

**Supporting Information for**

**Sampling and determination of antimony isotopes in airborne particles: an  
assessment of membrane filter materials**

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**Table S1. Total mass of antimony (Sb) in different blank membrane filters (ng/a piece of whole filter).**

Material	QM membrane filter						GM membrane filter				PTFE membrane filter				
Brand	Whatman			PALL			Whatman				Ahlstrom-Munksjö				
Size	203 mm × 254 mm			Ø = 90 mm			203 mm × 254 mm				Ø = 90 mm		203 mm × 254 mm		
Batch	Mixed			Mixed			No. 20977				No. 1827-082		No. 7652135-2778		
N1	n=50	Averag	579.42	n=2	Averag	94.82	n=2	Averag	761.24	n=4	Averag	32046.30	n=4	Averag	20904.38
		e			e			e			e			e	
		SD	178.59		SD	1.04		SD	17.97		SD	701.47		SD	1004.24
N2				n=2	Averag	98.37	n=2	Averag	1287.56						
					e			e		SD	320.68				
N3				n=2	Averag	96.23	n=2	Averag	1066.11						
					e			e		SD	16.10				
N4							n=2	Averag	709.45						
								e		SD	51.68				

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S2. Blank values of antimony (Sb) in different blank membrane filters (ng/cm<sup>2</sup>).**

Material	QM membrane filter						GM membrane filter			PTFE membrane filter					
Brand	Whatman			PALL			Whatman			Ahlstrom-Munksjö					
Size	203 mm × 254 mm		Ø = 90 mm		203 mm × 254 mm		Ø = 90 mm		203 mm × 254 mm						
Batch	Mixed		Mixed		No. 20977		No. 1827-082		No. 7652135-2778						
N1	n=50	Average	1.12	n=2	Average	1.49	n=2	Average	1.48	n=4	Average	503.71	n=4	Average	40.54
		SD	0.35		SD	0.02		SD	0.03		SD	11.03		SD	1.95
N2				n=2	Average	1.55	n=2	Average	2.50						
					SD	0.07		SD	0.62						
N3				n=2	Average	1.51	n=2	Average	2.07						
					SD	0.08		SD	0.03						
N4							n=2	Average	1.38						
								SD	0.10						

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S3. Blank values of antimony (Sb) in different blank membrane filters (ng/g).**

Material	QM membrane filter						GM membrane filter				PTFE membrane filter				
Brand	Whatman			PALL			Whatman				Ahlstrom-Munksjö				
Size	203 mm × 254 mm			Ø = 90 mm			203 mm × 254 mm				Ø = 90 mm		203 mm × 254 mm		
Batch	Mixed			Mixed			No. 20977				No. 1827-082		No. 7652135-2778		
N1	n=50	Averag	131.91	n=2	Averag	172.33	n=2	Averag	229.48	n=4	Averag	82170.00	n=4	Averag	7906.69
		e			e			e			e			e	
		SD	40.37		SD	1.18		SD	7.63		SD	1798.65		SD	546.16
N2				n=2	Averag	180.04	n=2	Averag	372.31						
					e			e		e					
					SD	5.95		SD	88.02						
N3				n=2	Averag	173.76	n=2	Averag	287.68						
					e			e		e					
					SD	8.61		SD	1.20						
N4							n=2	Averag	196.26						
								e		e					
								SD	12.41						

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S4. Total mass of antimony (Sb) in blank Whatman QM membrane filters from different production batches (ng/a piece of whole filter).**

	No. 17011224		No. 9578317		No. 9823892		No.16887010		No.16881891						
N1	n=3	Average	287.53	n=4	Average	755.54	n=3	Average	433.73	n=3	Average	495.82	n=3	Average	359.00
		SD	25.36		SD	51.51		SD	29.13		SD	96.69		SD	89.83
N2	n=3	Average	297.60	n=4	Average	762.26	n=3	Average	451.60						
		SD	28.42		SD	41.09		SD	16.75						
N3				n=4	Average	755.41	n=3	Average	516.27						
					SD	32.82		SD	71.42						
N4				n=4	Average	735.08	n=3	Average	650.00						
					SD	23.67		SD	48.31						
N5				n=4	Average	747.90	n=3	Average	700.47						
					SD	42.01		SD	33.32						
N6							n=3	Average	456.67						
								SD	23.00						

