

Supplement of:

Controlled chamber formation of per- and polyfluoroalkyl substances (PFAS) aerosols with *Pseudomonas fluorescens*: size distributions, effects, and inhalation deposition potential

Kourtchev et al.

Correspondence to: Ivan Kourtchev (ivan.kourtchev@coventry.ac.uk)

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Table S1 ^{13}C labelled PFAS in the EPA 533 ES isotope dilution standard mix (Wellington laboratories Inc, Canada).

^{13}C labelled PFAS	Abbreviation
Perfluorobutanoic acid, $^{13}\text{C}_4$	MPFBA
Perfluorobutane sulfonic acid, $^{13}\text{C}_3$	M3PFBS
Perfluoropentanoic acid, $^{13}\text{C}_5$	M5PFPeA
4:2 fluorotelomer sulfonate, $^{13}\text{C}_2$	M2-4:2FTS
Perfluorohexanoic acid, $^{13}\text{C}_5$	M5PFHxA
Perfluoroheptanoic acid, $^{13}\text{C}_4$	M4PFHpA
Perfluorohexane sulfonic acid, $^{13}\text{C}_3$	M3PFHxS
Perfluorooctanoic acid, $^{13}\text{C}_8$	M8PFOA
6:2 fluorotelomer sulfonate, $^{13}\text{C}_2$	M2-6:2FTS
Perfluorononanoic acid, $^{13}\text{C}_9$	M9PFNA
Perfluorooctane sulfonic acid, $^{13}\text{C}_8$	M8PFOS
Perfluorodecanoic acid, $^{13}\text{C}_6$	M6PFDA
8:2 fluorotelomer sulfonate, $^{13}\text{C}_2$	M2-8:2-FTS
Perfluoroundecanoic acid, $^{13}\text{C}_7$	M7PFUdA
Hexafluoropropylene oxide, $^{13}\text{C}_3$	M3HFPO-DA
Perfluorododecanoic acid, $^{13}\text{C}_2$	MPFDoA

Table S2. Breathing parameters used in MPPD model (version 2.11, Applied Research Associates, Inc.) to estimate deposition fraction as a function of particle size (Anjilvel and Asgharian, 1995, <https://doi.org/10.1006/faat.1995.1144>).

Species	Human
Model	Yeh/Schum Symmetric
FRC	3300 ml
URT Volume	50 ml
Breathing frequency	12 /min
Tidal volume	625 ml
Inspiration Fraction	0.5
Pause fraction	0
Body position	Upright
Breathing Scenario	Nasal

Table S3. Regional (head, tracheobronchial region – TB, and Pulmonary/Alveolar Region – Pul) and total deposition efficiencies calculated using MPPD (version 2.11, Applied Research Associates, Inc.) for each nanoMOUDI size bin.

MOUDI stage	13	12	11	10	9	8	7	6	5	4	3	2	1
Particle Size (µm)	0.01–0.018	0.018–0.032	0.032–0.056	0.056–0.1	0.1–0.18	0.18–0.32	0.32–0.56	0.56–1	1–1.8	1.8–3.2	3.2–5.6	5.6–10	10–30
Head	0.1333	0.0825	0.045	0.025	0.0315	0.0235	0.029	0.0537	0.1437	0.2775	0.578	0.886	0.9884
TB	0.406	0.313	0.2105	0.1395	0.092	0.066	0.052	0.0507	0.0555	0.0755	0.0875	0.0605	0.0085
Pul	0.1933	0.2745	0.2855	0.219	0.1415	0.094	0.0755	0.091	0.119	0.1845	0.15	0.037	0.0002
Total	0.7785	0.7066	0.5699	0.4058	0.2825	0.1993	0.179	0.2312	0.3908	0.6557	0.9122	0.9902	0.9998

Table S4. Size segregated deposition flux (pg/h) estimates in the human respiratory tract.

