Supporting Information

Release of Trace Organic Compounds During the Decomposition of Municipal Solid Waste Components

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Materials and Methods

Experimental Design. Biologically active reactors were monitored until degradation was virtually complete. For anaerobic conditions, reactors were monitored until there was less than a 0.1% daily increase in cumulative CH_4 yield, except for FW that was monitored until there was less than a 0.5% increase. The YW-ae reactors were operated until there was less than a 0.2% daily increase in cumulative CO_2 yield. Aeration of MSW-aa reactors was terminated once the daily increase in cumulative CO_2 yield was less than 0.5%. The MSW-ab reactors were operated until monthly NMOC emissions averaged less than 5% of the total NMOC yield.

Analytical Methods. VFAs were extracted from the orbo tubes by suspending the front section of Chromosorb P in 5 mL DI water in 12 mL glass centrifuge tubes. The tubes were shaken for 12 h on a platform shaker, followed by centrifugation at 18g for 8 min. 2 mL of supernatant was combined with 200 μL 1N HCl in amber silanized vials (4 mL) to neutralize the sodium carbonate and protonate the VFAs. Four μL of 2-ethylbutyric acid (1000 ppm) was added to each vial as an internal standard.

Solid phase microextraction (SPME) was used to adsorb and concentrate VFAs from the headspace of the acidified samples and standard solutions using carbowax/divinylbenzene Stableflex fiber assemblies (70 μm, Supelco, Bellefonte, PA). Fiber assemblies were exposed to the sample headspace for 15 min at 25°C and injected directly into the GC/MS. VFAs were separated via GC/MS using a HP G1800A GCD with a DB-FFAP column (30m x 0.25mm x 0.85μm) (Agilent, Palo Alto, CA) and an electron ionization detector using injector and detector temperatures of 220°C and 280°C, respectively. The initial temperature of the GC/MS oven was held at 50°C for 0.5 min, then increased to 100°C at 20°C min^{-1} This temperature was held constant for 5 min and finally increased to 200°C at 8°C min^{-1}, where it remained for 2 min. Helium was used as the carrier gas at 0.8 mL min^{-1}. Prior to analysis, the detector was autotuned with perfluorotributylamine (PFTBA) tuning solution (Agilent). Detector response was analyzed using EnviroQuant ChemStation G1701AA Version A.0300 software. Identification of each VFA was based on the retention time and on a mass spectrum match with the NBS75K library built into the software. Calibration curves were generated for 10 acids (acetic, propionic, n-butyric, isobutyric, 2-methylbutyric, isovaleric, valeric, isocaproic, caproic and heptanoic) and samples were quantified using selected ion monitoring (SIM). Recoveries were determined by injecting known masses of VFA standards (60 and 80 ug) into vials and transferring to gas

sampling bags with known volumes of UHP nitrogen. Duplicate 1-L samples were then pumped through orbo tubes and VFAs were analyzed as described above. Recoveries are reported in Table S1.

SOC Analysis. Standard curves were prepared by adding a known mass of standard solution into vials. Compounds were then transferred into a gas bag by sparging with a known volume of ultra high purity (UHP) N_2, after which known volumes of gas were analyzed to form standard curves. All standard mixes were purchased from Absolute Standards Inc. (Hamden, CT) except for the hydrocarbons mixture that was purchased from Supelco.

The injector and detector temperatures were 200°C and 280°C, respectively. The initial GC/MS oven temperature of 35°C was held for 15 min, then increased to 160°C at 2°C min^{-1} and finally increased to 200°C at 70°C min^{-1} where it was held for 10 min. The detector was autotuned with PFTBA-tuning solution daily and run in scan mode. After autotuning, 140 mL of a gas containing 1 ppmv 4-bromofluorobenzene (BFB) (Restek Corp.) was used to check detector performance. The BFB performance criteria in the ChemStation software (Agilent) were used without modification. Duplicate injections of standards at varying injection volumes were made to verify reproducibility. The average difference between replicate injections for all compounds analyzed was 8.76% (std. dev = 11.05%).

