Supporting Information

HETEROGENEOUS REACTIONS OF PM-BOUND PAHs AND NPAHs WITH NO_3/N_2O_5, OH RADICALS, AND O_3 UNDER SIMULATED LONG-RANGE ATMOSPHERIC TRANSPORT CONDITIONS: REACTIVITY AND MUTAGENICITY

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Appendix I. Chamber Exposures.

NO_3/N_2O_5 Exposure. NO_3 radicals were generated in the dark by the thermal decomposition of gaseous N_2O_5 in the presence of added NO_2.[1, 2] Because this reaction is reversible, NO_2 was added in order to achieve the desired NO_3/N_2O_5 concentration ratio and the chamber was continuously flushed to avoid the build-up of NO_2. One addition of ~0.40 – 0.46 ppm N_2O_5 and ~1 ppm NO_2 were made every hour over the 8 hour experimental time period. The calculated mean NO_3 concentration was ~420 ppt after adjusting for wall losses and dilution due to chamber turn over (flushing of the chamber with clean air). The total exposure period was equivalent to exposing the PM to an average ambient NO_3 concentration of 45 ppt for seven 12-hour night-time periods. Trans-Pacific atmospheric transport from Asia to the West Coast has been shown to occur in as little as 6 days during the Spring of the year,[3] making this an appropriate exposure for modeling trans-Pacific atmospheric transport. However, in order to maintain NO_3 radical concentrations in the environmental chamber that might be used to mimic ambient conditions, N_2O_5/NO_3 were much greater than those typically observed in ambient atmospheres, possibly promoting heterogeneous N_2O_5 reactions in the chamber system. It should also be noted that the concentrations of NO_2 (~1 ppm) and N_2O_5 (~0.5 ppm), exceed, by at least two orders of magnitude, expected ambient concentrations of both of these species.

OH Radical Exposure. The photolysis of methylnitrite (CH_3ONO), at wavelength > 300 nm in the presence of NO, was used to generate OH radicals.[4, 5] Irradiations were carried out at 20% of the maximum light intensity, with initial CH_3ONO and NO concentrations of 1 ppm were flushed with a stream of N_2 into the chamber. The chamber was operated continuously in the flush mode to avoid the build-up of NO_2 and HNO_3. However, HNO_3 was expected to form as described in the manuscript and was determined to have played a minor role in PAH nitration during these exposures (e.g. nitration of PYR and CHR to form 1-NP and 6-NCH during the OH

exposure). One addition of CH_3ONO and NO was made every hour, leading to an hourly OH radical concentration of 2×10^7 molecule cm^{-3} (~0.8 ppt) for a total 8 h exposure time. The total OH radical concentration was equivalent to exposing the PM to an average tropospheric OH radical concentration (1.0×10^6 molecule cm^{-3}) for ~6-7 days (24-hour day) in order to simulate trans-Pacific atmospheric transport of PM-bound PAHs during the springtime.[6, 7]

O_3 Exposure. Ozone was generated by a Welsbach T-408 O_3 generator and introduced into the chamber with a stream of N_2. The exposure was conducted in the dark and the chamber was not flushed. The average O_3 concentration was ~800 ppb over the 9.5 h exposure period, which was equivalent to exposing the PM to an average ambient O_3 concentration of 40 ppb for 8 days (24-hour day). Ozone concentrations exceeding 100 ppb have been measured during trans-Pacific atmospheric transport events.[8]

Appendix II. Sample Extraction and Analysis.

In brief, prior to extraction, the ambient PM filters used in the chemical study were spiked with perdeuterated PAH and NPAH surrogates. No perdeuterated surrogates were spiked onto the PM filters that were used for the mutagenicity testing to avoid isotope effects during the mutagenicity study. All PM filters were extracted twice at 100^{o}C and 1500 psi with dichloromethane using pressurized liquid extraction with subsequent combination of the two fractions. The extracts used for the Salmonella assay were evaporated to dryness under a gentle N_2 stream. The residue was dissolved in 500 µl dimethyl sulfoxide (DMSO). The extracts used for the chemical analysis were purified using 20-g silica columns prior to chemical analysis (Mega BE-SI, Agilent Technologies, New Castle, DE). PAHs and NPAHs were eluted in the dichloromethane fraction and spiked with perdeuterated PAH and NPAH internal standards. PAHs were analyzed by gas chromatographic mass spectrometry (Agilent 6890 GC coupled with an Agilent 5973N MSD) in selected ion monitoring using electron impact ionization, while NPAHs were analyzed using negative chemical ionization (NCI) with a programmed temperature vaporization (PTV) inlet (Gerstel, Germany)[9]. Both PAHs and NPAHs were separated on a 5% phenyl substituted methylpolysiloxane GC column (DB-5MS, 30m×0.25mm I.D., 0.25 µm film thickness, J&W Scientific, USA). The separation of 2-NF and 3-NF was achieved on a 50% phenyl substituted methylpolysiloxane GC column (DB-17MS, 30m×0.25mm I.D., 0.25 µm film thickness, J&W Scientific, USA).

Table SI.1: Sampling details for the PM filters used in the exposure experiments.

Filter Code	PM Size	Location	Sampling Date	Duration	Exposure	Experiment
PKU-1	$PM_{2.5}$	Beijing	4/20/11	24 h	NO_3/N_2O_5	Chemistry
PKU-2	$PM_{2.5}$	Beijing	4/21/11	24 h	NO_3/N_2O_5	Chemistry
PKU A	PM_{10}	Beijing	May 09- Feb 10	24 h	NO_3/N_2O_5	Chemistry
PKU-3	$PM_{2.5}$	Beijing	4/22/11	24 h	NO_3/N_2O_5	Mutagenicity
PKU-4	$PM_{2.5}$	Beijing	4/23/11	24 h	NO_3/N_2O_5	Mutagenicity
PKU-5	$PM_{2.5}$	Beijing	4/25/11	24 h	NO_3/N_2O_5	Mutagenicity
PKU-6	$PM_{2.5}$	Beijing	4/26/11	24 h	OH Radical	Chemistry
PKU B	PM_{10}	Beijing	May 09- Feb 10	24 h	OH Radical	Chemistry
PKU C	PM_{10}	Beijing	May 09- Feb 10	24 h	OH Radical	Chemistry
PKU-7	$PM_{2.5}$	Beijing	4/27/11	24 h	OH Radical	Mutagenicity
PKU-8	$PM_{2.5}$	Beijing	4/28/11	24 h	OH Radical	Mutagenicity
PKU-9	$PM_{2.5}$	Beijing	4/29/11	24 h	OH Radical	Mutagenicity
PKU-10	$PM_{2.5}$	Beijing	4/14/11	24 h	O_3	Chemistry
PKU-11	$PM_{2.5}$	Beijing	4/16/11	24 h	O_3	Chemistry
PKU D	PM_{10}	Beijing	May 09- Feb 10	24 h	O_3	Chemistry
PKU-12	$PM_{2.5}$	Beijing	4/18/11	24 h	O_3	Mutagenicity
PKU-13	$PM_{2.5}$	Beijing	4/19/11	24 h	O_3	Mutagenicity
PKU-14	$PM_{2.5}$	Beijing	4/13/11	24 h	O_3	Mutagenicity
MT97-67 Q3	$PM_{2.5}$	Riverside	10/4/97	12 h (daytime)	NO_3/N_2O_5	Chemistry
MT97-66 Q2	$PM_{2.5}$	Riverside	10/4/97	12 h (daytime)	OH Radical	Chemistry
MT97-65 Q1	$PM_{2.5}$	Riverside	10/4/97	12 h (daytime)	O_3	Chemistry

Calculation Method for Table SI.2 to SI.10

Each sample tested in the chemical studies (except for PKU-D) consisted of three paired PM filter portions (n=3). Means and standard errors of the PAH and NPAH masses were calculated for the unexposed and exposed filter portions. For each pair of PM filter portions, the percent change was calculated as:

$$\% \text{ change} = \frac{[\text{PAH or NPAH}]_{\text{EXPOSED}} - [\text{PAH or NPAH}]_{\text{UNEXPOSED}}}{[\text{PAH or NPAH}]_{\text{UNEXPOSED}}} \times 100$$

Where "Average percent change" is the average of percent changes of all paired PM samples.

