Supplement of Atmos. Chem. Phys., 18, 7607–7624, 2018
https://doi.org/10.5194/acp-18-7607-2018-supplement

Atmospheric Chemistry and Physics
Open Access
EGU

Supplement of

Evolution of the chemical fingerprint of biomass burning organic aerosol during aging

Amelie Bertrand et al.

Correspondence to: Nicolas Marchand (nicolas.marchand@univ-amu.fr)

1. TAG-AMS Analysis

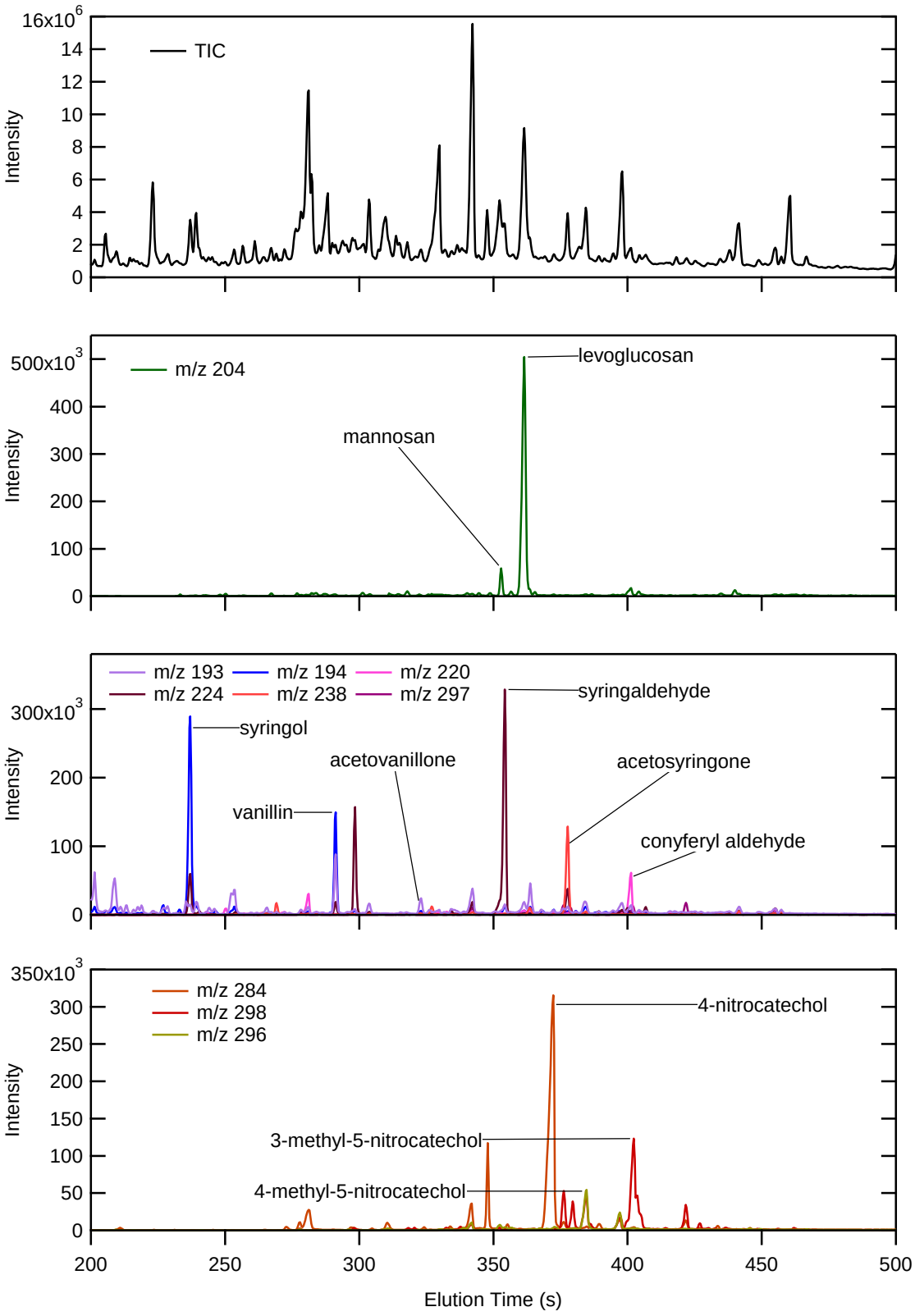

Figure S1: Chromatograms of biomass burning organic aerosol by TAG-AMS.

Table S1: Quantified compounds. In bold font are highlighted the compounds for which the authentic standards were available, as well the m/z used to quantify the compounds.

Compounds	m/z
Anhydrosugars	
Levoglucosan	**217**, 204, 191, 333
Mannosan	**204**, 217, 191, 333
Galactosan	**204**, 217, 191, 333
PAHs	
Acenaphtene*	**154**
Acenaphtylene*	**152**
Fluorene*	**166**
Phenanthrene	**178**
Anthracene	**178**
Fluoranthrene*	**202**
Acephenanthrene*	**202**
Pyrene	**202**
Benzo[a]anthracene	**228**
Chrysene	**228**
Benzo[b]fluoranthene	**252**
Benzo[k]fluoranthene	**252**
Benzo[j]fluoranthene^{T}	**252**
Benzo[e]pyrene^{ł}	**252**
Benzo[a]pyrene	**252**
Perylene°	**252**
Oxygenated PAHs	
1,2-Acenaphthylenone *	**168**, 139
Benzo[b]naphtho[1,2-d]furan*	**218**, 203, 189
Benzo[b]naphtho[2,3-d]furan*	**218**, 203, 189
2,3-5,6-Dibenzoxalene*	**218**, 203, 189
Benzo[k,l]xanthene*	**218**, 203, 189
4-Oxapyrene-5-one*	**220**, 163, 192
9H-Fluoren-9-one*	**180**, 152
9,10-Anthraquinone*	**152**, 180, 208
Xanthone*	**196**, 138, 139
Cyclopenta[d,e,f]phenanthrene-4-one*	**204**, 176
Methylated PAHs	
3-methylphenanthrene	192
2-methylphenanthrene	192
2-methylanthracene	192
4,9-methylphenanthrene	192
1-methylphenanthrene	192

Compounds	m/z
Alkanes	
Octadecane	43, **57**, 71, 85
Nonadecane	43, **57**, 71, 86
Eicosane	43, **57**, 71, 87
Heneicosane^{ł}	43, **57**, 71, 88
Docosane	43, **57**, 71, 89
Tricosane^{łł}	43, **57**, 71, 90
Tetracosane	43, **57**, 71, 91
Pentacosane^{łłł}	43, **57**, 71, 92
Hexacosane	43, **57**, 71, 93
Heptacosane^{łłłł}	43, **57**, 71, 94
Substituted Guaiacols	
Vaniline	**194**, 209, 224
Acetovanilone^{ł}	**193**, 223, 208, 238
Vanilic Acid	**267**, 297, 282, 312, 223
3-Guaiacylpropanol$^{\#\#}$	**206**, 236, 326, 179
Conyferyl Aldehyde	**220**, 219, 250, 192, 235
Substituted Syringols	
Syringaldehyde	**224**, 239, 254
Syringol	**196**, 211, 226, 156, 181
MethylSyringol^{+}	**210**, 240, 225, 167
Acetosyringone	**238**, 223, 253, 268
Isoeugenol$^{\#\#}$	**206**, 236, 221
Syringyl Acetone^{ł}	**239**, 209, 292, 267, 252
Propionyl Syringol^{ł}	**223**, 253, 267, 282, 297
Syringic Acid^{ł}	**297**, 312, 327, 253, 342
Synapyl Aldehyde^{T}	**222**, 250, 280, 265
Fatty Acids	
Palmitoleic Acid	75, **117**
Palmitic Acid	**117**, 129, 227, 313
Oleic Acid	**117**, 129, 357
Stearic Acid	**117**, 129, 341, 359, 257
Nitrocatechols	
4-Nitrocatechol	**284**, 299, 73
5-Methyl-5-Nitrocatechol	**296**, 313, 180, 73
3-Methyl-5-Nitrocatechol	**298**,313, 73
Others	
Pyrogallol^{+}	**239**, 342, 73
Nonanoic Acid$^{¯}$	**215**, 117, 129, 73, 75
Vanillylmandelic acid^{+}	**297**, 298, 371
Methylglutaric acid$^{¯}$	**261**, 199, 171, 143, 99
Tyrosol$^{¯}$	**179**, 193, 267

The following surrogates were used:

*Phenanthrene, ^{T}Benzo[b]fluoranthene, °Benzo[a]pyrene, ^{ł}Eicosane, ^{łł}Docosane, ^{łłł}Tetracosane, ^{łłł}Hexacosane

$^{\#}$Acetosyringone, $^{\#\#}$Vanillic Acid, $^{+}$Syringol, ^{ł}Syringaldehyde, †Conyferyl Aldehyde, $^{¯}$Palmitic Acid, ¶Vanillin

Table S2: TAG-AMS detection limit of the compounds (determined on the basis of a 10 minute sampling at 2 L min^{-1}.