SOCs were identified and quantified according to a mass spectrum match with the NBS75K library and retention time. For each compound, a target ion was specified along with qualifying ions. Relative responses of the qualifying ions were assigned as a percentage of the target ion that should be expected. Internal standards (1,4-difluorobenzene, chlorobenzene-D5, BFB) were analyzed by injecting 140 mL of gas containing 1 ppmv of each internal standard with each sample. Calibration curves with internal standard corrections were used to convert integration areas to masses. In preliminary work, it was determined that retention times did not vary with mass (*1*).

Gas sampling bags were cleaned between uses by filling with about 5-L of UHP N_2, baking at 60°C for 20 min and evacuating the gas while it was warm. This process was repeated six times. In preliminary work, this procedure was shown to provide no residual SOCs in gas bags for 148 of the 158 speciated compounds analyzed. Seven of the remaining compounds had greater than

95% removal efficiency while two were greater than 85%. Ethanol was the only compound shown to exhibit high carryover potential and it was not included in the results.

NMOC Release Rates. As illustrated in Figure S2, there was an increase in the NMOC release rate for two of the three MSW-ab reactors between days 100 and 200. The airflow remained constant and no CO_2 production was detected during this period, which rules out a biological mechanism. One potential explanation is that the NMOC release during this period was due to the exposure of a previously inaccessible refuse pocket becoming exposed to airflow.

Speciated Organic Compound Results and Discussion

The lower quantitation limits for the SOC yields were computed for the MSW-an reactors as an example (Table S3).

Alkenes. Alkenes contributed less than 1.8% of SOCs for all treatments, with 1-octene being dominant in all aerobic and abiotic treatments (MSW-aa, MSW-ab, YW-ae), except for MSW-aa-I. Various types of mold (*Aspergillus, Penicillium, Rhizopus*) produce 1-octene under aerobic conditions (*2*). Given its ubiquitous nature, mold could have been present on MSW components prior to reactor initiation, which would explain the presence of 1-octene in the MSW-ab reactors. If present, then elevated concentrations from the MSW-ab reactors would be predicted as 1-octene from mold is stripped in the abiotic system and degraded in the aerobic and anaerobic systems. Equilibrium partitioning of 1-octene was simulated in a landfill organic fate model (*3*) that predicted advective losses of 72% and 100% during simulations of anaerobic and aerobic conditions with no biodegradation, respectively. Thus, the lower yields in biologically active reactors suggest biodegradation.

Chlorinated and Other Compounds. Chlorinated compounds were not detected in high quantities compared to other classes of compounds analyzed. Some ethyl acetate, commonly found in cosmetics (*4*), was detected in MSW treatments in relatively small amounts which is comparable to work in pilot-scale composting bins (*5*).

Volatile Fatty Acids. Initially, selected gas samples were analyzed at time points where maximum VFA concentrations would be predicted based on leachate composition. All gas samples were then analyzed for treatments MSW-ae and YW-ae where there was an indication that VFAs make up a significant fraction of the NMOC release. In both treatments, the cumulative VFA yield did not exceed 5% of total NMOC yield. Rate curves for the MSW-aa and YW-ae treatments are shown in Figure S3.

Literature Cited

(1) U.S. Environmental Protection Agency. *Compendium Method TO-15-Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectroscopy (GC/MS)*; 2nd ed.; U.S. EPA: Washington, D.C. 1999.

(2) Meruva, N. K.; Penn, J. M.; Farthing, D. E. Rapid identification of microbial VOCs from tobacco molds using closed-loop stripping and gas chromatography/time-of-flight mass spectrometry. *Journal of Industrial Microbiology & Biotechnology* **2004,** *31*, 482-488.

(3) Kjeldsen, P.; Christensen, T. H. A simple model for the distribution and fate of organic chemicals in a landfill: MOCLA. *Waste Management & Research* **2001,** *19*, 201-216.

(4) National Institutes of Health. *Household Products Database*. http://householdproducts.nlm.nih.gov (accessed 7/1/05).

(5) Smet, E.; Van Langenhove, H.; De Bo, I. The emission of volatile compounds during the aerobic and the combined anaerobic/aerobic composting of biowaste. *Atmospheric Environment* **1999,** *33*, 1295-1303.