Table SI.2: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the chemical study of NO_3/N_2O_5 exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	PKU A (n=3)		PKU-1 (n=3)		PKU-2 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	6.8 ± 0.5	5.7 ± 0.6	97.1 ± 41.6	10.8 ± 0.1	5.0 ± 0.4	5.9 ± 1.3	-23% ± 15%
DBT	6.3 ± 0.8	5.0 ± 0.3	24.5 ± 6.0	11.1 ± 1.4	2.3 ± 0.5	2.5 ± 0.8	-11% ± 22%
PHE	81.5 ± 4.4	59.6 ± 7.2	243.7 ± 38.9	111.8 ± 2.9	31.3 ± 0.2	22.8 ± 1.5	-35% ± 5%*
ANT	8.2 ± 0.2	4.1 ± 0.3	16.4 ± 3.7	**4.9**			-57% ± 6%*
2-MPHE	28.3 ± 1.6	20.7 ± 2.3	66.4 ± 2.8	55.0 ± 3.9			-22% ± 5%*
2-MANT	3.9 ± 0.1	**3.1**					-22% ± 1%*
1-MPHE	17.4 ± 1.0	12.0 ± 1.2	40.9 ± 0.4	33.5 ± 0.9	13.1 ± 0.5	10.9 ± 0.9	-22% ± 3%*
3,6-DPHE	3.0 ± 0.1[2]	**2.7**	5.7[1]	4.9[1]			-11% ± 3%
RET	47.6 ± 3.7	36.0 ± 4.8	50.6 ± 0.8	41.1 ± 1.3	23.8 ± 0.9	13.0 ± 0.6	-29% ± 5%*
FLA	318.7 ± 17.7	202.0 ± 22.3	550.4 ± 22.6	540.1 ± 22.6	124.4 ± 3.4	105.5 ± 12.6	-18% ± 6%*
PYR	220.6 ± 13.6	122.1 ± 14.6	369.2 ± 7.5	278.3 ± 11.0	94.1 ± 3.1	33.7 ± 1.0	-45% ± 6%*
BcFLU			80.3 ± 0.8	45.9 ± 13.3	24.2 ± 0.7	10.5 ± 0.8	-50% ± 8%*
1-MPYR	21.1 ± 1.2	10.4 ± 1.1	30.0 ± 0.2	35.2 ± 17.0	10.6 ± 0.3	3.9 ± 0.04	-32% ± 21%
BaA	132.3 ± 6.9	67.1 ± 6.9	177.8 ± 5.4	146.3 ± 12.1	52.5 ± 3.6	27.7 ± 2.8	-38% ± 6%*
CHR + TRI	184.3 ± 13.4	143.4 ± 21.2	223.9 ± 4.6	207.8 ± 10.0	64.2 ± 1.4	52.8 ± 0.7	-16% ± 4%*

Table SI.2 (continued)

Compound	Uncoded A (n=3)		PKU-1 (n=3)		PKU-2 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
BbF	743.3 ± 48.8	595.2 ± 81.4	630.6 ± 8.3	596.5 ± 9.8	276.6 ± 4.5	225.6 ± 1.2	-15% ± 3%*
BkF	187.3 ± 10.4	136.3 ± 20.0	206.7 ± 3.5	184.3 ± 1.6	83.3 ± 2.0	58.0 ± 1.9	-23% ± 4%*
BeP	369.7 ± 21.6	275.9 ± 36.4	357.6 ± 5.7	335.5 ± 2.4	139.4 ± 4.1	106.2 ± 1.4	-19% ± 4%*
BaP	152.1 ± 11.4	65.0 ± 16.6	267.8 ± 6.6	201.9 ± 14.1	121.2 ± 27.7	52.9 ± 9.2	-46% ± 6%*
DahA+DacA	60.9 ± 3.4	48.3 ± 5.9	27.8 ± 0.1	28.2 ± 2.7	9.9 ± 0.3	7.9 ± 0.2	-14% ± 5%
IcdP	366.3 ± 21.8	284.2 ± 36.7	368.1 ± 3.0	367.7 ± 5.9	152.8 ± 4.3	118.6 ± 1.7	-16% ± 4%
BghiP	370.4 ± 22.8	249.0 ± 32.6	382.7 ± 3.0	352.8 ± 9.2	157.2 ± 4.2	112.1 ± 1.5	-23% ± 4%
NPAHs							
9-NAN	110.0 ± 7.0	64.4 ± 1.0	123.1 ± 2.4	100.0 ± 1.2	31.7 ± 1.7	23.5 ± 0.9	-29% ± 3%*
9-NPH			**0.5**	4.8 ± 1.7	**0.5**	2.7 ± 0.1	633% ± 177%*
3-NPH	4.1 ± 0.6	3.8 ± 0.1	2.7 ± 0.1	4.0 ± 0.7	1.2 ± 0.04	2.0 ± 0.1	38% ± 14%
2-NF	257.9 ± 15.5	231.1 ± 3.4	139.8 ± 2.1	141.3 ± 11.6	32.4 ± 2.1	32.0 ± 2.7	-3% ± 4%
3-NF	**0.9**	14.7 ± 0.8	**1.1**	6.7 ± 1.4	**1.1**	6.7 ± 0.5	862% ± 173%*
1-NP	3.1 ± 0.5	64.1 ± 2.7	4.3 ± 0.1	67.2 ± 9.3	2.2 ± 0.03	64.2 ± 0.9	2104% ± 224%*
2-NP			12.0 ± 0.4	12.1 ± 0.4	10.1 ± 0.2	10.0 ± 0.5	0.2% ± 3%
7-NBaA	29.4 ± 2.4	48.5 ± 0.8	24.5 ± 0.9	34.8 ± 2.2	12.4 ± 0.3	32.7 ± 0.4	91% ± 19%*
1-NTR	**0.6**	3.7 ± 0.2	**0.6**	1.1 ± 0.2	**0.6**	1.8 ± 0.4	278% ± 78%*
6-NCH	**0.8**	25.0 ± 0.8	**0.2**	6.9 ± 1.5	**0.2**	11.3 ± 1.0	4878% ± 644%*
2-NTR	**0.7**	5.9 ± 0.3	0.5 ± 0.03	1.5 ± 0.3	**0.4**	1.6 ± 0.1	420% ± 80%*
1,3-DNP			0.7[1]	1.1[1]			42%
1,6-DNP			0.6[1]	2.5[1]			296%
1,8-DNP			2.6 ± 0.04	5.3 ± 0.8	1.6[1]	2.5[1]	91% ± 23%*
6-NBaP	**5.3**	91.4 ± 1.8	**6.1**	191.3 ± 6.6	**6.1**	171.2 ± 15.6	2445% ± 226%*