PFAS	Tract region	0.01–0.018	0.018–0.032	0.032–0.056	0.056–0.1	0.1–0.18	0.18–0.32	0.32–0.56	0.56–1	1–1.8	1.8–3.2	3.2–5.6	5.6–10	10–30	Sum	Course (>1.8 um)	Fine (0.1-1.8 um)	UF (<0.1 um)
11 Cl-PF2OUdS	Head	0.000	0.000	0.000	0.009	0.082	0.132	0.373	0.143	0.521	0.081	0.029	0.015	0.000	1.384	0.125	1.251	0.009
	TB	0.000	0.000	0.000	0.049	0.238	0.371	0.669	0.135	0.201	0.022	0.004	0.001	0.000	1.691	0.027	1.615	0.049
	AL	0.000	0.000	0.000	0.077	0.366	0.528	0.972	0.243	0.431	0.054	0.007	0.001	0.000	2.679	0.062	2.540	0.077
	Total	0.000	0.000	0.000	0.142	0.731	1.120	2.304	0.616	1.417	0.190	0.045	0.017	0.000	6.583	0.253	6.189	0.142
L-PFBS	Head	0.000	0.000	0.000	0.000	0.042	0.082	0.262	0.051	0.146	0.000	0.000	0.000	0.000	0.584	0.000	0.584	0.000
	TB	0.000	0.000	0.000	0.000	0.124	0.232	0.469	0.048	0.056	0.000	0.000	0.000	0.000	0.930	0.000	0.930	0.000
	AL	0.000	0.000	0.000	0.000	0.191	0.330	0.681	0.087	0.121	0.000	0.000	0.000	0.000	1.409	0.000	1.409	0.000
	Total	0.000	0.000	0.000	0.000	0.381	0.700	1.615	0.220	0.397	0.000	0.000	0.000	0.000	3.313	0.000	3.313	0.000
82 FTS	Head	0.000	0.000	0.003	0.005	0.064	0.084	0.235	0.076	0.238	0.047	0.103	0.170	0.015	1.039	0.334	0.697	0.008
	TB	0.000	0.000	0.014	0.026	0.188	0.236	0.421	0.071	0.092	0.013	0.016	0.012	0.000	1.088	0.040	1.008	0.040
	AL	0.000	0.000	0.018	0.041	0.288	0.337	0.611	0.128	0.197	0.031	0.027	0.007	0.000	1.687	0.065	1.562	0.060
	Total	0.000	0.000	0.037	0.077	0.576	0.714	1.450	0.325	0.648	0.111	0.162	0.190	0.015	4.304	0.478	3.713	0.113
PFOS	Head	5.236	1.234	0.036	0.040	0.076	0.112	0.401	0.098	0.289	0.068	0.213	0.064	0.000	7.867	0.345	0.976	6.546
	TB	15.947	4.682	0.170	0.223	0.222	0.316	0.718	0.093	0.111	0.019	0.032	0.004	0.000	22.538	0.055	1.460	21.023
	AL	7.593	4.106	0.231	0.351	0.341	0.450	1.043	0.167	0.239	0.045	0.055	0.003	0.000	14.623	0.103	2.239	12.280
	Total	30.579	10.570	0.460	0.650	0.681	0.954	2.473	0.423	0.785	0.161	0.336	0.071	0.000	48.143	0.569	5.315	42.259
L-PFHpS	Head	0.011	0.001	0.007	0.014	0.078	0.106	0.267	0.104	0.284	0.122	0.147	0.191	0.000	1.332	0.460	0.839	0.033
	TB	0.033	0.003	0.034	0.077	0.226	0.297	0.478	0.099	0.110	0.033	0.022	0.013	0.000	1.425	0.069	1.210	0.147
	AL	0.016	0.003	0.046	0.122	0.348	0.423	0.694	0.177	0.236	0.081	0.038	0.008	0.000	2.191	0.127	1.878	0.185
	Total	0.063	0.007	0.091	0.225	0.695	0.897	1.646	0.449	0.774	0.288	0.232	0.214	0.000	5.581	0.734	4.461	0.386
62 FTS	Head	0.071	0.106	0.656	0.213	0.136	0.123	0.738	0.132	0.884	0.235	26.555	3.833	4.687	38.369	35.310	2.013	1.046
	TB	0.216	0.402	3.070	1.190	0.398	0.345	1.324	0.124	0.342	0.064	4.020	0.262	0.040	11.797	4.386	2.533	4.878
	AL	0.103	0.353	4.164	1.868	0.612	0.492	1.922	0.223	0.732	0.156	6.891	0.160	0.001	17.677	7.209	3.981	6.487
	Total	0.414	0.908	8.312	3.461	1.223	1.043	4.556	0.566	2.405	0.555	41.909	4.284	4.741	74.376	51.489	9.793	13.094
PFHxSK(br+Lin)	Head	0.006	0.000	0.006	0.011	0.076	0.103	0.277	0.093	0.272	0.112	0.132	0.184	0.000	1.273	0.428	0.821	0.024
	TB	0.017	0.001	0.030	0.063	0.222	0.289	0.497	0.088	0.105	0.031	0.020	0.013	0.000	1.375	0.063	1.201	0.111
	AL	0.008	0.001	0.040	0.099	0.341	0.412	0.722	0.157	0.226	0.075	0.034	0.008	0.000	2.123	0.117	1.857	0.149

