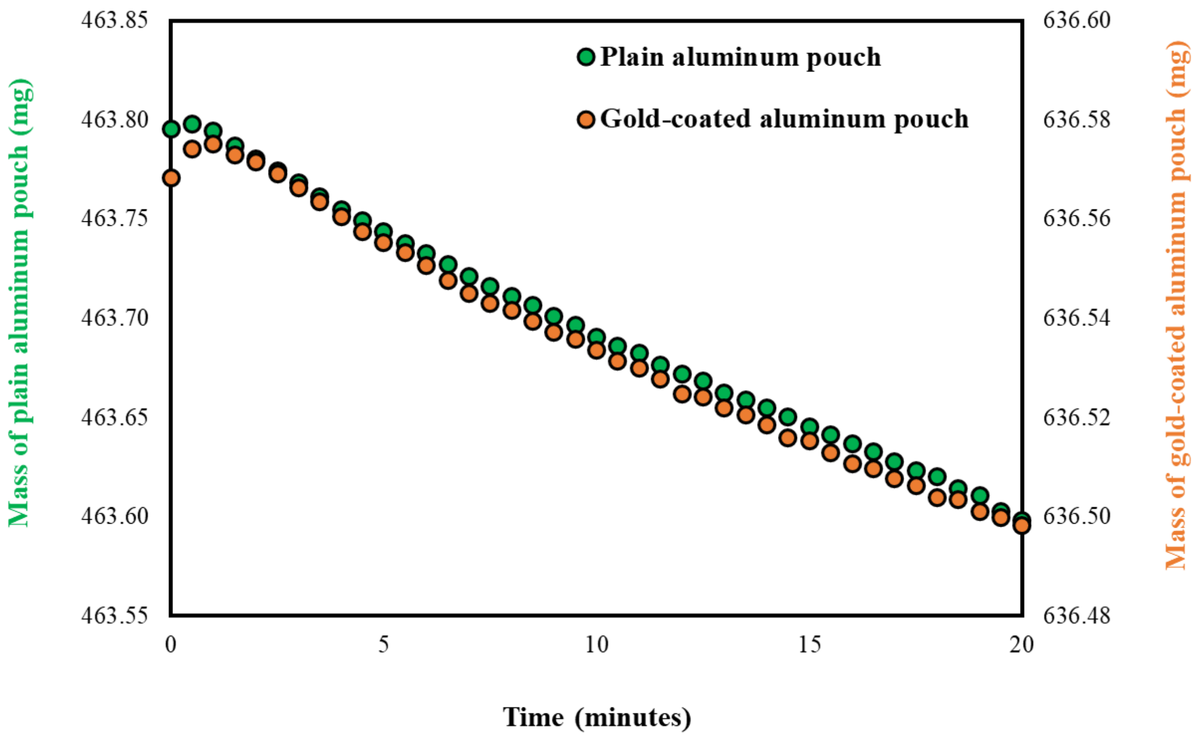

Figure S2. Comparison of the variation in wet weight of plain and gold-coated aluminum pouches with loaded filters