Table SI.3: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the chemical study of OH radical exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	PKU B (n=3)		PKU C (n=3)		PKU-6 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	8.5 ± 0.3	8.2 ± 0.3	8.7 ± 0.5	7.6 ± 0.4	6.8 ± 0.3	5.5 ± 0.4	-12% ± 4%*
DBT	7.6 ± 0.7	6.4 ± 0.3	6.7 ± 0.5	6.1 ± 0.5	3.5 ± 0.1	2.1 ± 1.1	-21% ± 11%
PHE	96.4 ± 4.2	86.0 ± 3.8	102.4 ± 7.8	82.2 ± 5.0	60.4 ± 1.7	33.1 ± 1.4	-25% ± 6%*
ANT	8.1 ± 0.6	4.7 ± 0.03	8.9 ± 0.8	5.7 ± 0.2	9.2 ± 0.2	5.3 ± 0.3	-40% ± 3%*
2-MPHE	31.5 ± 1.4	27.8 ± 1.0	33.9 ± 2.8	26.1 ± 1.3	29.7 ± 0.6	25.3 ± 3.0	-16% ± 4%*
2-MANT	3.7 ± 0.2	**3.1**	3.9 ± 0.4	**3.1**			-17% ± 4%*
1-MPHE	19.9 ± 1.1	16.7 ± 0.7	21.0 ± 1.8	15.9 ± 0.4	19.8 ± 0.6	14.3 ± 1.5	-22% ± 3%*
3,6-DPHE	2.8 ± 0.1^2	2.5 ± 0.2^2	3.2 ± 0.1^2	**2.7**	6.5 ± 0.8^2	6.0 ± 0.3^2	-11% ± 5%
RET	31.0 ± 1.2	29.1 ± 1.5	32.5 ± 2.2	26.5 ± 1.8	44.3 ± 2.2	40.6 ± 3.7	-11% ± 3%*
FLA	379.6 ± 22.8	336.9 ± 13.0	432.9 ± 37.4	319.3 ± 20.9	195.2 ± 2.9	156.1 ± 14.4	-19% ± 3%*
PYR	250.0 ± 10.9	216.0 ± 9.2	265.7 ± 19.3	210.6 ± 12.1	142.3 ± 3.5	86.0 ± 8.0	-24% ± 5%*
BcFLU					39.5 ± 1.0	21.1 ± 1.9	-47% ± 4%*
1-MPYR	21.5 ± 1.4	17.0 ± 0.3	23.1 ± 1.4	15.9 ± 1.0	18.9 ± 0.4	8.2 ± 0.8	-36% ± 6%*
BaA	130.2 ± 5.4	99.3 ± 2.5	135.8 ± 9.4	102.3 ± 4.6	133.2 ± 4.6	83.8 ± 4.9	-28% ± 3%*
CHR + TRI	138.6 ± 5.8	139.4 ± 6.6	149.2 ± 11.1	132.8 ± 7.9	98.0 ± 18.4	106.9 ± 3.6	3% ± 10%
BbF	650.0 ± 33.8	641.8 ± 27.3	668.5 ± 44.4	590.7 ± 29.5	440.8 ± 6.0	440.0 ± 9.9	-7% ± 3%*
BkF	179.0 ± 10.7	172.4 ± 7.9	182.5 ± 14.5	154.7 ± 9.5	146.8 ± 2.1	132.1 ± 2.9	-9% ± 3%*
BeP	342.7 ± 16.6	327.4 ± 12.3	353.0 ± 24.7	309.4 ± 16.1	236.5 ± 2.7	210.9 ± 5.8	-9% ± 3%*
BaP	230.6 ± 11.2	231.9 ± 9.4	245.8 ± 18.2	197.5 ± 10.4	178.8 ± 3.6	93.0 ± 4.6	-22% ± 8%*
DahA+DacA	71.6 ± 3.7	70.3 ± 2.5	75.0 ± 5.4	67.4 ± 3.9	17.8 ± 0.3	15.4 ± 0.6	-8% ± 3%
IcdP	481.8 ± 22.1	486.6 ± 21.4	497.5 ± 34.5	462.1 ± 30.3	242.9 ± 1.6	222.2 ± 5.4	-5% ± 3%
BghiP	494.8 ± 26.9	468.8 ± 19.4	508.9 ± 37.7	445.8 ± 29.2	255.1 ± 0.9	216.2 ± 7.7	-11% ± 3%*

Table SI.3 (continued)

Compound	PKU B (n=3)		PKU C (n=3)		PKU-6 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
NPAHs							
9-NAN	54.6 ± 3.4	10.7 ± 1.7	72.2 ± 7.3	8.8 ± 0.7	49.5 ± 1.7	6.9 ± 0.9	-85% ± 1%*
3-NPH	5.0 ± 0.4	3.9 ± 0.1	6.0 ± 0.6	3.8 ± 0.5	1.4 ± 0.04	0.9 ± 0.1	-32% ± 3%*
2-+3-NF	90.2 ± 7.0	85.7 ± 1.4	114.5 ± 10.5	82.5 ± 7.3	49.5 ± 0.8	39.2 ± 2.1	-18% ± 4%*
1-NP	0.9 ± 0.2	3.8 ± 0.2	0.7 ± 0.03	4.0 ± 0.3	3.3 ± 0.04	12.1 ± 1.9	376% ± 54%*
2-NP	17.4 ± 1.2	17.0 ± 0.8	17.1 ± 2.0	15.4 ± 1.3	11.2 ± 0.2	8.6 ± 1.1	-11% ± 5%
7-NBaA	18.5 ± 1.2	6.6 ± 1.0	18.0 ± 1.5	5.3 ± 0.4	21.6 ± 0.4	6.3 ± 0.4	-68% ± 3%*
1,8-DNP					2.2 ± 0.02	1.9 ± 0.1	-15% ± 3%
6-NBaP	**5.3**	52.8 ± 11.2	**5.3**	21.4 ± 5.8[2]	**6.1**	29.1 ± 7.6	552% ± 131%*

Table SI.4: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the chemical study of O_3 exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	PKU D (n=2)		PKU-10 (n=3)		PKU-11 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	13.5 ± 2.4	9.9 ± 0.5	11.1 ± 1.0	9.2 ± 1.3	14.1 ± 0.9	10.8 ± 1.4	-21% ± 5%*
DBT	11.0 ± 1.5	10.1 ± 1.4	11.9 ± 0.1	9.0 ± 1.0	15.4 ± 0.7	9.0 ± 1.1	-26% ± 8%*
PHE	147.6 ± 21.4	98.0 ± 4.8	104.9 ± 6.8	85.5 ± 7.4	161.2 ± 11.7	119.1 ± 7.2	-25% ± 4%*
ANT	10.7 ± 0.7	8.6 ± 0.1	9.0 ± 1.0	8.0 ± 1.2	13.3 ± 1.0	10.4 ± 0.8	-16% ± 8%*
2-MPHE	48.0 ± 10.3	34.7 ± 1.3	51.0 ± 3.1	42.3 ± 3.0	67.2 ± 3.3	48.8 ± 4.0	-22% ± 5%*
2-MANT	5.1 ± 0.3	4.4 ± 0.6					-13% ± 17%
1-MPHE	27.7 ± 5.6	19.0 ± 1.5	36.4 ± 2.2	30.8 ± 1.1	45.8 ± 0.8	30.7 ± 3.2	-25% ± 5%*
3,6-DPHE	3.7 ± 0.6	**2.7**			10.3 ± 4.0^2	**5.7**	-30% ± 12%
RET	43.2 ± 9.9	24.5 ± 1.8	100.5 ± 8.5	74.9 ± 8.3	72.2 ± 7.5	56.6 ± 8.3	-28% ± 4%*
FLA	527.1 ± 156.7	389.2 ± 47.5	250.4 ± 14.2	204.5 ± 12.4	498.7 ± 14.4	341.1 ± 26.6	-23% ± 7%*
PYR	313.5 ± 45.2	186.6 ± 8.0	147.5 ± 6.3	83.1 ± 6.3	252.0 ± 9.1	143.4 ± 7.4	-42% ± 2%*
BcFLU			34.9 ± 1.7	21.8 ± 1.5	48.4 ± 1.8	28.5 ± 1.9	-39% ± 2%*
1-MPYR	24.2 ± 3.6	13.4 ± 0.1	15.9 ± 1.2	9.0 ± 0.7	20.8 ± 1.2	11.5 ± 0.9	-44% ± 2%*
BaA	154.0 ± 17.1	89.4 ± 2.4	75.5 ± 2.4	46.0 ± 3.4	103.3 ± 3.7	63.8 ± 3.7	-39% ± 1%*
CHR + TRI	219.8 ± 36.2	140.2 ± 8.9	89.8 ± 3.7	67.8 ± 4.0	133.5 ± 6.3	105.1 ± 5.6	-26% ± 3%*
BbF	848.2 ± 162.5	631.6 ± 16.0	261.5 ± 8.1	209.5 ± 9.2	336.5 ± 8.7	287.7 ± 10.7	-19% ± 3%*
BkF	223.1 ± 47.5	144.8 ± 4.7	69.7 ± 2.7	44.1 ± 2.5	96.2 ± 1.6	67.8 ± 5.7	-33% ± 3%*
BeP	438.5 ± 66.3	304.0 ± 7.6	138.9 ± 4.6	91.9 ± 4.9	184.0 ± 5.2	136.9 ± 6.8	-30% ± 2%*
BaP	250.3 ± 34.7	133.4 ± 4.9	85.1 ± 4.2	45.8 ± 2.8	124.0 ± 3.0	72.4 ± 3.3	-44% ± 2%*
DahA+DacA	83.4 ± 11.1	51.1 ± 3.5	9.5 ± 0.3	5.7 ± 0.3	12.4 ± 0.4	8.2 ± 0.5	-37% ± 2%*
IcdP	465.7 ± 62.0	303.3 ± 16.7	129.0 ± 3.8	87.2 ± 4.1	171.6 ± 4.6	124.8 ± 4.6	-31% ± 2%*
BghiP	444.4 ± 77.8	279.5 ± 15.7	129.1 ± 4.1	82.1 ± 3.6	167.3 ± 5.2	118.3 ± 4.5	-34% ± 2%*

