

Readme file for: "Data from: Expiratory aerosol particle escape from surgical masks due to imperfect sealing"

Version 1 (12 January 2021)

Experiment Description: Participants were asked to perform various expiratory activities (breathing, speaking, coughing) while wearing no mask or a mask or surgical mask). Study participants performed these activities in front of a funnel connected to an aerodynamic particle sizer (APS), which measured the size-dependent aerosol concentration. Size-dependent concentrations were measured every 1-second during the activities. Additionally, the intensity and duration of the talking and coughing activities were measured using a calibrated microphone. The APS was located in a HEPA-filtered laminar flow hood to reduce background counts to near zero. Participants performed activities in different orientations with respect to their position in front of the funnel. These included:

- No mask: facing straight on, wearing no mask
- Forward: facing straight on, wearing mask
- Top: Head tilted downwards to have bridge of nose in front of funnel, wearing mask
- Side: Head turned sideways to have edge of mask against cheek in front of funnel, wearing mask
- Bottom: Head tilted upwards or above funnel to have chin area in front of funnel, wearing mask

Further details are provided in the associated manuscript (Cappa et al., submitted).

Files Provided:

Provided for each participant/mask type/expiratory activity are the following files:

(i) a text (.txt) file containing the tab-delimited exported files from the APS. Particle sizes are in microns; the smallest size includes all particles measured below that size. Particle counts are given for each size every second. The APS data were exported from the TSI, Inc. AIM software as tab delimited. The file structure for these files is provided below. These files are located in subfolders named by participant ID (e.g., "M1" or "F1") and have the naming structure YYYY_ZZZZ_FX or YYYY_ZZZZ_MX, where X is the participant number (1-11), YYYY is the designator for each mask type (NoMask or SUR = surgical mask), and ZZZZ is the activity (Talk, Cough).

(ii) a .txt file containing the microphone signals (amplitude, in volts) recorded during the activity. The time-interval between points is 2.26757e-5 seconds. These files are provided for both the talking and coughing activities. For coughing, the total time per file is 30 seconds. For talking, the total time per file is variable and depends on the amount of time it took for the reading, but is around 100 seconds. There is only one column per file. These files are located in subfolders named by participant ID (e.g., "M1" or "F1") and have the naming structure wav_YYYY_ZZZZ_FX or wav_YYYY_ZZZZ_MX, where X is the participant number (1-11), YYYY is the designator for each mask type (NoMask or SUR = surgical mask), and ZZZZ is the activity (Talk, Cough).

(iii) A copy of the code used to process the loaded data. All analysis was performed in Igor Pro (v. 8.04, Wavemetrics).

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Data were processed using Igor Pro (v. 8.04, Wavemetrics). The data are available as a single zip file for download. All personal identifiers have been removed.

Folder structure:

- Breath = folder containing data associated with breathing
- Cough = = folder containing data associated with coughing

File structure for APS data files:

Line 1: The sample time for each spectrum, in seconds (here, 1 second)

Line 2: The assumed particle density entered in the AIM software, in g/cm^3

Line 3: An indication of whether the Stokes correction was applied, off or on

Line 4: The lower bound size of the smallest particles bin, in microns

Line 5: The upper bound size of the largest particle bin, in microns

Line 6: The Sample Number

Line 7: The date of sample measurement (M/D/YYYY)

Line 8: The start time of the sample measurement, in local time

Line 9: First column = Aerodynamic Diameter label, Other columns = Raw Counts

Line 10-61: First Column = the bin-center particle aerodynamic diameter, in microns

Line 10-61: Other columns = the raw counts, in particles per sample time (here, particles/second)

Line 62-85: Ancillary information (not used)

Additional files are provided summarizing the data shown in Figures 2 and 3. Both text and Excel files are provided for convenience.

- Figure2.txt: contains the average particle emission rates (in particles per second) for talking or coughing for each participant
- Figure3.txt: contains the particle size distributions averaged over all participants for each orientation. The diameter is the aerodynamic diameter (in microns) and the size distributions are in $dN/d\log D_p$, with units p/s