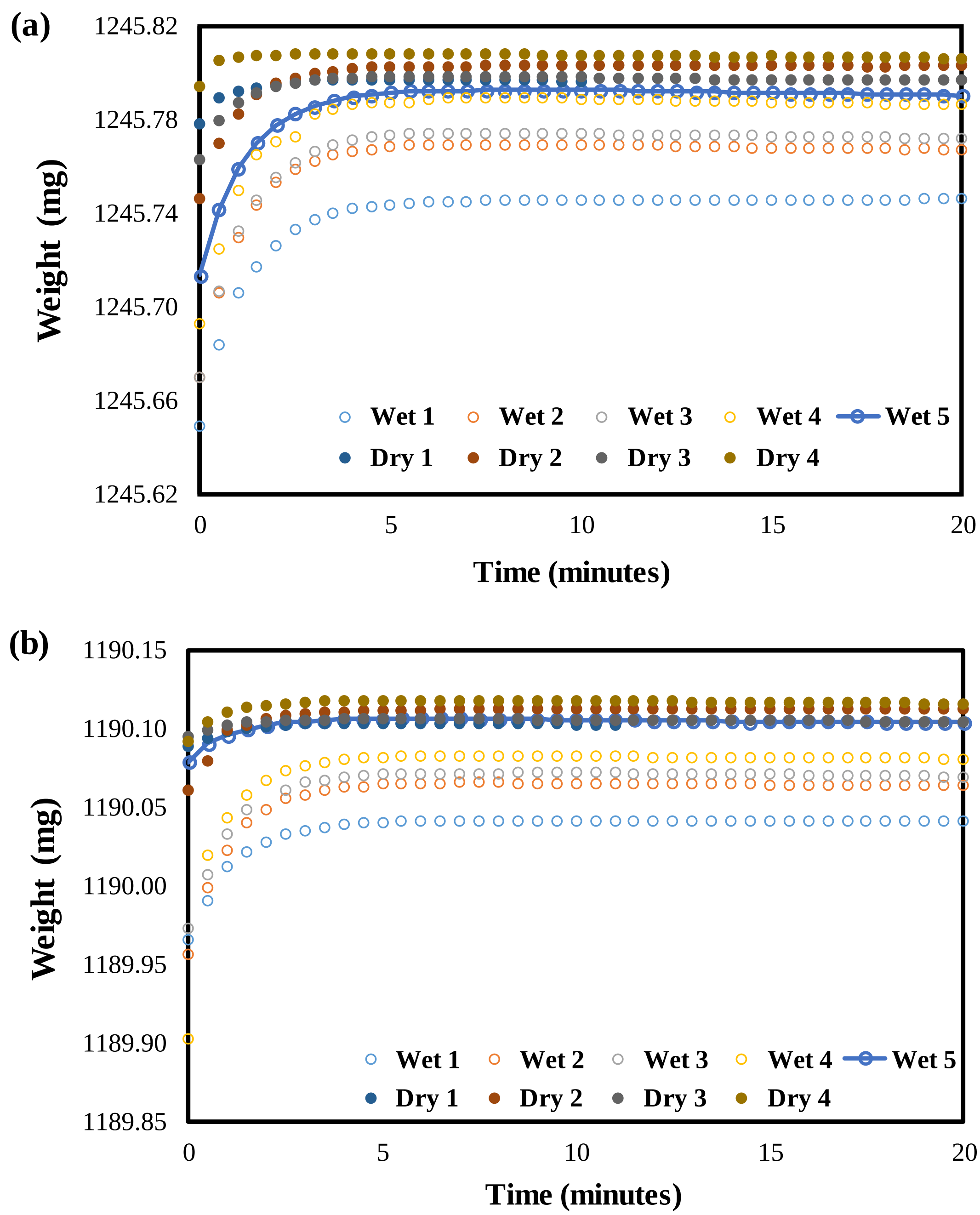

Figure S3. Variation in the weight of the plain aluminum pouch with a Teflon filter (a) 84.3% and (b) 90.5% over time starting when the pouch is removed from the respective chamber and placed on the balance. Hollow circles represent the transfer from the wet chamber to the balance, while solid circles depict the transfer from the dry desiccator to the balance