Table SI.4 (continued)

Compound	PKU D (n=2)		PKU-10 (n=3)		PKU-11 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
NPAHs							
9-NAN	79.7 ± 13.4	70.7 ± 22.3	32.5 ± 5.0	18.0 ± 1.6	16.1 ± 0.9	7.9 ± 0.4	-36% ± 11%
3-NPH	3.1 ± 1.1	4.4 ± 1.6	1.5 ± 0.3	1.3 ± 0.1	1.2 ± 0.1	1.0 ± 0.1	9% ± 27%
2-+3-NF	151.3 ± 25.0	203.3 ± 69.0	31.4 ± 2.9	24.8 ± 0.9	34.6 ± 1.8	29.2 ± 1.5	4% ± 17%
1-NP	1.9 ± 0.5	1.4 ± 0.4	6.6 ± 0.8	6.2 ± 0.6	5.9 ± 0.6	6.3 ± 0.3	1% ± 5%
2-NP			4.0 ± 0.5	3.1 ± 0.2	2.9[1]	2.8[1]	-18% ± 6%
2,8-DNDBT			1.7 ± 0.4[2]	1.4 ± 0.04[2]			-14% ± 20%
7-NBaA	16.1 ± 0.8	12.0 ± 0.9	11.0 ± 1.6	7.4 ± 0.8	3.4 ± 0.1	2.1 ± 0.01	-33% ± 4%*
1-NTR			1.7 ± 0.4	1.5 ± 0.5			-15% ± 15%
6-NCH			1.3 ± 0.2	1.2 ± 0.3			-13% ± 23%
3-NBENZ			1.2 ± 0.2[2]	1.3 ± 0.03[2]			6% ± 16%
2-NTR			1.1 ± 0.2	1.0 ± 0.3			-14% ± 21%
1,8-DNP					1.7 ± 0.1[2]	**1.6[2]**	-5% ± 3%
6-NBaP	17.3[1]	5.3[1]			4.8[1]	3.8[1]	-45% ± 24%

Table SI.5: Means and standard errors of PAH and NPAH masses (ng) measured in Riverside filters used for the chemical study of NO_3/N_2O_5 exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	R-671 (n=3)		R-672 (n=3)		R-673 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	4.8^{1}	3.5^{1}	3.7 ± 0.2^{2}	2.1 ± 2.1^{2}	4.2 ± 0.1^{2}	**3.5**	-28% ± 20%
DBT	**0.6**^{2}	1.8 ± 0.3^{2}	0.6 ± 0.02^{2}	2.3 ± 0.3^{2}	1.3 ± 0.3	6.8 ± 4.5	515% ± 345%
PHE	1.6 ± 0.5	3.0 ± 0.6	1.5 ± 0.3	4.8 ± 2.2	4.4 ± 0.5	10.0 ± 3.5	195% ± 74%*
2-MPHE			**5.0**	5.3^{1}	6.0 ± 0.6	13.0 ± 5.0	97% ± 77%
1-MPHE			**4.0**	5.9^{1}	4.1 ± 0.1	7.1 ± 2.7	70% ± 49%
FLA	5.3 ± 0.2	6.1 ± 0.4	4.9 ± 0.2	6.0 ± 0.5	8.0 ± 1.6	6.3 ± 1.0	8% ± 10%
PYR	4.4 ± 0.1	5.0 ± 0.1	4.5 ± 0.2	4.6 ± 0.4	6.0 ± 1.0	4.7 ± 0.03	-0.3% ± 6%
BaA	1.7 ± 0.5^{2}	1.6 ± 0.5^{2}			2.4 ± 0.1	**1.2**	-24% ± 27%
CHR + TRI	1.9 ± 0.1	2.1 ± 0.1	1.8 ± 0.1	1.9 ± 0.1	2.5 ± 0.5	2.1 ± 0.1	2% ± 6%
BbF	5.2 ± 0.5	5.7 ± 0.1	4.8 ± 0.1	5.2 ± 0.2	7.0 ± 1.7	5.2 ± 0.2	-0.02% ± 7%
BkF					2.7^{1}	2.2^{1}	-17%
BeP	4.2 ± 0.2	4.6 ± 0.1	4.0 ± 0.2	4.2 ± 0.2	5.1 ± 0.7	4.2 ± 0.1	-0.4% ± 5%
BaP					9.3^{1}	8.8^{1}	-6%
IcdP	3.6 ± 0.3	3.9 ± 0.2	3.4 ± 0.1	3.5 ± 0.1	4.4 ± 0.7	3.4 ± 0.1	-1% ± 6%
BghiP	5.6 ± 0.4	6.5 ± 0.01	5.7 ± 0.1	5.9 ± 0.3	6.7 ± 0.6	6.0 ± 0.2	3% ± 5%
NPAHs							
9-NAN	0.3^{1}	**0.2**			0.4 ± 0.1^{2}	**0.2**	-34% ± 12%
3-NPH	0.3 ± 0.1	0.3 ± 0.01	0.2 ± 0.1	0.3 ± 0.1	0.1^{1}	0.2^{1}	52% ± 37%
2-+3-NF	4.6 ± 0.2	4.2 ± 0.3	5.3 ± 0.3	4.9 ± 0.2	5.3 ± 0.3	5.2 ± 0.3	-5% ± 3%
1-NP	0.2 ± 0.1	0.2 ± 0.02	0.3 ± 0.1	0.3 ± 0.03	0.3 ± 0.04	0.3 ± 0.03	3% ± 8%
1-NTR	0.3^{1}	**0.2**					-7%