Compounds	LD (ng.m-3)*	Compounds	LD (ng.m-3)*
Levoglucosan	0.99	Nonadecane	1.40
Mannosan	0.99	Eicosane	0.68
Galactosan	0.99	Heneicosane	1.03
Acenaphtene	0.84	Docosane	1.05
Acenaphtylene	0.69	Tricosane	0.85
Fluorene	0.64	Tetracosane	0.83
Phenanthrene	0.63	Pentacosane	1.63
Anthracene	0.77	Hexacosane	1.63
Fluoranthrene	0.44	Heptacosane	2.48
Acephenanthrene	0.22	Vaniline	1.07
Pyrene	0.23	Acetovanilone	0.98
Benzo[a]anthracene	0.12	Vanilic Acid	0.80
Chrysene	0.11	3-Guaiacylpropanol	1.26
Benzo[b]fluoranthrene	0.37	Conyferyl Aldehyde	1.22
Benzo[k]fluoranthene	0.69	Syringaldehyde	1.10
Benzo[j]fluoranthene	0.09	Syringol	1.75
Benzo[e]pyrene	0.75	Acetosyringone	1.84
Benzo[a]pyrene	0.38	Isoeugenol	1.00
Perylene	0.76	Syringyl Acetone	0.90
1,2-Acenaphthylenone	0.42	Propionyl Syringol	0.96
Benzo[b]naphtho[1,2-d]furan	0.17	Syringic Acid	0.38
Benzo[b]naphtho[2,3-d]furan	0.17	Synapyl Aldehyde	1.05
2,3-5,6-Dibenzoxalene	0.17	Palmitoleic Acid	5.15
Benzo[k,l]xanthene	0.17	Palmitic Acid	5.40
4-Oxapyrene-5-one	0.14	Oleic Acid	0.15
9H-Fluoren-9-one	1.12	Stearic Acid	1.06
9,10-Anthraquinone	1.62	4-Nitrocatechol	1.55
Xanthone	0.26	Pyrogallol	1.56
Cyclopenta[d,e,f]phenanthrene-4one	0.14	Methylsyringol	0.09
3-methylphenanthrene	0.75	Nonanoic Acid	0.12
2-methylphenanthrene	0.76	Vanillylmandelic acid	0.23
2-methylanthracene	0.55	Methylglutaric acid	0.42
4,9-methylphenanthrene	0.58	Tyrosol	1.00
1-methylphenanthrene	0.77	5-Methyl-5-Nitrocatechol	1.51
Octadecane	1.55	3-Methyl-5-Nitrocatechol	0.89

*calculated on the basis of a 10 minutes sampling at 2 L.min^{-1}

2. Off line samples and 2D-GC analysis

Two samples were collected on quartz fiber filter for each experiment - before and during photo-oxidation - in parallel with the TAG (Figure 2). Sampling lasted for 20 minutes at a flow rate of 20 L min^{-1}. The sampling line was equipped with a parallel plate charcoal denuder to remove all organic gases. Prior to their use, the filters were baked at 550 °C for 4 hours to prevent any trace contamination and stored after collection at – 4 °C.

One pair of samples (primary and aged OA, experiment 5) was analyzed following the method by Isaacman et al. (2012) using a 2D-GC coupled to an Electron Impact/Vacuum Ultra Violet (VUV) light - High Resolution - Time of Flight - Mass Spectrometer (GCxGC

EI/VUV HR-ToF-MS). The parent mass of the compounds and structural information were obtained respectively via ionization with VUV light (-10.5 eV) and EI (-70 eV).

For analysis, 0.41 cm^2 punches of the filters were desorbed in a helium environment at 320 °C. The desorbed content was derivatized under a stream of MSTFA enriched helium and trapped in a Cooled Injection System (CIS) maintained at 30 °C prior to injection onto the GC columns. Compounds are first separated by volatility with a Rxi-5Sil MS Restek column then by polarity with a Rtx-200 MS Restek column. The intensity signals from each pair of filters are normalized to that of the internal standard. The normalized signal from the fresh emissions sample is then subtracted from that of the aged emissions sample. Figure 5 illustrates compounds that significantly decrease in concentration during aging (shown in green), i.e., compounds lost to the walls or reacted away. In addition, the 2D-GC analysis served to check for potential co-elution of the compounds examined in this study.

REFERENCES:

Isaacman, G., Wilson, K.R., Chan, A.W.H., Worton, D.R., Kimmel, J.R., Nah, T., Hohaus, T., Gonin, M., Kroll, J.H., Worsnop, D.R., Goldstein, A.H., 2012. Improved Resolution of Hydrocarbon Structures and Constitutional Isomers in Complex Mixtures Using Gas Chromatography-Vacuum Ultraviolet-Mass Spectrometry. Anal. Chem. 84, 2335–2342.

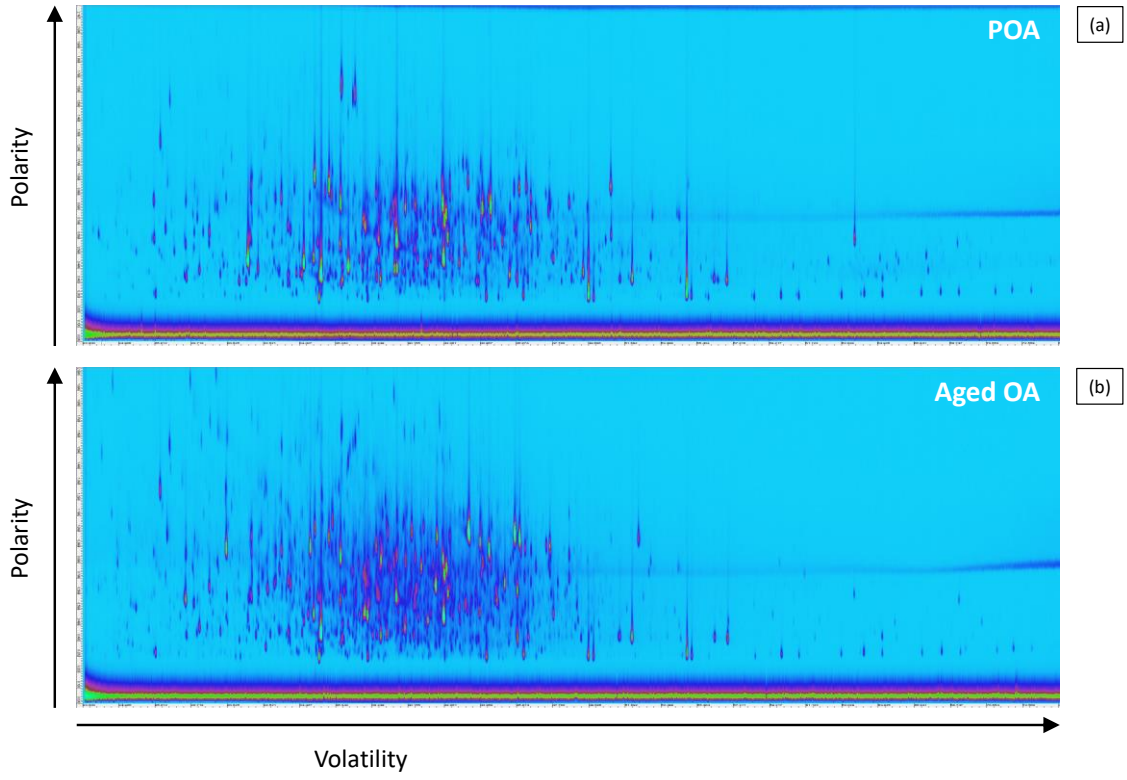

Figure S2: Results of the 2D-GC analysis of the quartz fiber filters. (a) Chromatogram of a sample collected before lights on. (b) Chromatogram of a sample collected during aging