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S5. Blank values of antimony (Sb) in blank Whatman QM membrane filters from different production batches (ng/cm<sup>2</sup>).**

	No. 17011224			No. 9578317			No. 9823892			No.16887010			No.16881891		
N1	n=3	Average	0.56	n=4	Average	1.47	n=3	Average	0.84	n=3	Average	0.96	n=3	Average	0.70
		SD	0.05		SD	0.10		SD	0.06		SD	0.19		SD	0.17
N2	n=3	Average	0.58	n=4	Average	1.48	n=3	Average	0.88						
		SD	0.06		SD	0.08		SD	0.03						
N3				n=4	Average	1.47	n=3	Average	1.00						
					SD	0.06		SD	0.14						
N4				n=4	Average	1.43	n=3	Average	1.26						
					SD	0.05		SD	0.09						
N5				n=4	Average	1.45	n=3	Average	1.36						
					SD	0.08		SD	0.06						
N6							n=3	Average	0.89						
								SD	0.04						

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S6. Background values of antimony (Sb) in blank Whatman QM membrane filters from different production batches (ng/g).**

	No. 17011224			No. 9578317			No. 9823892			No.16887010			No.16881891		
N1	n=3	Average	64.82	n=4	Average	169.59	n=3	Average	102.98	n=3	Average	110.18	n=3	Average	79.78
		SD	5.85		SD	10.57		SD	8.64		SD	21.49		SD	19.96
N2	n=3	Average	66.84	n=4	Average	171.00	n=3	Average	101.09						
		SD	6.79		SD	8.84		SD	2.50						
N3				n=4	Average	169.51	n=3	Average	122.11						
					SD	8.15		SD	15.42						
N4				n=4	Average	165.72	n=3	Average	152.74						
					SD	4.91		SD	12.15						
N5				n=4	Average	169.38	n=3	Average	164.96						
					SD	10.88		SD	8.31						
N6							n=3	Average	106.10						
								SD	6.48						

N, different boxes;

n, sample number;

SD, standard deviation.

**Table S7. Antimony (Sb) stable isotope ratios of the certified reference materials (CRMs), certified reference materials + membrane filter (MF + CRMs), and (MF + CRMs)<sub>MF subtraction</sub>.**

	Sample	Recovery (%)	$\epsilon^{123}\text{Sb}$ (‰)
	NIST 1648a		
n=6	Average	96%	3.12
	SD		0.30
	MF+NIST 1648a		
n=6	Average		2.50
	SD		0.28
	(MF+NIST 1648a) <sub>MF subtraction</sub>		
n=6	Average	94%	2.59
	SD		0.29
	NIST 2711a		
n=8	Average	97%	1.68
	SD		0.22
	MF+NIST 2711a		
n=6	Average	104%	1.67
	SD		0.19
	(MF+NIST 2711a) <sub>MF subtraction</sub>		
n=6	Average	97%	1.73
	SD		0.21
	BCR 176R		
n=7	Average	90%	0.86
	SD		0.20
	MF+BCR 176R		
n=2	Average		0.42
	SD		0.09
	(MF+BCR 176R) <sub>MF subtraction</sub>		
n=2	Average	91%	0.41
	SD		0.09
	GBW07405		
n=3	Average	98%	2.18
	SD		0.06
	MF+GBW07405		
n=3	Average		2.42
	SD		0.35
	(MF+GBW07405) <sub>MF subtraction</sub>		
n=3	Average	112%	2.47
	SD		0.36
	GBW07312		
n=3	Average	98%	2.67
	SD		0.08
	MF+GBW07312		
n=3	Average		3.07



	SD		0.02
	(MF+GBW07312) <sub>MF subtraction</sub>		
n=3	Average	91%	3.25
	SD		0.02

**Table S8. Total mass of Sb (ng) in blank membrane filters (MF) and added certified reference materials (CRMs) in the treatment (MF + CRMs).**

Samples	MF	CRMs
NIST 1648a+MF	99.26	1667.57
NIST 2711a+MF	109.46	1475.68
BCR 176R+MF	130.68	14886.96
GBW07405+MF	89.73	2804.77
GBW07312+MF	73.39	918.14