Table SI.6: Means and standard errors of PAH and NPAH masses (ng) measured in Riverside filters used for the chemical study of OH radical exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	R-661 (n=3)		R-662 (n=3)		R-673 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	**3.5**	4.9 ± 0.9	3.7^{1}	**3.5**	3.9 ± 0.2^{2}	3.6 ± 0.1^{2}	16% ± 15%
DBT	0.6^{1}	1.1^{1}	0.8 ± 0.2^{2}	**0.6**	0.6 ± 0.2	0.8 ± 0.3	48% ± 37%
PHE	2.7 ± 0.7	11.0 ± 2.6	3.8 ± 1.1	5.3 ± 0.3	3.2 ± 1.1	6.1 ± 1.1	232% ± 90%*
ANT					1.3^{1}	1.4^{1}	-15%
2-MPHE	6.0 ± 0.3	8.0 ± 0.3	5.9 ± 0.2	7.0 ± 0.7	5.4 ± 0.2	6.8 ± 0.3	26% ± 6%*
1-MPHE	**4.0**	4.4 ± 0.3	**4.0**	4.2 ± 0.2^{2}	**4.0**	4.0^{1}	8% ± 4%*
FLA	6.2 ± 0.2	7.6 ± 0.4	6.5 ± 0.1	6.6 ± 0.4	5.9 ± 0.3	6.6 ± 0.2	12% ± 4%*
PYR	5.1 ± 0.1	5.9 ± 0.2	5.6 ± 0.4	5.9 ± 0.4	5.1 ± 0.2	5.9 ± 0.2	14% ± 2%*
BaA	**1.2**	2.1					84%
CHR + TRI	2.0 ± 0.2	2.1 ± 0.1	2.1 ± 0.1	2.8 ± 0.2	1.8 ± 0.1	2.4 ± 0.2	25% ± 8%*
BbF	5.4 ± 0.2	5.5 ± 0.2	5.7 ± 0.2	6.2 ± 0.5	5.1 ± 0.3	5.3 ± 0.2	5% ± 3%
BeP	4.8 ± 0.1	5.3 ± 0.3	4.9 ± 0.2	5.3 ± 0.4	4.5 ± 0.3	5.1 ± 1.0	11% ± 7%
IcdP	4.1 ± 0.1	4.1 ± 0.2	4.1 ± 0.03	4.4 ± 0.3	4.0 ± 0.3	4.0 ± 0.2	2% ± 3%
BghiP	6.6 ± 0.1	6.5 ± 0.4	7.1 ± 0.4	7.4 ± 0.5	6.4 ± 0.3	6.8 ± 0.3	3% ± 3%
NPAHs							
9-NAN	0.3 ± 0.03^{2}	**0.2**					-31% ± 7%
3-NPH	0.6 ± 0.1^{2}	0.2 ± 0.1^{2}	0.3 ± 0.1	0.4 ± 0.0	0.4 ± 0.1^{2}	0.2 ± 0.1^{2}	-0.2% ± 37%
2-+3-NF	4.9 ± 0.02	4.6 ± 0.1	5.4 ± 0.1	4.7 ± 0.1	4.5 ± 0.1	4.0 ± 0.1	-10% ± 2%*
1-NP	0.3 ± 0.04	0.3 ± 0.1	0.3 ± 0.03	0.3 ± 0.03	0.2 ± 0.02	0.3 ± 0.02	8% ± 5%

Table SI.7: Means and standard errors of PAH and NPAH masses (ng) measured in Riverside filters used for the chemical study of O_3 exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	R-651 (n=3)		R-652 (n=3)		R-653 (n=3)		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	5.2^{1}	**3.5**					-32%
DBT	3.9 ± 0.3^{2}	2.0 ± 1.5^{2}	1.9 ± 1.3^{2}	1.9 ± 1.3^{2}	3.7 ± 0.2^{2}	3.1 ± 0.01^{2}	38% ± 82%
PHE	5.7 ± 2.9^{2}	2.0 ± 0.6^{2}	2.7 ± 1.0	4.1 ± 1.8	3.0 ± 0.9	1.7 ± 0.7	22% ± 57%
ANT							
2-MPHE	6.7 ± 0.7^{2}	**5.0**	6.8 ± 1.8^{2}	8.3 ± 2.1^{2}	9.2^{1}	**5.0**	-3% ± 28%
1-MPHE			**4.0**	4.9 ± 0.5^{2}			25% ± 12%
FLA	8.6 ± 2.7	6.0 ± 0.3	6.4 ± 0.8	6.5 ± 1.0	5.9 ± 0.2	5.7 ± 0.3	-5% ± 10%
PYR	6.4 ± 1.6	4.9 ± 0.2	5.4 ± 0.3	5.4 ± 0.7	5.2 ± 0.2	4.8 ± 0.1	-8% ± 6%
BaA	3.0 ± 0.6	2.0 ± 0.4	2.3 ± 0.1	1.8 ± 0.9	2.4 ± 0.04	2.3 ± 0.04	-19% ± 13%
CHR + TRI	2.5 ± 0.2	2.2 ± 0.1	2.3 ± 0.2	2.5 ± 0.3	2.1 ± 0.1	2.4 ± 0.1	4% ± 5%
BbF	6.9 ± 1.1	6.0 ± 0.2	6.0 ± 0.2	6.5 ± 0.8	5.8 ± 0.1	6.1 ± 0.1	2% ± 6%
BkF	2.6^{1}	2.2^{1}					-14%
BeP	5.4 ± 0.6	4.8 ± 0.1	5.0 ± 0.1	5.2 ± 0.5	4.8 ± 0.1	4.8 ± 0.1	-2% ± 4%
DahA+DacA							
IcdP	4.8 ± 0.6	4.0 ± 0.1	4.3 ± 0.2	4.6 ± 0.4	4.4 ± 0.2	4.1 ± 0.4	-5% ± 5%
BghiP	7.5 ± 0.6	6.8 ± 0.3	7.2 ± 0.4	7.6 ± 0.9	7.2 ± 0.1	7.0 ± 0.4	-2% ± 4%
NPAHs							
3-NPH	0.4 ± 0.01	0.3 ± 0.01	0.4 ± 0.01	0.3 ± 0.01	0.4 ± 0.01	0.3 ± 0.0	-12% ± 2%*
2-+3-NF	4.5 ± 0.1	4.6 ± 0.2	5.4 ± 0.5	4.1 ± 0.03	4.6 ± 0.1	3.9 ± 0.2	-13% ± 4%*
1-NP	0.3 ± 0.01	0.2 ± 0.01	0.2 ± 0.01	0.2 ± 0.01	0.2 ± 0.00	0.2 ± 0.01	-13% ± 3%*
1-NTR	0.5 ± 0.1^{2}	0.4 ± 0.1^{2}					-37% ± 6%
6-NCH	0.3 ± 0.1^{2}	**0.1**					-65% ± 7%
3-NBENZ	0.8^{1}	0.5^{1}					-43%
2-NTR	0.7 ± 0.03^{2}	0.4 ± 0.1^{2}					-45% ± 17%

Table SI.8: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the mutagenicity study of NO_3/N_2O_5 radical exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (*p*-value < 0.05).