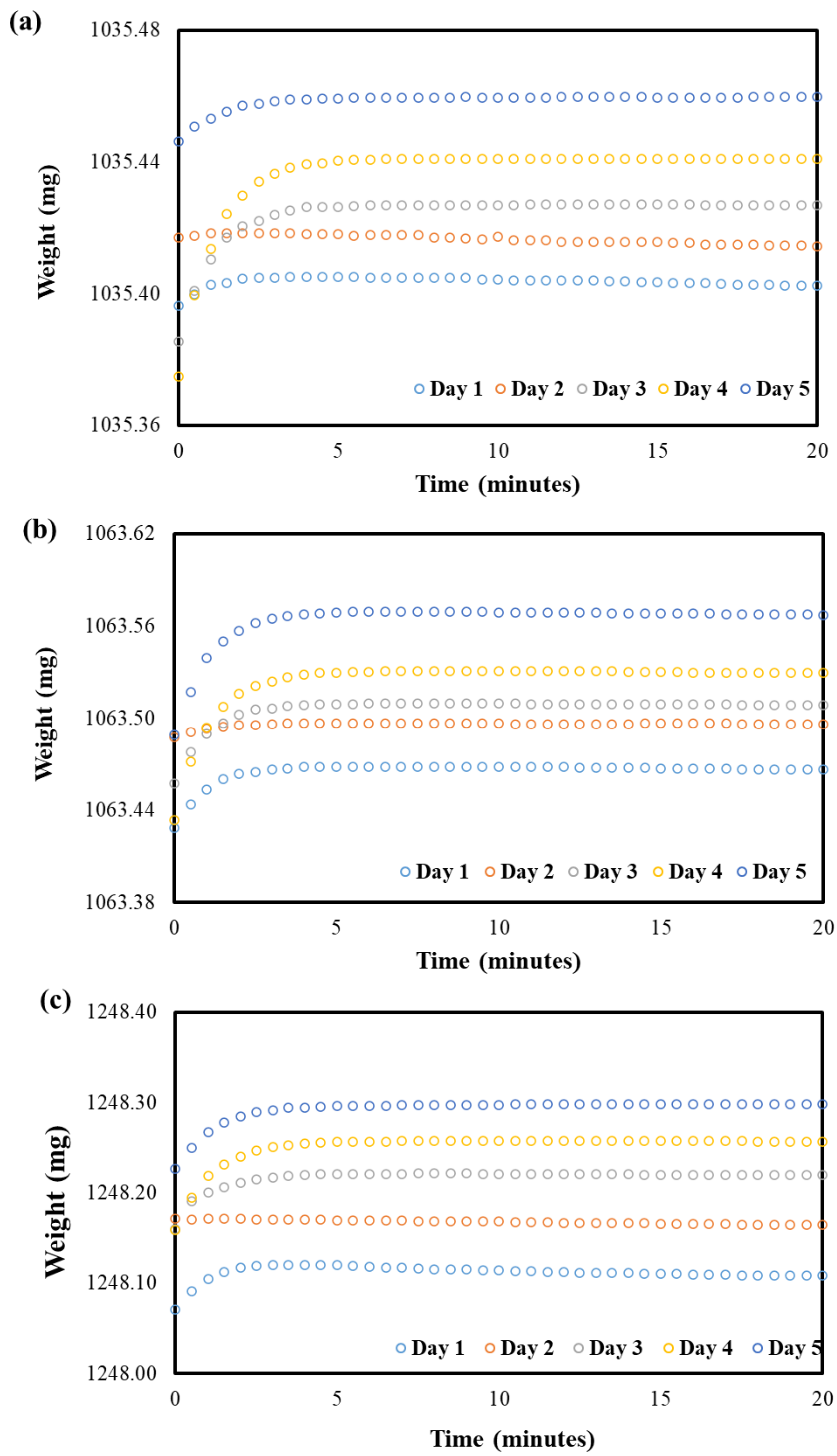

Figure S4. Variation in the wet weight of the plain aluminum pouch without a Teflon filter (a) 84.3%, (b) 90.8% and (c) 97.5% over time starting when the pouch is removed from the respective chamber and placed on the balance.