3. Emission Factors and Contributions to OA

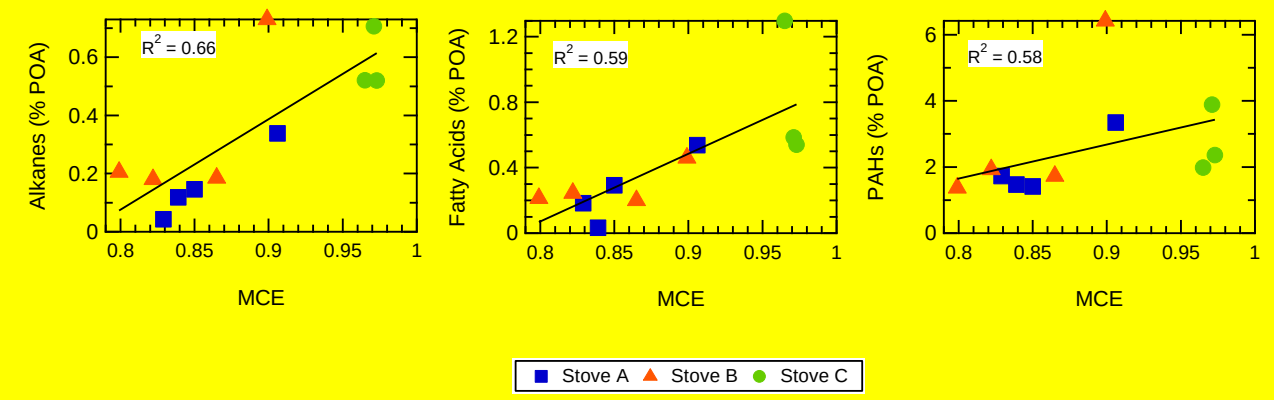

Figure S3: Contribution to the total POA mass concentration of PAHs, fatty acids, and n-alkanes ($C_{18} - C_{27}$).

Table S3: Emission factor (in μg kg^{-1}) for primary and aged emissions

Experiment 1 - Stove A		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	5.25×10^6
OA (mg kg^{-1})	1336	4076
OM/OC	1.8	2
EF Compounds (μg kg^{-1})		
Levoglucosan	249 × 10³	219 × 10³
Mannosan	13 × 10³	10 × 10³
Galactosan	1 × 10³	720
Acenaphtene	660	831
Acenaphtylene	3 × 10³	818
Fluorene	1 × 10³	1 × 10³
Phenanthrene	4 × 10³	3 × 10³
Anthracene	1 × 10³	752
Fluoranthrene	519	1 × 10³
Acephenanthrene	52	83
Pyrene	183	349
Benzo[a]anthracene	82	37
Chrysene	88	69
Benzo[b]fluoranthrene	88	68
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	6	4
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	2 × 10³	1 × 10³
Benzo[b]naphtho[1,2-d]furan	54	135
Benzo[b]naphtho[2,3-d]furan	25	56
2,3-5,6-Dibenzoxalene	17	29
Benzo[k,l]xanthene	11	6
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	190	205
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	158	195
3-methylphenanthrene	336	308
2-methylphenanthrene	408	407
2-methylanthracene	112	101
4,9-methylphenanthrene	208	222
1-methylphenanthrene	192	188
Octadecane	371	398
Nonadecane	672	932
Eicosane	218	312
Heneicosane	114	46
Docosane	216	258
Tricosane	82	25
Tetracosane	53	32
Pentacosane	103	112
Hexacosane	45	33
Heptacosane	66	52
Vanillin	5 × 10³	11 × 10³
Acetovanillone	1 × 10³	3 × 10³
Vanillic Acid	1 × 10³	3 × 10³
3-Guaiacylpropanol	3 × 10³	1 × 10³
Conyferyl Aldehyde	4 × 10³	1 × 10³
Syringaldehyde	34 × 10³	34 × 10³
Syringol	19 × 10³	6 × 10³
Acetosyringone	5 × 10³	4 × 10³
Isoeugenol	11 × 10³	3 × 10³
Syringyl Acetone	65 × 10³	19 × 10³
Propionyl Syringol	7 × 10³	4 × 10³
Syringic Acid	1 × 10³	2 × 10³
Synapyl Aldehyde	17 × 10³	3 × 10³
Palmitoleic Acid	3 × 10³	112
Palmitic Acid	828	614
Oleic Acid	< LD	< LD
Stearic Acid	363	306
4-Nitrocatechol	751	55 × 10³
Pyrogallol	< LD	159
Methylsyringol	516	331
Vanillylmandelic acid	168	1 × 10³
2-methyl-2-pentanedioic Acid	< LD	2 × 10³
Tyrosol	2 × 10³	4 × 10³
5-Methyl-5-Nitrocatechol	< LD	6 × 10³
3-Methyl-5-Nitrocatechol	687	11 × 10³

Table S3: (Continued)

Experiment 2 - Stove A		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.83×10^6
OA (mg kg^{-1})	1205	4145
OM/OC	1.7	1.9
EF Compounds (µg kg^{-1})		
Levoglucosan	152×10^3	98×10^3
Mannosan	13×10^3	10×10^3
Galactosan	10×10^3	778
Acenaphtene	851	1×10^3
Acenaphtylene	2×10^3	583
Fluorene	1×10^3	997
Phenanthrene	4×10^3	3×10^3
Anthracene	694	533
Fluoranthrene	425	742
Acephenanthrene	54	48
Pyrene	160	246
Benzo[a]anthracene	99	28
Chrysene	105	68
Benzo[b]fluoranthrene	82	23
Benzo[k]fluoranthene	< LD	42
Benzo[j]fluoranthene	8	< LD
Benzo[e]pyrene	28	1
Benzo[a]pyrene	5	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	2×10^3	2×10^3
Benzo[b]naphtho[1,2-d]furan	55	93
Benzo[b]naphtho[2,3-d]furan	28	44
2,3-5,6-Dibenzoxalene	22	31
Benzo[k,l]xanthene	12	< LD
4-Oxapyrene-5-one	20	20
9H-Fluoren-9-one	127	182
9,10-Anthraquinone	53	2
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	76	91
3-methylphenanthrene	105	92
2-methylphenanthrene	137	161
2-methylanthracene	62	49
4,9-methylphenanthrene	70	89
1-methylphenanthrene	60	74
Octadecane	114	122
Nonadecane	260	285
Eicosane	127	146
Heneicosane	67	117
Docosane	166	52
Tricosane	120	42
Tetracosane	105	31
Pentacosane	182	180
Hexacosane	120	112
Heptacosane	161	85
Vanillin	4×10^3	12×10^3
Acetovanillone	920	3×10^3
Vanillic Acid	1×10^3	3×10^3
3-Guaiacylpropanol	4×10^3	1×10^3
Conyferyl Aldehyde	4×10^3	586
Syringaldehyde	25×10^3	26×10^3
Syringol	12×10^3	5×10^3
Acetosyringone	5×10^3	4×10^3
Isoeugenol	7×10^3	2×10^3
Syringyl Acetone	79×10^3	12×10^3
Propionyl Syringol	6×10^3	3×10^3
Syringic Acid	725	1×10^3
Synapyl Aldehyde	13×10^3	921
Palmitoleic Acid	< LD	< LD
Palmitic Acid	< LD	401
Oleic Acid	137	5
Stearic Acid	255	212
4-Nitrocatechol	244	48×10^3
Pyrogallol	< LD	143
Methylsyringol	888	551
Vanillylmandelic acid	192	908
2-methyl-2-pentanedioic Acid	< LD	1×10^3
Tyrosol	2×10^3	7×10^3
5-Methyl-5-Nitrocatechol	84	4×10^3
3-Methyl-5-Nitrocatechol	< LD	8×10^3