Compound	PKU-3		PKU-4		PKU-5		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	9.1	6.5	9.0	8.2	26.7	12.4	-30% ± 13%
DBT	7.9	7.2	7.3	7.0	23.7	14.7	-17% ± 11%
PHE	62.9	50.1	69.1	60.0	241.8	156.8	-23% ± 6%
ANT	7.4	5.4	6.9	**4.9**	20.5	11.6	-33% ± 5%
2-MPHE	34.4	33.6	35.0	36.8	95.7	81.5	-4% ± 6%
1-MPHE	24.3	19.1	26.8	18.6			-26% ± 5%*
3,6-DPHE					7.9	6.3	-20%
RET	73.9	62.7	92.9	85.8	70.5	63.4	-11% ± 2%*
FLA	167.4	116.0	212.6	144.9	619.5	536.7	-25% ± 6%*
PYR	110.0	52.3	153.0	87.4	382.5	246.1	-44% ± 5%
BcFLU	31.0	18.2	35.4	24.3	93.6	63.5	-35% ± 3%
1-MPYR	14.7	7.8	16.2	10.5	32.3	18.2	-42% ± 3%
BaA	86.4	53.5	83.6	50.1	109.9	147.5	-34% ± 5%*
CHR + TRI	85.6	75.8	82.8	64.0	246.6	228.7	-14% ± 5%*
BbF	380.9	328.1	280.1	218.6	786.4	729.5	-14% ± 4%*
BkF	107.6	86.9	78.7	56.2	257.3	231.0	-19% ± 5%*
BeP	200.6	163.0	149.3	105.9	440.1	402.3	-19% ± 6%*
BaP	123.5	70.1	102.6	65.6	320.3	216.3	-37% ± 3%
DahA+DacA	14.3	12.5	10.3	7.9	33.5	32.7	-13% ± 6%
IcdP	194.8	169.1	129.0	98.0	412.3	390.8	-14% ± 5%*
BghiP	202.7	164.4	125.1	89.9	415.5	383.6	-18% ± 6%*

Table SI.8 (continued)

Compound	PKU-3		PKU-4		PKU-5		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
NPAH							
2-NFL			**0.2**	0.6			155%
9-NAN	47.9	34.3	21.0	15.7	75.1	57.8	26% ± 2%
9-NPH	**0.5**	4.2	**0.5**	8.7	**0.5**	5.3	1090% ± 268%
3-NPH	1.4	2.6	1.2	3.7	3.4	4.5	114% ± 58%
2-NF	29.1	25.7	40.5	21.9	199.9	167.0	-25% ± 11%
3-NF	**1.1**	10.3	**1.1**	17.5	**1.1**	12.5	1156% ± 199%*
1-NP	3.5	61.6	3.2	75.8	6.5	121.9	1896% ± 195%*
2-NP	10.4	7.5			31.0	32.0	-12.4% ± 16%
7-NBaA	19.1	39.4	8.0	28.2	26.8	51.2	150% 52%*
1-NTR	**0.6**	3.9	**0.6**	4.6	**0.6**	2.3	493% ± 114%*
6-NCH	**0.6**	19.8	0.3	25.5	**0.2**	16.3	6955% ± 2034%*
3-NBENZ	**0.6**	3.0	**1.0**	3.3	**1.0**	5.4	351% ± 63%*
2-NTR	**0.4**	3.1	**0.4**	5.0	**0.4**	2.9	840% ± 173%*
1,3-DNP			**0.7**	1.6			119%
1,6-DNP	**0.6**	2.1	**0.6**	6.7	**0.6**	2.2	483% ± 242%
1,8-DNP			**1.6**	11.8	**1.6**	4.2	389% ± 329%
6-NBaP	**6.1**	159.2	**6.1**	127.4	**6.1**	273.5	2946% ± 723%

Table SI.9: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the mutagenicity study of OH radical exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	PKU-7		PKU-8		PKU-9		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	8.3	7.3	123.4	8.4	311.3	12.6	-67% ± 28%
DBT	5.5	5.7	22.8	6.8	53.7	9.3	-50% ± 27%
PHE	99.7	61.2	248.2	68.2	390.4	75.6	-64% ± 13%
ANT	9.0	5.8	19.5	**4.9**	27.3	6.7	-62% ± 13%
2-MPHE	48.1	37.7	68.5	40.4	84.5	50.3	-34% ± 6%
1-MPHE	33.3	23.5	38.2	22.1	49.4	29.2	-37% ± 4%*
3,6-DPHE	**5.7**	6.7	6.9	8.8	8.1	**5.7**	5% ± 18%
RET	46.4	42.8	40.3	31.5	58.5	50.2	-15%
FLA	379.2	301.0	468.8	353.8	361.6	276.6	-23% ± 1%*
PYR	258.5	153.0	315.1	198.5	225.3	123.2	-41% ± 2%*
BcFLU	51.0	28.5	69.3	38.8	53.7	30.0	-44% ± 0.1*
1-MPYR	24.4	11.4	27.5	13.7	22.6	10.1	-53% ± 2*
BaA	124.7	75.8	159.0	99.6	110.7	72.0	-37% ± 1%*
CHR + TRI	136.9	118.9	219.0	200.3	165.0	144.5	-11% ± 1%*
BbF	403.8	363.1	753.0	676.5	630.9	533.9	-12% ± 2%*
BkF	126.8	116.9	252.8	220.9	208.8	167.8	-13% ± 3%
BeP	209.1	188.6	435.6	382.5	361.0	295.0	-13% ± 3%
BaP	163.5	59.0	300.0	187.7	217.8	122.4	-48% ± 8%*
DahA+DacA	15.6	12.6	34.7	29.8	25.1	20.4	-17% ± 2%*
IcdP	227.0	196.6	422.6	393.9	337.4	287.3	-12% ± 3%*
BghiP	230.8	187.5	459.7	402.2	365.7	288.2	-17% ± 3%*

Table SI.9 (continued)

Compound	PKU-7		PKU-8		PKU-9		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
NPAHs							
9-NAN	60.9	10.3	91.2	13.8	47.8	11.0	-82% ± 7%*
2-NDBT			0.5	0.3			-37%
3-NPH	1.5	1.2	3.5	2.3	3.0	2.1	-28% ± 12%
2-+3-NF	113.8	104.6	276.5	214.5	116.0	90.4	-18% ± 14%
1-NP	3.6	14.3	38.6	10.5	54.0	19.0	53% ± 366%
2-NP	8.0	6.4	154.5	21.3	210.7	24.4	-65% ± 68%
7-NBaA	9.0	3.7	193.4	10.5	208.7	10.3	-83% ± 35%
2-NTR			0.6	**0.4**	0.5	**0.4**	-29% ± 14%
1,8-DNP			3.2	2.8	2.8	2.1	-20% ± 11%
6-NBaP	**6.1**	28.8	**6.1**	58.1	8.6	56.7	591% ± 418%*

Table SI.10: Means and standard errors of PAH and NPAH masses (ng) measured in PKU filters used for the mutagenicity study of O_3 exposure. In the case that a compound was not detected in all samples, superscript denotes number of samples detected. Numbers in bold are estimated detection limits. An asterisk indicates the statistically significant difference in mass (p-value < 0.05).

Compound	PKU-12		PKU-13		PKU-14		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
PAHs							
FLU	9.1	6.9	18.9	14.7	11.7	7.8	-27% ± 3%
DBT	8.6	7.0	23.7	13.4	12.1	9.4	-28% ± 8%
PHE	133.9	78.7	344.6	240.7	173.5	91.1	-40% ± 5%*
ANT	7.3	8.3	25.3	18.3	10.4	6.4	-18% ± 16%
2-MPHE	58.0	37.5	106.8	79.4	69.0	40.5	-34% ± 5%*
2-MANT			10.1	**7.6**			-25%
1-MPHE	42.6	26.5	80.3	54.0	45.2	24.4	-39% ± 4%*
3,6-DPHE			8.7	**5.7**			-34%
RET	89.3	39.8	100.7	75.7	71.4	33.6	-44% ± 10%*
FLA	463.3	367.9	1101.1	910.2	563.3	439.2	-20% ± 1%*
PYR	347.4	136.5	759.1	432.4	387.4	159.4	-54% ± 6%*
BcFLU	86.3	35.4	144.9	85.9	78.9	34.5	-52% ± 6%*
1-MPYR	38.8	14.4	61.8	35.2	32.9	13.1	-55% ± 6%*
BaA	221.5	101.6	372.6	207.3	190.6	91.3	-50% ± 3%*
CHR + TRI	221.1	139.7	446.5	330.6	235.6	146.7	-34% ± 4%*
BbF	598.9	451.6	1050.1	870.2	680.0	519.5	-22% ± 2%*
BkF	204.2	118.0	349.8	270.6	229.6	142.2	-34% ± 6%*
BeP	327.4	202.5	597.0	457.3	368.9	239.9	-32% ± 4%*
BaP	301.9	138.5	486.4	324.2	302.3	161.2	-45% ± 6%*
DahA+DacA	27.0	14.9	49.1	35.0	27.9	16.4	-38% ± 5%*
IcdP	363.3	234.9	593.8	476.1	413.2	276.2	-29% ± 5%*
BghiP	390.1	244.1	635.8	494.7	426.0	280.8	-31% ± 5%*