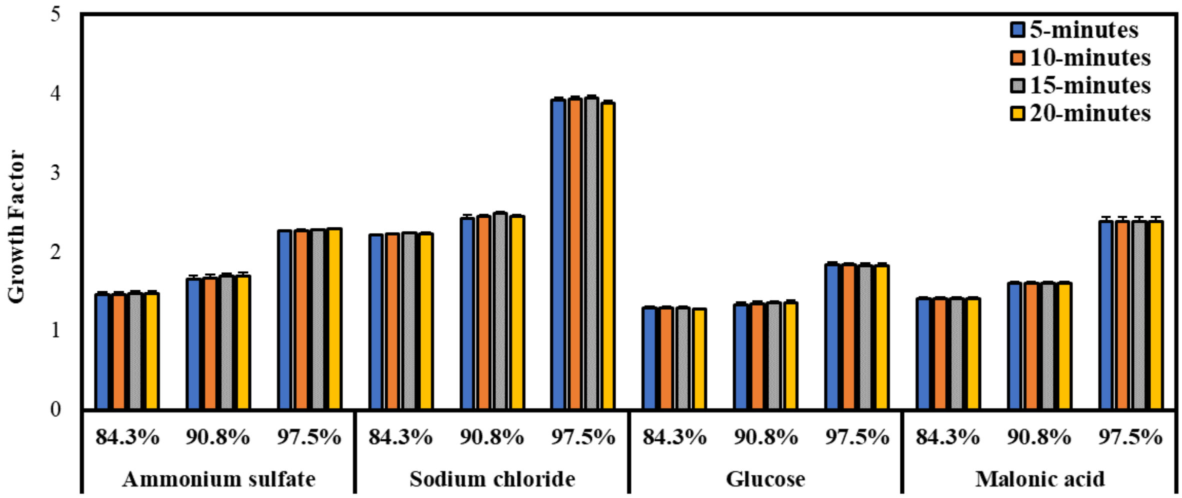

Figure S5. Comparison of estimated GFs from the 20 minutes wet weighing interval with the 5, 10, and 15-minute intervals. Error bar represents the standard deviation.

S1. Estimation of Growth Factor Uncertainty

The growth factor (GF) was calculated using Equations S1 through S4:

$$\text{GF} = \frac{D_{wet}}{D_{dry}} \tag{S1}$$

$$\text{GF}= \frac{(V_{solute} + V_{water})^{(\frac{1}{3})}}{(V_{solute})^{(\frac{1}{3})}} \tag{S2}$$

$$\text{GF}= \frac{(\frac{(m_{dry})}{(\rho_{solute})} + \frac{(m_{water})}{(\rho_{solute})})^{(\frac{1}{3})}}{(\frac{(m_{dry})}{(\rho_{solute})})^{(\frac{1}{3})}} \tag{S3}$$

$$\text{GF} = \frac{(\frac{(\text{DS}-\text{DB})}{(\rho_{solute})} + \frac{((WSP-DSP)-(WBP-DBP))}{(\rho_{water})})^{(\frac{1}{3})}}{(\frac{(\text{DS}-\text{DB})}{(\rho_{solute})})^{(\frac{1}{3})}} \tag{S4}$$

The total uncertainty in the growth factor (δ(GF)) can be determined using uncertainty propagation, as shown in Eq. S5:

$$\delta(\mathrm{GF}) = \sqrt{(\frac{\partial(GF)}{\partial DS}.\sigma(DS))^2 + (\frac{\partial(GF)}{\partial DB}.\sigma(DB))^2 + (\frac{\partial(GF)}{\partial WSP}.\sigma(WSP))^2 + (\frac{\partial(GF)}{\partial DSP}.\sigma(DSP))^2 + (\frac{\partial(GF)}{\partial WBP}.\sigma(WBP))^2 + (\frac{\partial(GF)}{\partial DBP}.\sigma(DBP))^2} \quad \text{(S5)}$$

where, wet sample with pouch (WSP) is the mass of the pouch and sampled filter at high RH, dry sample with pouch (DSP) is the mass of the pouch with particles on the filter at dry conditions, wet blank with pouch (WBP) is the mass of the pouch with blank filter at high RH, dry blank with pouch (DBP) is the mass of the pouch with blank filter at dry conditions, dry sample (DS) is the mass of the filter with particles on the filter at dry condition, and dry blank (DB) is the mass of the blank filter. $mass_{solute}$ and $mass_{water}$ are the mass of dry solute and water, respectively. ρ_{solute} and ρ_{water} denote the densities of dry solute and water, respectively.