Table S3: (Continued)

Experiment 3 - Stove A		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.83×10^{6}
OA (mg kg^{-1})	820	3642
OM/OC	1.8	2
EF Compounds (μg kg^{-1})		
Levoglucosan	248×10^3	101×10^3
Mannosan	20×10^3	9×10^3
Galactosan	4×10^3	3×10^3
Acenaphtene	956	1×10^3
Acenaphtylene	2×10^3	559
Fluorene	462	545
Phenanthrene	3×10^3	2×10^3
Anthracene	685	491
Fluoranthrene	< LD	< LD
Acephenanthrene	< LD	< LD
Pyrene	< LD	< LD
Benzo[a]anthracene	< LD	< LD
Chrysene	< LD	< LD
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	2×10^3	543
Benzo[b]naphtho[1,2-d]furan	< LD	< LD
Benzo[b]naphtho[2,3-d]furan	< LD	< LD
2,3-5,6-Dibenzoxalene	< LD	< LD
Benzo[k,l]xanthene	NaN	NaN
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	102	225
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	69	157
3-methylphenanthrene	48	86
2-methylphenanthrene	64	152
2-methylanthracene	9	28
4,9-methylphenanthrene	41	70
1-methylphenanthrene	47	94
Octadecane	212	159
Nonadecane	51	142
Eicosane	90	253
Heneicosane	< LD	< LD
Docosane	< LD	< LD
Tricosane	< LD	< LD
Tetracosane	< LD	< LD
Pentacosane	< LD	< LD
Hexacosane	< LD	< LD
Heptacosane	< LD	< LD
Vanillin	6×10^3	13×10^3
Acetovanillone	1×10^3	2×10^3
Vanillic Acid	1×10^3	3×10^3
3-Guaiacylpropanol	4×10^3	770
Conyferyl Aldehyde	4×10^3	577
Syringaldehyde	29×10^3	19×10^3
Syringol	16×10^3	10×10^3
Acetosyringone	5×10^3	2×10^3
Isoeugenol	11×10^3	4×10^3
Syringyl Acetone	69×10^3	8×10^3
Propionyl Syringol	7×10^3	3×10^3
Syringic Acid	656	1×10^3
Synapyl Aldehyde	9×10^3	723
Palmitoleic Acid	< LD	< LD
Palmitic Acid	1×10^3	896
Oleic Acid	< LD	< LD
Stearic Acid	446	432
4-Nitrocatechol	118	30×10^3
Pyrogallol	136	255
Methylsyringol	676	670
Vanillylmandelic acid	< LD	789
2-methyl-2-pentanedioic Acid	< LD	1×10^3
Tyrosol	1×10^3	3×10^3
5-Methyl-5-Nitrocatechol	< LD	3×10^3
3-Methyl-5-Nitrocatechol	151	6×10^3

Table S3: (Continued)

Experiment 4 - Stove A		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	5.53×10^6
OA (mg kg^{-1})	167	1015
OM/OC	1.9	2
EF Compounds (μg kg^{-1})		
Levoglucosan	59×10^3	50×10^3
Mannosan	5×10^3	4×10^3
Galactosan	1×10^3	543
Acenaphtene	342	1×10^3
Acenaphtylene	838	221
Fluorene	254	352
Phenanthrene	1×10^3	1×10^3
Anthracene	243	232
Fluoranthrene	470	2×10^3
Acephenanthrene	15	34
Pyrene	151	709
Benzo[a]anthracene	6	10
Chrysene	11	13
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	701	1×10^3
Benzo[b]naphtho[1,2-d]furan	32	174
Benzo[b]naphtho[2,3-d]furan	15	71
2,3-5,6-Dibenzoxalene	8	50
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	70	198
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	67	138
3-methylphenanthrene	46	69
2-methylphenanthrene	59	104
2-methylanthracene	13	19
4,9-methylphenanthrene	41	62
1-methylphenanthrene	43	65
Octadecane	95	262
Nonadecane	53	153
Eicosane	13	41
Heneicosane	65	307
Docosane	127	379
Tricosane	49	157
Tetracosane	43	93
Pentacosane	80	180
Hexacosane	38	86
Heptacosane	< LD	< LD
Vanillin	4×10^3	10×10^3
Acetovanillone	695	1×10^3
Vanillic Acid	398	1×10^3
3-Guaiacylpropanol	627	280
Conyferyl Aldehyde	542	193
Syringaldehyde	4×10^3	5×10^3
Syringol	5×10^3	2×10^3
Acetosyringone	866	418
Isoeugenol	3×10^3	1×10^3
Syringyl Acetone	10×10^3	2×10^3
Propionyl Syringol	2×10^3	272
Syringic Acid	295	737
Synapyl Aldehyde	2×10^3	226
Palmitoleic Acid	< LD	< LD
Palmitic Acid	611	908
Oleic Acid	< LD	< LD
Stearic Acid	283	447
4-Nitrocatechol	276	19×10^3
Pyrogallol	60	241
Methylsyringol	162	116
Vanillylmandelic acid	81	679
2-methyl-2-pentanedioic Acid	< LD	246
Tyrosol	926	1×10^3
5-Methyl-5-Nitrocatechol	< LD	2×10^3
3-Methyl-5-Nitrocatechol	467	3×10^3

Table S3: (Continued)

Experiment 5 - Stove B		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.81×10^6
OA (mg kg^{-1})	806	2033
OM/OC	1.7	2
EF Compounds (μg kg^{-1})		
Levoglucosan	110×10^3	58×10^3
Mannosan	7×10^3	5×10^3
Galactosan	2×10^3	1×10^3
Acenaphtene	304	4×10^3
Acenaphtylene	4×10^3	2×10^3
Fluorene	720	1×10^3
Phenanthrene	888	3×10^3
Anthracene	207	514
Fluoranthrene	648	2×10^3
Acephenanthrene	24	21
Pyrene	259	691
Benzo[a]anthracene	48	26
Chrysene	66	40
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	1×10^3	2×10^3
Benzo[b]naphtho[1,2-d]furan	52	178
Benzo[b]naphtho[2,3-d]furan	24	83
2,3-5,6-Dibenzoxalene	17	58
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	96	264
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	56	124
3-methylphenanthrene	30	77
2-methylphenanthrene	39	114
2-methylanthracene	< LD	< LD
4,9-methylphenanthrene	26	72
1-methylphenanthrene	32	79
Octadecane	182	390
Nonadecane	89	204
Eicosane	165	324
Heneicosane	116	381
Docosane	266	591
Tricosane	145	262
Tetracosane	154	241
Pentacosane	287	447
Hexacosane	170	275
Heptacosane	75	87
Vanillin	7×10^3	12×10^3
Acetovanillone	1×10^3	2×10^3
Vanillic Acid	830	2×10^3
3-Guaiacylpropanol	2×10^3	710
Conyferyl Aldehyde	2×10^3	515
Syringaldehyde	17×10^3	11×10^3
Syringol	4×10^3	3×10^3
Acetosyringone	3×10^3	1×10^3
Isoeugenol	5×10^3	2×10^3
Syringyl Acetone	23×10^3	5×10^3
Propionyl Syringol	3×10^3	1×10^3
Syringic Acid	577	1×10^3
Synapyl Aldehyde	5×10^3	757
Palmitoleic Acid	< LD	< LD
Palmitic Acid	1×10^3	1×10^3
Oleic Acid	< LD	< LD
Stearic Acid	557	710
4-Nitrocatechol	2×10^3	29×10^3
Pyrogallol	113	331
Methylsyringol	157	210
Vanillylmandelic acid	48	373
2-methyl-2-pentanedioic Acid	< LD	436
Tyrosol	1×10^3	2×10^3
5-Methyl-5-Nitrocatechol	< LD	3×10^3
3-Methyl-5-Nitrocatechol	900	6×10^3

Table S3: (Continued)