Table SI.10 (continued)

Compound	PKU-12		PKU-13		PKU-14		Avg. %change
	Unexposed	Exposed	Unexposed	Exposed	Unexposed	Exposed	
NPAHs							
9-NAN	121.4	42.2	120.0	54.5	83.9	29.7	-62% ± 3%*
3-NPH	3.6	2.0	2.8	1.9	3.1	2.0	-38% ± 3%*
2-+3-NF	112.9	77.7	188.5	141.5	172.5	121.4	-29% ± 2%*
1-NP	6.9	4.7	8.4	5.0	5.8	4.0	-34% ± 3%*
2-NP	16.3	10.0	18.4	12.8	17.4	10.8	-36% ± 3%*
7-NBaA	39.9	21.0	16.7	9.4	19.5	10.0	-47% ± 2%
6-NCH			0.2	**0.2**			-22%
2-NTR					0.5	**0.4**	-28%
1,8-DNP	3.4	**1.6**	4.9	3.0	3.1	1.8	-45% ± 4%

Figure SI.1: Cutting of the filters used in the chemical and mutagencity studies.

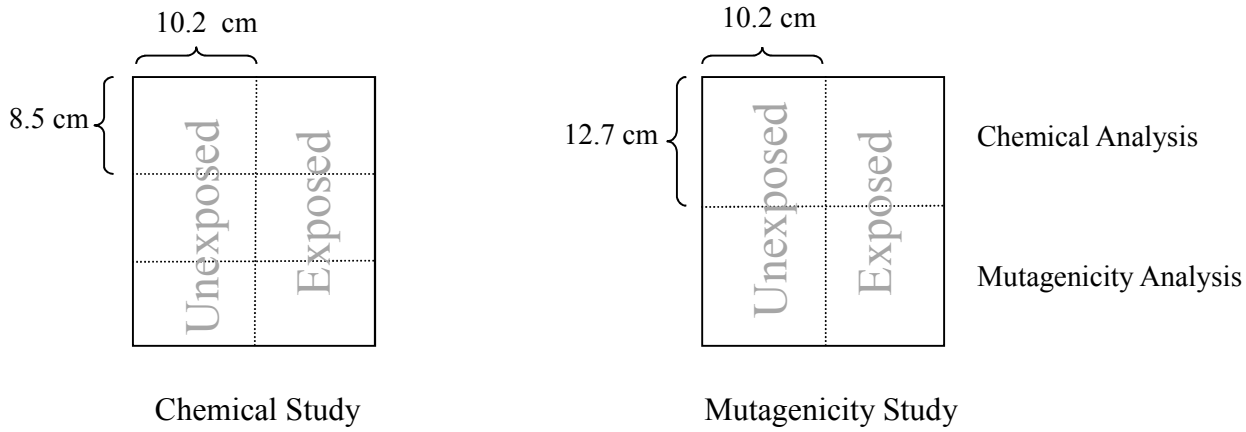


Figure SI.2: Method of exposing cut PM filters inside the Teflon chamber.

Figure SI.3 A. $PAH_{exposed}/PAH_{unexposed}$ and B. $NPAH_{exposed}/NPAH_{unexposed}$ of Riverside PM filters (n=9) used for the chemical study. An asterisk denotes the statistically significant difference between the unexposed and exposed masses. (N.D. = Not detected)

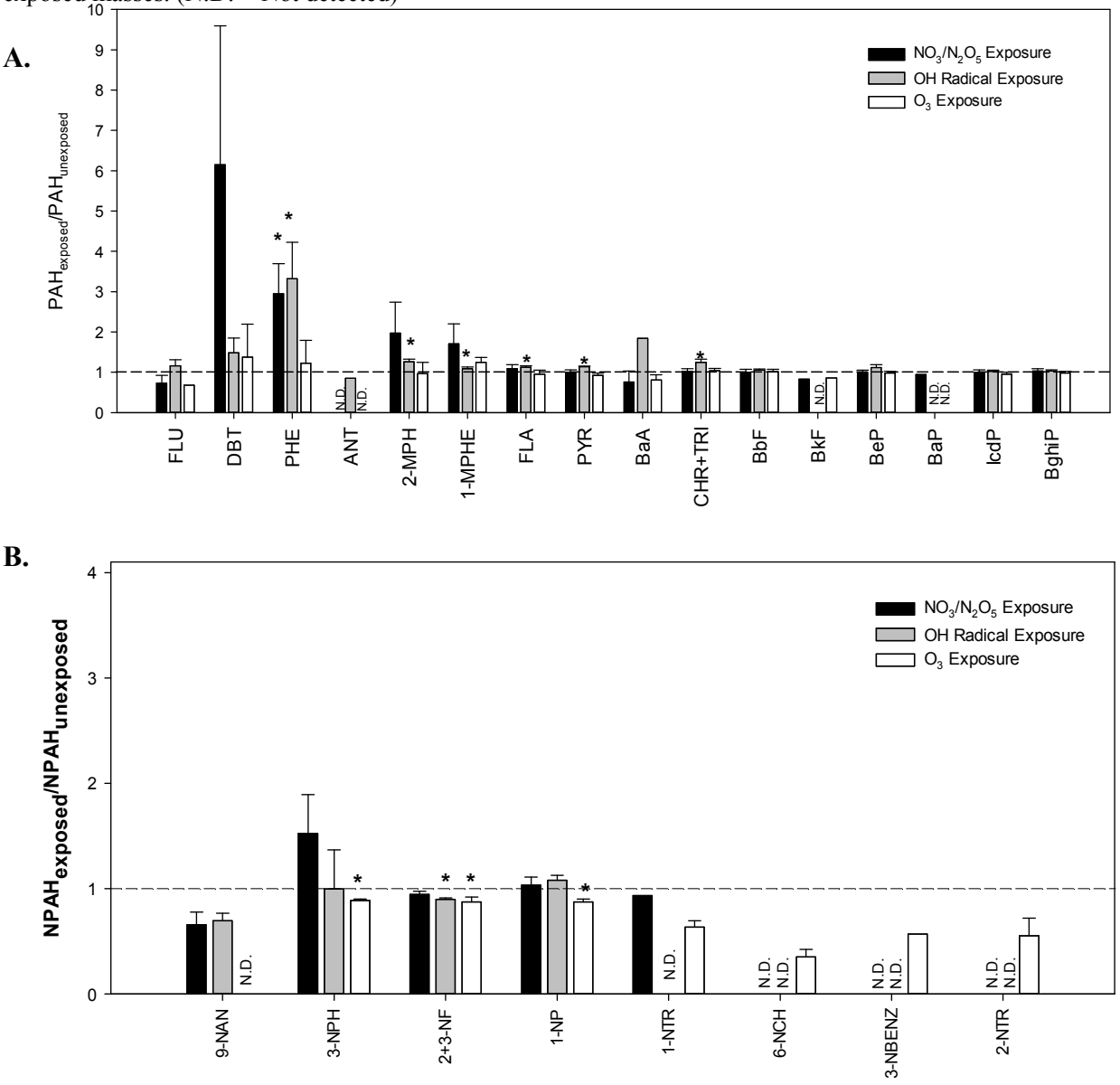


Figure SI.4 Correlation between the percent reactivity of the Beijing (9 points from the chemical study and 3 points from the mutagenicity study) and Riverside PM samples (9 points from the chemical study) exposed to NO_3/N_2O_5 to the $2\text{-}NF_{unexposed}$ concentrations normalized to the $BeP_{unexposed}$ concentrations. The mean correlations of the Beijing samples (PKU-A, PKU-1, PKU-2) and the Riverside PM samples (R-671, R672, and R-673) have been previously presented in Zimmermann et al.[10] The line shown is for illustrative purposes only.