	Total	0.032	0.003	0.081	0.184	0.681	0.874	1.711	0.399	0.741	0.265	0.208	0.205	0.000	5.384	0.678	4.405	0.300
L-PFPeS	Head	0.000	0.001	0.008	0.014	0.085	0.106	0.275	0.103	0.313	0.156	0.163	0.236	0.000	1.459	0.554	0.882	0.023
	TB	0.000	0.002	0.037	0.080	0.249	0.299	0.493	0.097	0.121	0.042	0.025	0.016	0.000	1.461	0.083	1.258	0.119
	AL	0.000	0.002	0.051	0.125	0.383	0.426	0.715	0.175	0.259	0.103	0.042	0.010	0.000	2.290	0.156	1.957	0.178
	Total	0.000	0.005	0.101	0.232	0.764	0.902	1.696	0.443	0.851	0.368	0.257	0.264	0.000	5.883	0.888	4.657	0.338
42 FTS	Head	0.000	0.002	0.007	0.011	0.081	0.119	0.288	0.099	0.298	0.109	0.272	0.079	0.045	1.410	0.505	0.885	0.021
	TB	0.000	0.007	0.035	0.063	0.238	0.334	0.517	0.094	0.115	0.030	0.041	0.005	0.000	1.478	0.077	1.296	0.105
	AL	0.000	0.006	0.047	0.099	0.366	0.475	0.750	0.168	0.246	0.072	0.071	0.003	0.000	2.304	0.146	2.005	0.152
	Total	0.000	0.015	0.094	0.184	0.730	1.007	1.778	0.427	0.809	0.257	0.430	0.088	0.045	5.865	0.820	4.751	0.294
PFBA	Head	0.020	0.318	0.023	0.193	0.377	0.585	1.071	1.086	1.847	1.148	1.692	3.423	4.115	15.897	10.378	4.966	0.553
	TB	0.060	1.205	0.106	1.076	1.102	1.642	1.921	1.025	0.714	0.312	0.256	0.234	0.035	9.688	0.838	6.403	2.447
	AL	0.029	1.057	0.143	1.689	1.695	2.338	2.789	1.840	1.530	0.763	0.439	0.143	0.001	14.456	1.346	10.192	2.918
	Total	0.116	2.721	0.286	3.129	3.383	4.958	6.612	4.675	5.024	2.712	2.670	3.825	4.162	44.275	13.370	24.653	6.252
PFDaA	Head	0.000	0.003	0.000	0.003	0.010	0.010	0.045	0.036	0.111	0.032	0.015	0.073	0.000	0.340	0.120	0.213	0.007
	TB	0.000	0.012	0.000	0.019	0.031	0.028	0.081	0.034	0.043	0.009	0.002	0.005	0.000	0.264	0.016	0.217	0.031
	AL	0.000	0.011	0.000	0.030	0.047	0.039	0.118	0.062	0.092	0.021	0.004	0.003	0.000	0.427	0.028	0.358	0.041
	Total	0.000	0.027	0.000	0.056	0.094	0.083	0.279	0.157	0.302	0.075	0.023	0.082	0.000	1.180	0.181	0.916	0.083
CI-PF3ONS	Head	0.000	0.000	0.004	0.009	0.079	0.104	0.263	0.104	0.303	0.143	0.186	0.146	0.000	1.342	0.475	0.853	0.014
	TB	0.001	0.000	0.021	0.050	0.230	0.292	0.472	0.098	0.117	0.039	0.028	0.010	0.000	1.358	0.077	1.209	0.072
	AL	0.001	0.000	0.028	0.078	0.354	0.415	0.685	0.176	0.251	0.095	0.048	0.006	0.000	2.138	0.149	1.882	0.107
	Total	0.002	0.000	0.056	0.145	0.706	0.881	1.624	0.448	0.825	0.337	0.294	0.163	0.000	5.482	0.794	4.484	0.203
NaDONA	Head	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.003	0.000	0.000	0.043	0.008	0.021	0.078	0.071	0.007	0.000
	TB	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.003	0.000	0.000	0.007	0.001	0.000	0.019	0.007	0.011	0.000
	AL	0.000	0.000	0.000	0.000	0.000	0.005	0.007	0.005	0.000	0.000	0.011	0.000	0.000	0.029	0.011	0.017	0.000
	Total	0.000	0.000	0.000	0.000	0.000	0.011	0.017	0.012	0.000	0.000	0.068	0.009	0.021	0.138	0.097	0.040	0.000
GenX	Head	0.694	1.001	0.299	0.306	1.015	1.016	1.222	1.719	2.025	2.203	3.408	5.052	1.673	21.633	12.337	6.997	2.300
	TB	2.113	3.796	1.400	1.706	2.963	2.854	2.191	1.623	0.782	0.599	0.516	0.345	0.014	20.904	1.475	10.413	9.016
	AL	1.006	3.329	1.899	2.679	4.558	4.064	3.181	2.914	1.677	1.465	0.885	0.211	0.000	27.868	2.561	16.394	8.913
	Total	4.052	8.570	3.791	4.964	9.100	8.617	7.543	7.402	5.507	5.205	5.379	5.647	1.692	77.468	17.923	38.168	21.377