Experiment 6 - Stove B		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	5.25×10^6
OA (mg kg^{-1})	531	2317
OM/OC	1.8	2
EF Compounds (μg kg^{-1})		
Levoglucosan	160 × 10³	101 × 10³
Mannosan	11 × 10³	9 × 10³
Galactosan	1 × 10³	1 × 10³
Acenaphtene	709	2 × 10³
Acenaphtylene	594	249
Fluorene	292	484
Phenanthrene	2 × 10³	2 × 10³
Anthracene	412	314
Fluoranthrene	495	1 × 10³
Acephenanthrene	17	18
Pyrene	169	452
Benzo[a]anthracene	20	16
Chrysene	28	23
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	1 × 10³	2 × 10³
Benzo[b]naphtho[1,2-d]furan	39	107
Benzo[b]naphtho[2,3-d]furan	19	50
2,3-5,6-Dibenzoxalene	11	35
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	109	189
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	72	97
3-methylphenanthrene	67	74
2-methylphenanthrene	81	103
2-methylanthracene	19	22
4,9-methylphenanthrene	45	65
1-methylphenanthrene	39	64
Octadecane	139	299
Nonadecane	72	121
Eicosane	31	70
Heneicosane	96	230
Docosane	179	397
Tricosane	106	171
Tetracosane	< LD	< LD
Pentacosane	187	251
Hexacosane	116	140
Heptacosane	51	60
Vanillin	5 × 10³	11 × 10³
Acetovanillone	961	2 × 10³
Vanillic Acid	1 × 10³	2 × 10³
3-Guaiacylpropanol	2 × 10³	643
Conyferyl Aldehyde	1 × 10³	347
Syringaldehyde	14 × 10³	13 × 10³
Syringol	7 × 10³	5 × 10³
Acetosyringone	2 × 10³	2 × 10³
Isoeugenol	6 × 10³	3 × 10³
Syringyl Acetone	34 × 10³	6 × 10³
Propionyl Syringol	4 × 10³	3 × 10³
Syringic Acid	782	1 × 10³
Synapyl Aldehyde	5 × 10³	575
Palmitoleic Acid	< LD	< LD
Palmitic Acid	713	822
Oleic Acid	< LD	< LD
Stearic Acid	348	469
4-Nitrocatechol	< LD	44 × 10³
Pyrogallol	70	339
Methylsyringol	485	365
Vanillylmandelic acid	54	1 × 10³
2-methyl-2-pentanedioic Acid	< LD	529
Tyrosol	2 × 10³	2 × 10³
5-Methyl-5-Nitrocatechol	130	4 × 10³
3-Methyl-5-Nitrocatechol	507	8 × 10³

Table S3: (Continued)

Experiment 7 - Stove B		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	5.60×10^6
OA (mg kg^{-1})	651	3562
OM/OC	1.8	2
EF Compounds (μg kg^{-1})		
Levoglucosan	202 × 10³	121 × 10³
Mannosan	16 × 10³	10 × 10³
Galactosan	3 × 10³	2 × 10³
Acenaphtene	1 × 10³	2 × 10³
Acenaphtylene	2 × 10³	489
Fluorene	535	582
Phenanthrene	1 × 10³	2 × 10³
Anthracene	229	188
Fluoranthrene	301	1 × 10³
Acephenanthrene	9	15
Pyrene	113	349
Benzo[a]anthracene	15	13
Chrysene	25	26
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	2 × 10³	2 × 10³
Benzo[b]naphtho[1,2-d]furan	28	75
Benzo[b]naphtho[2,3-d]furan	9	43
2,3-5,6-Dibenzoxalene	9	29
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	95	177
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	54	80
3-methylphenanthrene	44	69
2-methylphenanthrene	54	97
2-methylanthracene	25	57
4,9-methylphenanthrene	30	58
1-methylphenanthrene	33	60
Octadecane	203	272
Nonadecane	79	131
Eicosane	162	244
Heneicosane	73	246
Docosane	181	418
Tricosane	75	158
Tetracosane	93	120
Pentacosane	183	222
Hexacosane	65	81
Heptacosane	48	50
Vanillin	7 × 10³	14 × 10³
Acetovanillone	934	2 × 10³
Vanillic Acid	1 × 10³	3 × 10³
3-Guaiacylpropanol	3 × 10³	931
Conyferyl Aldehyde	2 × 10³	687
Syringaldehyde	20 × 10³	17 × 10³
Syringol	12 × 10³	6 × 10³
Acetosyringone	4 × 10³	2 × 10³
Isoeugenol	15 × 10³	5 × 10³
Syringyl Acetone	52 × 10³	9 × 10³
Propionyl Syringol	6 × 10³	3 × 10³
Syringic Acid	994	2 × 10³
Synapyl Aldehyde	9 × 10³	905
Palmitoleic Acid	< LD	< LD
Palmitic Acid	1 × 10³	843
Oleic Acid	< LD	< LD
Stearic Acid	506	416
4-Nitrocatechol	509	65 × 10³
Pyrogallol	112	430
Methylsyringol	274	557
Vanillylmandelic acid	110	1 × 10³
2-methyl-2-pentanedioic Acid	88	1 × 10³
Tyrosol	1 × 10³	3 × 10³
5-Methyl-5-Nitrocatechol	< LD	4 × 10³
3-Methyl-5-Nitrocatechol	830	10 × 10³

Table S3: (Continued)

Experiment 8 - Stove B		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.96×10^6
OA (mg kg^{-1})	117	550
OM/OC	1.9	2.1
EF Compounds (μg kg^{-1})		
Levoglucosan	49 × 10³	22 × 10³
Mannosan	6 × 10³	3 × 10³
Galactosan	582	175
Acenaphtene	619	940
Acenaphtylene	924	173
Fluorene	783	729
Phenanthrene	981	792
Anthracene	219	115
Fluoranthrene	1 × 10³	2 × 10³
Acephenanthrene	57	36
Pyrene	381	543
Benzo[a]anthracene	8	5
Chrysene	15	10
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	783	729
Benzo[b]naphtho[1,2-d]furan	74	121
Benzo[b]naphtho[2,3-d]furan	28	50
2,3-5,6-Dibenzoxalene	17	33
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	122	132
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	161	125
3-methylphenanthrene	93	47
2-methylphenanthrene	139	77
2-methylanthracene	31	16
4,9-methylphenanthrene	83	44
1-methylphenanthrene	115	53
Octadecane	96	140
Nonadecane	69	74
Eicosane	142	189
Heneicosane	110	183
Docosane	179	242
Tricosane	93	100
Tetracosane	46	47
Pentacosane	85	87
Hexacosane	35	29
Heptacosane	< LD	< LD
Vanillin	5 × 10³	6 × 10³
Acetovanillone	1 × 10³	954
Vanillic Acid	476	737
3-Guaiacylpropanol	625	185
Conyferyl Aldehyde	344	120
Syringaldehyde	7 × 10³	5 × 10³
Syringol	2 × 10³	1 × 10³
Acetosyringone	741	260
Isoeugenol	3 × 10³	684
Syringyl Acetone	6 × 10³	1 × 10³
Propionyl Syringol	2 × 10³	890
Syringic Acid	382	444
Synapyl Aldehyde	2 × 10³	123
Palmitoleic Acid	< LD	< LD
Palmitic Acid	326	396
Oleic Acid	< LD	< LD
Stearic Acid	211	196
4-Nitrocatechol	2 × 10³	9 × 10³
Pyrogallol	65	133
Methylsyringol	543	133
Vanillylmandelic acid	38	129
2-methyl-2-pentanedioic Acid	5	91
Tyrosol	2 × 10³	1 × 10³
5-Methyl-5-Nitrocatechol	424	1 × 10³
3-Methyl-5-Nitrocatechol	693	2 × 10³

Table S3: (Continued)