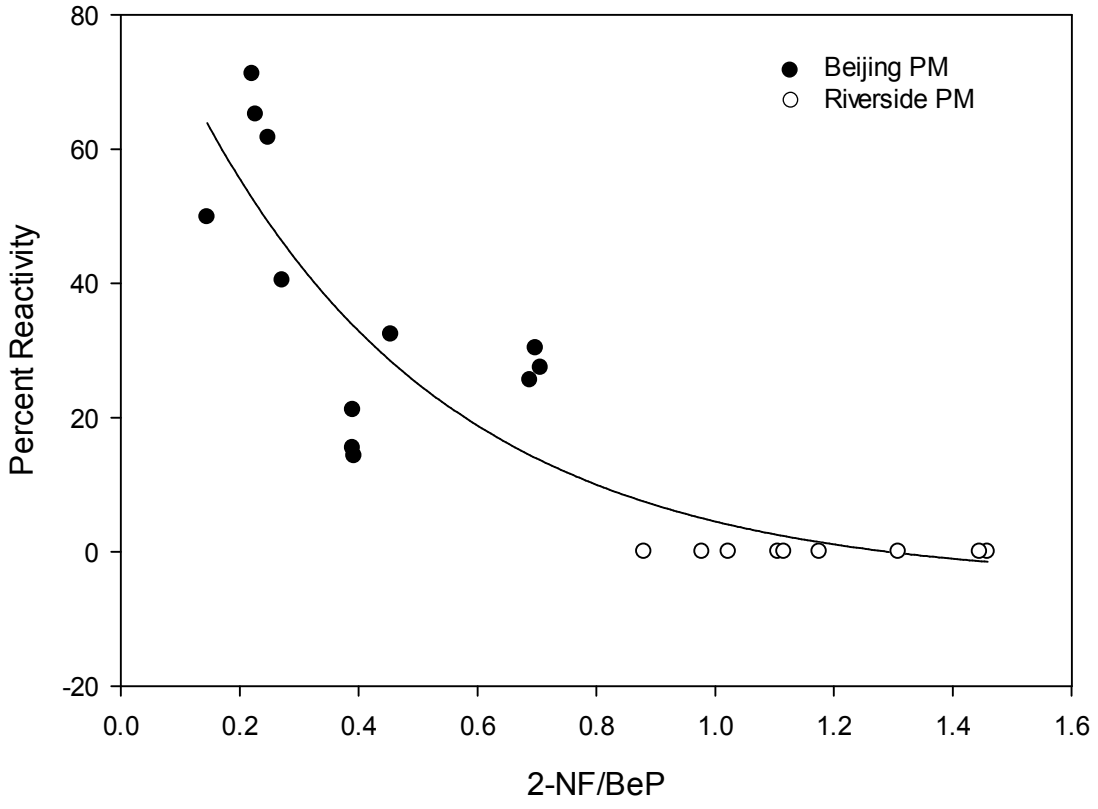
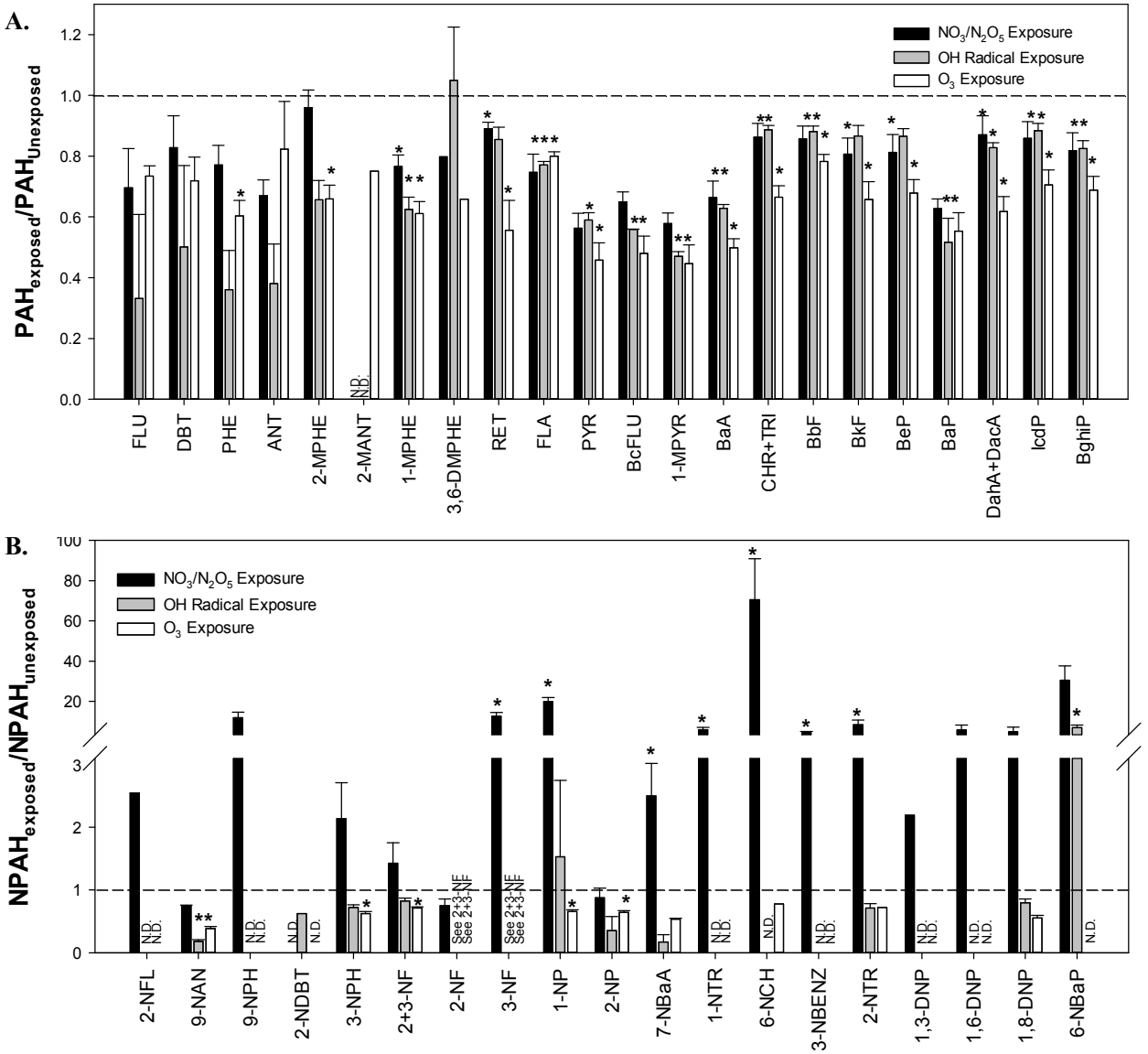


Figure SI.5: A. $PAH_{exposed}/PAH_{unexposed}$ and B. $NPAH_{exposed}/NPAH_{unexposed}$ of Beijing PM filters (n=3) used for the mutagenicity study. An asterisk denotes the statistically significant difference between the unexposed and exposed masses. (N.D. = Not detected)



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