PFESA	Head	0.000	0.000	0.005	0.011	0.074	0.093	0.229	0.090	0.276	0.115	0.116	0.175	0.000	1.184	0.406	0.761	0.017
	TB	0.000	0.000	0.025	0.063	0.215	0.260	0.410	0.085	0.107	0.031	0.018	0.012	0.000	1.226	0.061	1.077	0.088
	AL	0.000	0.000	0.034	0.098	0.331	0.370	0.596	0.153	0.228	0.077	0.030	0.007	0.000	1.925	0.114	1.679	0.133
	Total	0.000	0.000	0.068	0.182	0.660	0.786	1.413	0.389	0.750	0.272	0.183	0.195	0.000	4.899	0.650	3.998	0.251

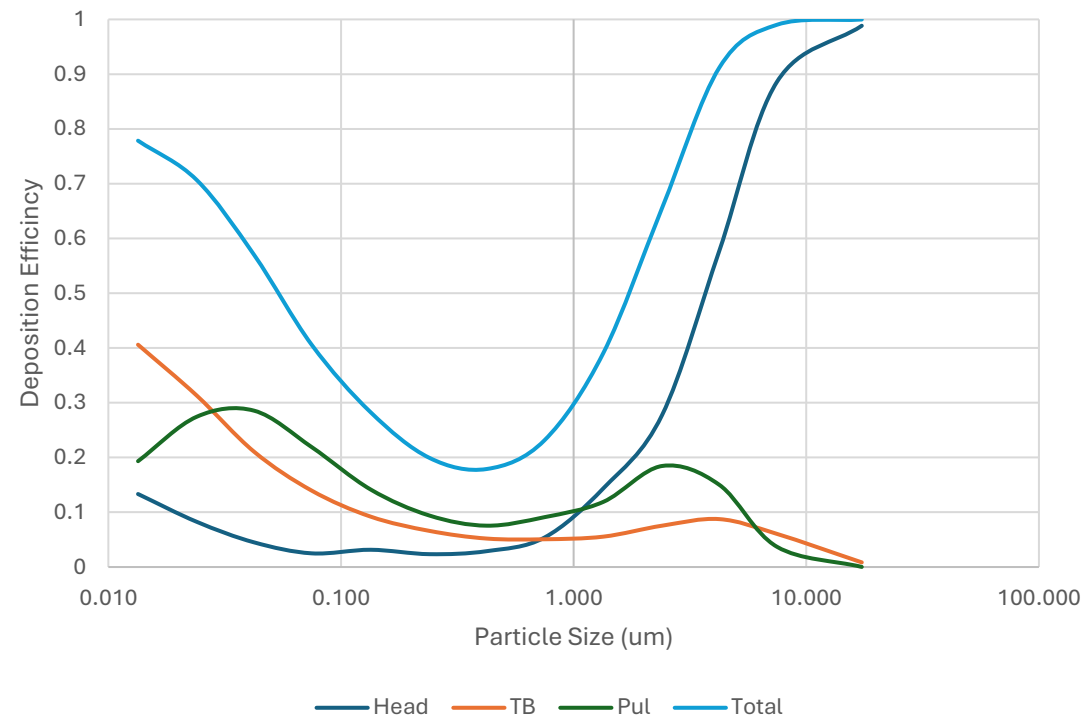


Figure S1. MPPD modelled deposition efficiency in the head, tracheobronchial region, pulmonary region and total human respiratory tract as a function of particle size. MPPD model parameters are given in Table S2