Experiment 9 - Stove C		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.19×10^6
OA (mg kg^{-1})	115	59
OM/OC	1.7	2
EF Compounds (μg kg^{-1})		
Levoglucosan	51×10^3	28×10^3
Mannosan	8×10^3	4×10^3
Galactosan	742	239
Acenaphtene	74	465
Acenaphtylene	372	139
Fluorene	97	115
Phenanthrene	317	552
Anthracene	66	102
Fluoranthrene	399	732
Acephenanthrene	11	15
Pyrene	138	295
Benzo[a]anthracene	14	13
Chrysene	26	23
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	296	362
Benzo[b]naphtho[1,2-d]furan	29	66
Benzo[b]naphtho[2,3-d]furan	14	28
2,3-5,6-Dibenzoxalene	10	20
Benzo[k,l]xanthene	3	4
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	44	74
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	33	41
3-methylphenanthrene	16	19
2-methylphenanthrene	27	31
2-methylanthracene	4	5
4,9-methylphenanthrene	14	17
1-methylphenanthrene	16	21
Octadecane	65	142
Nonadecane	44	66
Eicosane	79	161
Heneicosane	81	146
Docosane	102	188
Tricosane	66	85
Tetracosane	34	37
Pentacosane	67	84
Hexacosane	24	17
Heptacosane	26	14
Vanillin	3×10^3	4×10^3
Acetovanillone	488	538
Vanillic Acid	352	499
3-Guaiacylpropanol	116	68
Conyferyl Aldehyde	174	83
Syringaldehyde	2×10^3	2×10^3
Syringol	925	585
Acetosyringone	219	113
Isoeugenol	1×10^3	249
Syringyl Acetone	1×10^3	484
Propionyl Syringol	506	532
Syringic Acid	240	260
Synapyl Aldehyde	628	95
Palmitoleic Acid	< LD	< LD
Palmitic Acid	1×10^3	502
Oleic Acid	< LD	< LD
Stearic Acid	267	180
4-Nitrocatechol	< LD	7×10^3
Pyrogallol	23	85
Methylsyringol	28	25
Vanillylmandelic acid	107	108
2-methyl-2-pentanedioic Acid	< LD	17
Tyrosol	362	281
5-Methyl-5-Nitrocatechol	< LD	396
3-Methyl-5-Nitrocatechol	< LD	685

Table S3: (Continued)

Experiment 10 - Stove C		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	5.41×10^6
OA (mg kg^{-1})	90	58
OM/OC	1.8	2.1
EF Compounds (μg kg^{-1})		
Levoglucosan	28×10^3	16×10^3
Mannosan	4×10^3	3×10^3
Galactosan	462	187
Acenaphtene	265	248
Acenaphtylene	408	89
Fluorene	70	69
Phenanthrene	374	535
Anthracene	52	48
Fluoranthrene	234	462
Acephenanthrene	9	10
Pyrene	90	191
Benzo[a]anthracene	19	16
Chrysene	25	24
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	235	252
Benzo[b]naphtho[1,2-d]furan	22	43
Benzo[b]naphtho[2,3-d]furan	11	21
2,3-5,6-Dibenzoxalene	9	14
Benzo[k,l]xanthene	4	4
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	34	56
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	19	26
3-methylphenanthrene	12	15
2-methylphenanthrene	17	23
2-methylanthracene	5	3
4,9-methylphenanthrene	13	15
1-methylphenanthrene	11	15
Octadecane	56	95
Nonadecane	28	40
Eicosane	55	77
Heneicosane	50	100
Docosane	94	146
Tricosane	60	60
Tetracosane	27	25
Pentacosane	62	56
Hexacosane	14	12
Heptacosane	16	14
Vanillin	2×10^3	2×10^3
Acetovanillone	314	349
Vanillic Acid	316	421
3-Guaiacylpropanol	< LD	67
Conyferyl Aldehyde	144	70
Syringaldehyde	2×10^3	1×10^3
Syringol	658	323
Acetosyringone	167	90
Isoeugenol	335	17
Syringyl Acetone	547	301
Propionyl Syringol	643	392
Syringic Acid	207	240
Synapyl Aldehyde	300	128
Palmitoleic Acid	< LD	< LD
Palmitic Acid	314	241
Oleic Acid	< LD	< LD
Stearic Acid	168	105
4-Nitrocatechol	< LD	7×10^3
Pyrogallol	30	64
Methylsyringol	21	14
Vanillylmandelic acid	23	39
2-methyl-2-pentanedioic Acid	< LD	7
Tyrosol	153	157
5-Methyl-5-Nitrocatechol	62	327
3-Methyl-5-Nitrocatechol	19	428

Table S3: (Continued)

Experiment 11 - Stove C		
	Fresh	**Aged**
Integrated OH exposure (molecule cm^{-3} hour)	0	4.63×10^6
OA (mg kg^{-1})	89	77
OM/OC	1.8	2
EF Compounds (μg kg^{-1})		
Levoglucosan	26×10^3	22×10^3
Mannosan	5×10^3	4×10^3
Galactosan	754	323
Acenaphtene	314	431
Acenaphtylene	1×10^3	183
Fluorene	130	96
Phenanthrene	484	631
Anthracene	77	93
Fluoranthrene	248	360
Acephenanthrene	12	11
Pyrene	108	152
Benzo[a]anthracene	27	22
Chrysene	36	31
Benzo[b]fluoranthrene	< LD	< LD
Benzo[k]fluoranthene	< LD	< LD
Benzo[j]fluoranthene	< LD	< LD
Benzo[e]pyrene	< LD	< LD
Benzo[a]pyrene	< LD	< LD
Perylene	< LD	< LD
1,2-Acenaphthylenone	470	373
Benzo[b]naphtho[1,2-d]furan	26	37
Benzo[b]naphtho[2,3-d]furan	13	18
2,3-5,6-Dibenzoxalene	10	13
Benzo[k,l]xanthene	< LD	< LD
4-Oxapyrene-5-one	< LD	< LD
9H-Fluoren-9-one	43	56
9,10-Anthraquinone	< LD	< LD
Xanthone	< LD	< LD
Cyclopenta[d,e,f]phenanthrene	20	23
3-methylphenanthrene	12	15
2-methylphenanthrene	18	22
2-methylanthracene	3	1
4,9-methylphenanthrene	10	13
1-methylphenanthrene	11	13
Octadecane	83	91
Nonadecane	35	40
Eicosane	93	101
Heneicosane	83	99
Docosane	133	141
Tricosane	65	65
Tetracosane	38	29
Pentacosane	73	60
Hexacosane	18	13
Heptacosane	< LD	< LD
Vanillin	2×10^3	3×10^3
Acetovanillone	295	469
Vanillic Acid	404	627
3-Guaiacylpropanol	70	98
Conyferyl Aldehyde	158	108
Syringaldehyde	2×10^3	2×10^3
Syringol	913	433
Acetosyringone	160	123
Isoeugenol	404	95
Syringyl Acetone	366	404
Propionyl Syringol	411	479
Syringic Acid	233	335
Synapyl Aldehyde	305	209
Palmitoleic Acid	< LD	< LD
Palmitic Acid	383	351
Oleic Acid	< LD	< LD
Stearic Acid	131	149
4-Nitrocatechol	180	11×10^3
Pyrogallol	40	89
Methylsyringol	19	14
Vanillylmandelic acid	< LD	59
2-methyl-2-pentanedioic Acid	< LD	8
Tyrosol	93	115
5-Methyl-5-Nitrocatechol	61	508
3-Methyl-5-Nitrocatechol	261	790

Table S4: pWLC contribution of the compounds to the total OA mass concentration at different times of the photo-oxidative process.

