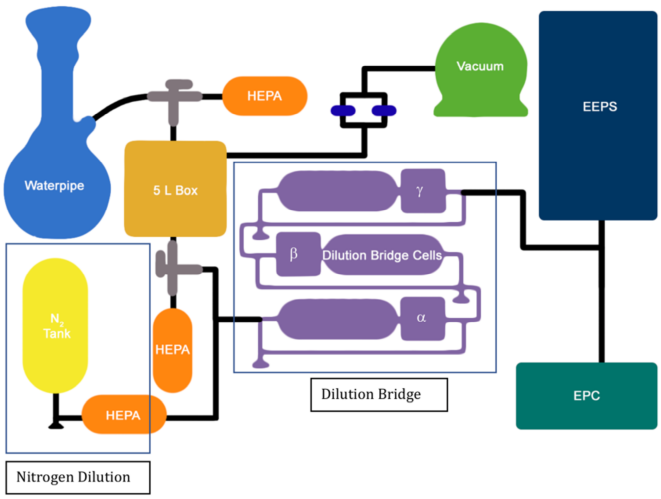

Dilution Factor Calculation

The theoretical dilution factor (D_t) is defined as the product of the dilution due to the dilution bridges (D_F), the dilution due to the box (D_B), and the dilution due to the nitrogen (D_N) (Eq.1).

$$D_T = D_F * D_B * D_N \qquad (1)$$

The D_F is defined as the product of the dilution factor of the bridge cells (D_α, D_β, D_γ) (Eq. 2).

$$D_F = D_\alpha * D_\beta * D_\gamma \qquad (2)$$

D_α, D_β, D_γ is determined from the maximum flow ($F_{M,k}$) and the filtered flow (F_k) (Eq. 3).

$$D_k = \frac{F_{M,k}}{F_{M,k} - F_k};\ k = \alpha, \beta, \gamma, N \qquad (3)$$

The maximum flow through bridges A, B, and C was experimentally determined to be 11.17 LPM, 10.69 LPM, and 10.64 LPM respectively.

Mixing the filtered air present in the box during the puff. D_B can be determined from the volume of the box and the volume of the puff (Eq. 4).

$$D_B = V_B * t_{Puff} * \text{Puff Rate} \qquad (4)$$

Similar to the determination of the dilution factor of a dilution bridge, the dilution factor due to nitrogen (D_N) can be calculated by from the max flow and the measured nitrogen flow (Eq. 5).

$$d_N = \frac{A_m}{(A_m - N)} \qquad (5)$$

60 minute calibration runs were performed using a medium pipe, Teflon and glycerol in the head, and charcoal to determine the linear relationship between the D_t and the experimental dilution factor (D_E). The PM was both sampled in the box and after the dilution bridges. After three trials, a relationship of D_t = 1.0674* D_E -0.5394 (R=0.8493) was determined.

Figure S1. Experimental apparatus for physical properties determination with dilution construct including bridge and nitrogen dilutant highlighted.