	Bin 0	**Bin 1**	**Bin 2**	**Bin 3**	**Bin 4**	**Bin 5**	**Bin 6**
Integrated OH exposure (molecule cm^{-3} hour) (n = nb samples)	**0 n = 11**	**> 0 - 0.5 x 10^6 n = 6**	**0.5 - 2 x 10^6 n = 11**	**2 - 4 x 10^6 n = 17**	**4 - 6 x 10^6 n = 15**	**6 - 7.5 x 10^6 n = 8**	**7.5 - 9 x 10^6 n = 2**
Total Contribution* (% OA)	52	20	20	14	10	13	9
Primary Compounds (% OA)							
Levoglucosan (min - max)	29.18 (12.74 - 45.28)	9.45 (3.84 - 14.66)	9.63 (2.19 - 23.27)	6.34 (1.82 - 15.69)	4.58 (1.79 - 13.85)	6 (3.15 - 13.52)	3.51 (3.24 - 3.78)
Mannosan	3.19 (0.90 - 6.93)	0.79 (0.23 - 1.33)	1.37 (0.18 - 4.07)	0.88 (0.17 - 2.18)	0.53 (0.17 - 1.90)	0.77 (0.18 - 2.10)	0.32 (0.20 - 0.45)
Galactosan	0.5 (0.09 - 0.87)	0.18 (0.06 - 0.30)	0.17 (0.02 - 0.44)	0.08 (0.01 - 0.19)	0.05 (0.01 - 0.13)	0.06 (< 0.01 - 0.12)	0.02 (< 0.01 - 0.03)
Acenaphtene	0.19 (0.04 - 0.53)	0.09 (0.02 - 0.16)	0.14 (< 0.01 - 0.35)	0.12 (0.02 - 0.24)	0.09 (0.02 - 0.25)	0.14 (0.02 - 0.23)	0.09 (0.02 - 0.17)
Acenaphtylene	0.44 (0.11 - 1.34)	0.16 (0.08 - 0.38)	0.15 (0.02 - 0.68)	0.04 (0.01 - 0.14)	0.03 (< 0.01 - 0.09)	0.03 (< 0.01 - 0.07)	0.02 (0.01 - 0.03)
Fluorene	0.15 (0.06 - 0.67)	0.06 (0.04 - 0.09)	0.07 (0.02 - 0.31)	0.05 (0.01 - 0.13)	0.03 (0.01 - 0.11)	0.05 (0.02 - 0.12)	0.08 (0.02 - 0.13)
Phenanthrene	0.41 (0.11 - 0.84)	0.18 (0.09 - 0.34)	0.19 (0.05 - 0.50)	0.16 (0.05 - 0.36)	0.12 (0.04 - 0.35)	0.16 (0.06 - 0.31)	0.1 (0.06 - 0.15)
Anthracene	0.08 (0.03 - 0.19)	0.04 (0.02 - 0.07)	0.03 (< 0.01 - 0.08)	0.02 (< 0.01 - 0.05)	0.02 (< 0.01 - 0.05)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.02)
Fluoranthrene	0.22 (BDL - 0.97)	0.07 (BDL - 0.23)	0.14 (BDL - 0.46)	0.13 (BDL - 0.28)	0.1 (BDL - 0.32)	0.2 (0.02 - 0.36)	0.14 (0.03 - 0.25)
Acephenanthrene	< 0.01 (BDL - 0.05)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)
Pyrene	0.08 (BDL - 0.33)	0.02 (BDL - 0.07)	0.05 (BDL - 0.15)	0.05 (BDL - 0.11)	0.04 (BDL - 0.12)	0.07 (< 0.01 - 0.14)	0.05 (< 0.01 - 0.09)
Benzo[a]anthracene	< 0.01 (BDL - 0.03)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.03)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)
Chrysene	0.01 (BDL - 0.04)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.04)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.02)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)
Benzo[b]fluoranthrene	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)

Table S4: (Continued)

Integrated OH exposure (molecule cm^{-3} hour) (n = nb samples)	**0 n = 11**	**> 0 - 0.5 x 10^6 n = 6**	**0.5 - 2 x 10^6 n = 11**	**2 - 4 x 10^6 n = 17**	**4 - 6 x 10^6 n = 15**	**6 - 7.5 x 10^6 n = 8**	**7.5 - 9 x 10^6 n = 2**
Benzo[k]fluoranthene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo[j]fluoranthene	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL	BDL
Benzo[e]pyrene	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL
Benzo[a]pyrene	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL
Perylene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Acenaphthylenone	0.31 (0.12 - 0.67)	0.14 (0.07 - 0.23)	0.15 (0.03 - 0.42)	0.10 (0.01 - 0.23)	0.08 (0.01 - 0.20)	0.11 (0.03 - 0.18)	0.08 (0.03 - 0.13)
Benzo[b]naphtho[1,2-d]furan	0.02 (BDL - 0.06)	< 0.01 (BDL - 0.02)	0.01 (BDL - 0.03)	0.01 (BDL - 0.02)	< 0.01 (BDL - 0.03)	0.02 (< 0.01 - 0.03)	0.01 (< 0.01 - 0.02)
Benzo[b]naphtho[2,3-d]furan	< 0.01 (BDL - 0.02)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - 0.01)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)
2,3-5,6-Dibenzoxalene	< 0.01 (BDL - 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)
Benzo[k,l]xanthene	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)
4-Oxapyrene-5-one	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL
9H-Fluoren-9-one	0.03 (0.01 - 0.10)	0.01 (< 0.01 - 0.03)	0.02 (< 0.01 - 0.05)	0.02 (< 0.01 - 0.03)	0.01 (< 0.01 - 0.03)	0.02 (< 0.01 - 0.04)	0.02 (< 0.01 - 0.03)
9,10-Anthraquinone	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL
Xanthone	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Table S4: (Continued)

Integrated OH exposure (molecule cm^{-3} hour) (n = nb samples)	**0 n = 11**	**> 0 - 0.5 x 10^6 n = 6**	**0.5 - 2 x 10^6 n = 11**	**2 - 4 x 10^6 n = 17**	**4 - 6 x 10^6 n = 15**	**6 - 7.5 x 10^6 n = 8**	**7.5 - 9 x 10^6 n = 2**
Cyclopenta[d,e,f]phenanthrene-4-one	0.03 (< 0.01 - 0.14)	< 0.01 (< 0.01 - 0.03)	0.01 (< 0.01 - 0.06)	0.01 (< 0.01 - 0.03)	< 0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.02)
3-methylphenanthrene	0.02 (< 0.01 - 0.08)	< 0.01 (< 0.01 - 0.02)	< 0.01 (< 0.01 - 0.03)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)
2-methylphenanthrene	0.03 (< 0.01 - 0.12)	0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.04)	< 0.01 (< 0.01 - 0.02)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.01)
2-methylanthracene	< 0.01 (BDL - 0.03)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)
4,9-methylphenanthrene	0.02 (< 0.01 - 0.07)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - 0.03)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - < 0.01)
1-methylphenanthrene	0.02 (< 0.01 - 0.10)	< 0.01 (< 0.01 - 0.02)	< 0.01 (< 0.01 - 0.03)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)
Octadecane	0.05 (< 0.01 - 0.09)	0.02 (< 0.01 - 0.04)	0.03 (< 0.01 - 0.09)	0.03 (< 0.01 - 0.06)	0.02 (< 0.01 - 0.06)	0.03 (< 0.01 - 0.07)	0.02 (< 0.01 - 0.03)
Nonadecane	0.03 (< 0.01 - 0.06)	0.01 (< 0.01 - 0.04)	0.01 (< 0.01 - 0.04)	0.01 (< 0.01 - 0.03)	0.01 (< 0.01 - 0.03)	0.02 (< 0.01 - 0.03)	0.02 (0.01 - 0.02)
Eicosane	0.04 (< 0.01 - 0.12)	0.01 (< 0.01 - 0.02)	0.03 (< 0.01 - 0.10)	0.02 (< 0.01 - 0.07)	0.02 (< 0.01 - 0.06)	0.03 (< 0.01 - 0.08)	0.02 (< 0.01 - 0.04)
Heneicosane	0.04 (BDL - 0.09)	0.01 (BDL - 0.03)	0.03 (BDL - 0.08)	0.02 (BDL - 0.06)	0.02 (BDL - 0.06)	0.03 (< 0.01 - 0.07)	0.02 (< 0.01 - 0.03)
Docosane	0.06 (BDL - 0.15)	0.02 (BDL - 0.05)	0.04 (BDL - 0.13)	0.04 (BDL - 0.08)	0.03 (BDL - 0.09)	0.05 (< 0.01 - 0.09)	0.03 (< 0.01 - 0.04)
Acenaphtene	0.03 (BDL - 0.08)	0.09 (BDL - 0.02)	0.14 (BDL - 0.06)	0.12 (BDL - 0.04)	0.09 (BDL - 0.04)	0.14 (< 0.01 - 0.04)	0.09 (< 0.01 - 0.02)
Tetracosane	0.02 (BDL - 0.04)	< 0.01 (BDL - 0.02)	0.01 (BDL - 0.04)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.02)	< 0.01 (< 0.01 - < 0.01)
Pentacosane	0.04 (BDL - 0.08)	0.01 (BDL - 0.03)	0.02 (BDL - 0.07)	0.02 (BDL - 0.04)	0.01 (BDL - 0.04)	0.02 (< 0.01 - 0.04)	< 0.01 (< 0.01 - 0.02)

Table S4: (Continued)

Integrated OH exposure (molecule cm^{-3} hour) (n = nb samples)	0 n = 11	> 0 - 0.5 x 10^6 n = 6	0.5 - 2 x 10^6 n = 11	2 - 4 x 10^6 n = 17	4 - 6 x 10^6 n = 15	6 - 7.5 x 10^6 n = 8	7.5 - 9 x 10^6 n = 2
Hexacosane	0.02 (BDL - 0.03)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (< 0.01 - 0.01)	< 0.01 (< 0.01 - < 0.01)
Heptacosane	< 0.01 (BDL - 0.02)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - 0.02)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)
3-Guaiacylpropanol	0.28 (BDL - 0.53)	0.10 (0.04 - 0.14)	0.05 (0.02 - 0.11)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.03 (0.02 - 0.03)
Conyferyl Aldehyde	0.29 (0.15 - 0.53)	0.07 (0.03 - 0.12)	0.04 (0.02 - 0.09)	0.03 (0.01 - 0.07)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.05)	0.02 (0.02 - 0.02)
Syringaldehyde	2.73 (1.80 - 5.92)	1.71 (0.79 - 2.66)	1.12 (0.44 - 2.49)	0.67 (0.41 - 0.94)	0.53 (0.39 - 0.83)	0.60 (0.40 - 0.85)	0.62 (0.54 - 0.71)
Syringol	1.43 (0.49 - 2.98)	1.08 (0.24 - 2.42)	0.59 (0.10 - 1.21)	0.25 (0.09 - 0.48)	0.16 (0.09 - 0.30)	0.19 (0.10 - 0.29)	0.13 (0.09 - 0.17)
Methylsyringol	0.09 (0.02 - 0.46)	0.06 (0.01 - 0.14)	0.03 (< 0.01 - 0.14)	0.01 (< 0.01 - 0.03)	0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.02)	0.01 (< 0.01 - 0.02)
Acetosyringone	0.41 (0.18 - 0.66)	0.20 (0.08 - 0.29)	0.11 (0.04 - 0.17)	0.06 (0.04 - 0.09)	0.05 (0.02 - 0.09)	0.05 (0.03 - 0.06)	0.05 (0.04 - 0.06)
Isoeugenol	1.22 (0.38 - 2.65)	0.67 (0.21 - 1.08)	0.27 (0.01 - 0.78)	0.09 (< 0.01 - 0.16)	0.08 (0.01 - 0.12)	0.09 (0.01 - 0.12)	0.09 (0.06 - 0.12)
Syringyl Acetone	4.61 (0.42 - 8.45)	1.46 (0.29 - 2.71)	0.36 (0.18 - 0.65)	0.22 (0.16 - 0.31)	0.21 (0.14 - 0.41)	0.21 (0.15 - 0.35)	0.25 (0.15 - 0.34)
Propionyl Syringol	0.74 (0.40 - 1.48)	0.32 (0.16 - 0.47)	0.24 (0.03 - 0.55)	0.16 (0.02 - 0.33)	0.10 (0.02 - 0.26)	0.12 (0.02 - 0.26)	0.10 (0.06 - 0.14)
Synapyl Aldehyde	0.94 (0.34 - 1.38)	0.18 (0.05 - 0.44)	0.09 (0.02 - 0.28)	0.05 (0.02 - 0.12)	0.03 (0.02 - 0.08)	0.04 (0.02 - 0.08)	0.04 (0.02 - 0.05)
Palmitoleic Acid	0.02 (BDL - 0.20)	< 0.01 (BDL - < 0.01)	BDL	BDL	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)
Palmitic Acid	0.28 (BDL - 1.06)	0.09 (0.02 - 0.21)	0.15 (0.01 - 0.63)	0.09 (< 0.01 - 0.31)	0.06 (< 0.01 - 0.24)	0.11 (0.01 - 0.25)	0.04 (0.01 - 0.07)

Table S4: (Continued)

Integrated OH exposure (molecule cm^{-3} hour) (n = nb samples)	**0 n = 11**	**> 0 - 0.5 x 10^6 n = 6**	**0.5 - 2 x 10^6 n = 11**	**2 - 4 x 10^6 n = 17**	**4 - 6 x 10^6 n = 15**	**6 - 7.5 x 10^6 n = 8**	**7.5 - 9 x 10^6 n = 2**
Oleic Acid	< 0.01 (BDL - 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	< 0.01 (BDL - < 0.01)	BDL	BDL
Stearic Acid	0.11 (0.02 - 0.24)	0.05 (< 0.01 - 0.10)	0.06 (< 0.01 - 0.20)	0.04 (< 0.01 - 0.10)	0.03 (< 0.01 - 0.08)	0.05 (< 0.01 - 0.09)	0.02 (< 0.01 - 0.03)
Non-conventional Primary Compounds (% OA)							
Vanillin	1.66 (0.34 - 4.22)	0.8 (0.33 - 1.69)	1.06 (0.27 - 2.48)	0.86 (0.23 - 1.86)	0.62 (0.20 - 1.51)	1.01 (0.20 - 2.03)	0.7 (0.20 - 1.19)
Acetovanillone	0.29 (0.08 - 0.93)	0.13 (0.06 - 0.25)	0.17 (0.05 - 0.40)	0.14 (0.05 - 0.26)	0.14 (0.04 - 0.84)	0.14 (0.05 - 0.26)	0.1 (0.05 - 0.16)
Vanillic Acid	0.24 (0.09 - 0.46)	0.12 (0.06 - 0.18)	0.16 (0.05 - 0.37)	0.14 (0.05 - 0.35)	0.1 (0.05 - 0.26)	0.14 (0.06 - 0.26)	0.09 (0.07 - 0.12)
Syringic Acid	0.17 (0.06 - 0.33)	0.09 (0.04 - 0.13)	0.11 (0.03 - 0.26)	0.08 (0.03 - 0.19)	0.06 (0.02 - 0.15)	0.08 (0.04 - 0.14)	0.05 (0.04 - 0.07)
Pyrogallol	0.02 (BDL - 0.06)	0.02 (BDL - 0.04)	0.03 (< 0.01 - 0.05)	0.02 (< 0.01 - 0.05)	0.02 (< 0.01 - 0.04)	0.02 (< 0.01 - 0.04)	0.01 (< 0.01 - 0.02)
Tyrosol	0.36 (0.11 - 1.75)	0.16 (0.09 - 0.28)	0.17 (0.07 - 0.70)	0.12 (0.06 - 0.31)	0.09 (0.05 - 0.19)	0.12 (0.07 - 0.20)	0.15 (0.07 - 0.22)
Secondary Compounds (% OA)							
4 Nitrocatechol	0.19 (BDL - 1.37)	0.81 (0.40 - 1.41)	1.68 (0.88 - 2.83)	2.43 (0.71 - 6.27)	1.77 (0.70 - 4.11)	1.92 (0.97 - 3.65)	1.05 (0.96 - 1.14)
4-Methyl-5-Nitrocatechol	0.05 (BDL - 0.36)	0.15 (0.07 - 0.26)	0.2 (0.08 - 0.50)	0.18 (0.07 - 0.28)	0.14 (0.06 - 0.23)	0.15 (0.10 - 0.19)	0.11 (0.09 - 0.13)
3-Methyl-5-Nitrocatechol	0.15 (BDL - 0.59)	0.48 (0.30 - 0.57)	0.45 (0.17 - 0.94)	0.32 (0.14 - 0.59)	0.25 (0.12 - 0.42)	0.24 (0.20 - 0.34)	0.19 (0.18 - 0.20)
Vanillylmandelic acid	0.02 (BDL - 0.09)	0.08 (0.03 - 0.16)	0.06 (0.02 - 0.17)	0.04 (0.02 - 0.08)	0.03 (0.01 - 0.06)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.02)
Methylglutaric acid	< 0.01 (BDL - 0.01)	0.02 (< 0.01 - 0.02)	0.02 (< 0.01 - 0.04)	0.02 (< 0.01 - 0.03)	0.02 (< 0.01 - 0.04)	0.02 (< 0.01 - 0.04)	0.02 (0.01 - 0.03)

*Sum from the contribution of all compounds averaged within the bins