Figure S1. Reactor Design. A, 20-L 2 mil tedlar inner with aluminized outer gas bag; B, teflon shutoff valve w/ female luer adapter; C, ¼" Kynar tee; D, ¼" brass elbow; E, 3/8" O.D. teflon lined Tygon tubing; F, JN series screwed bonnet needle valves; G, Kynar coated aluminum refuse containment chamber; H, ¼" O.D. Kynar tubing; I, 6 mm teflon stopcock; J, Mininert valve (13 mm); K, peristaltic pump (Masterflex 7518-00); L, glass leachate collection vessel; M, ¼" brass male/female adapter; N, 7/16" Viton tubing; O, magnetic stir plate; P, 3/8" mini ball valve.

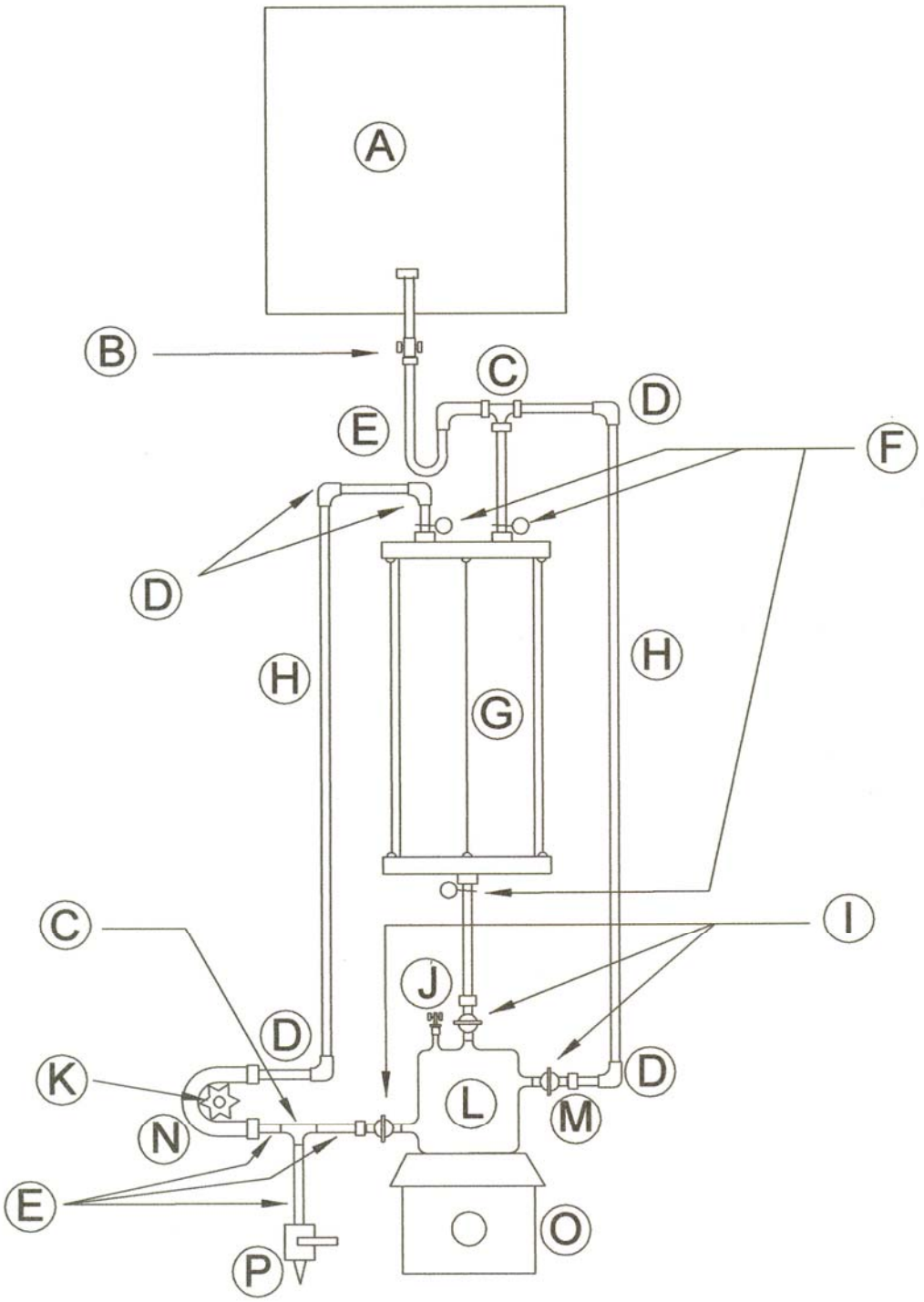
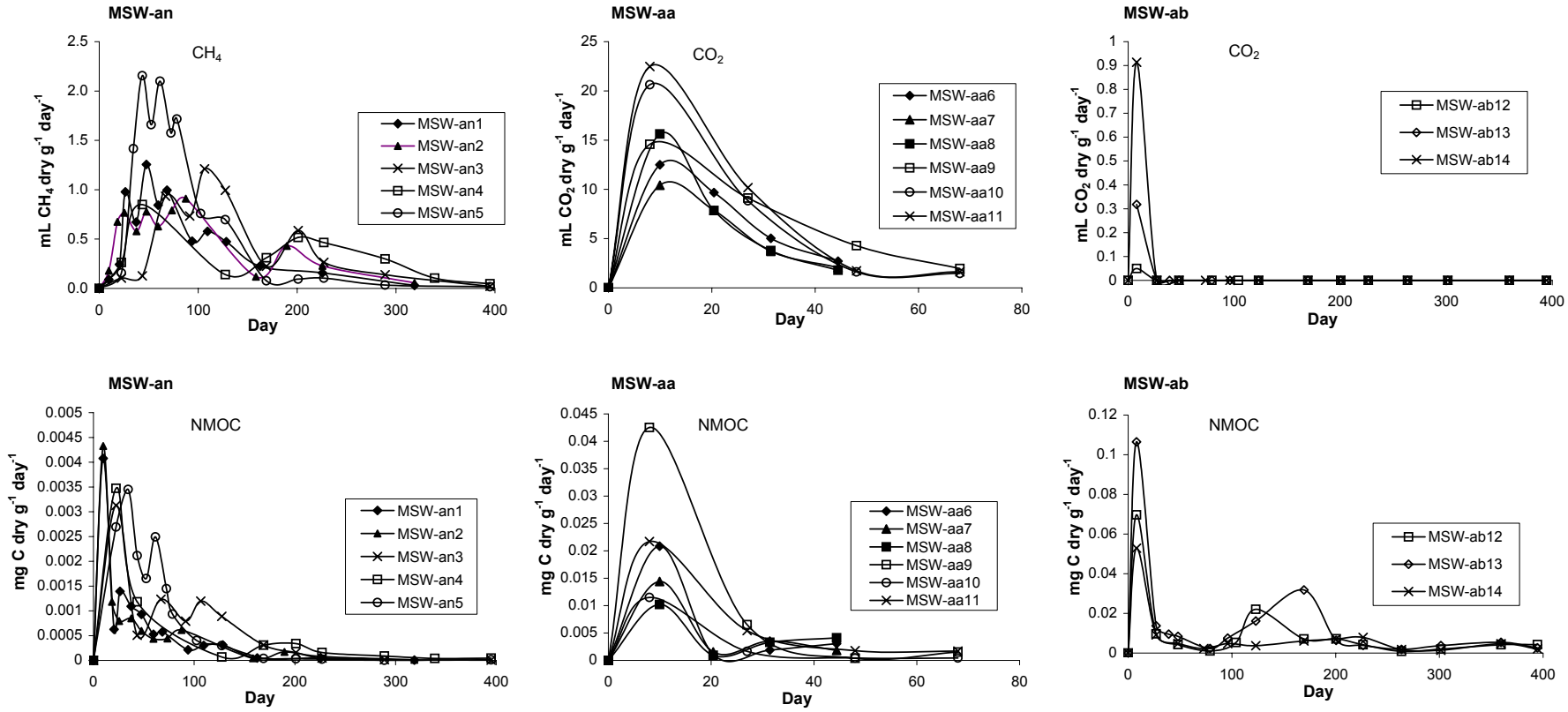


Figure S2. Gas and NMOC production rates. Solid data points (▲, ■, ♦) indicate reactors operated during phase I whereas open data points (x, □, ○) indicate reactors operated during phase II.



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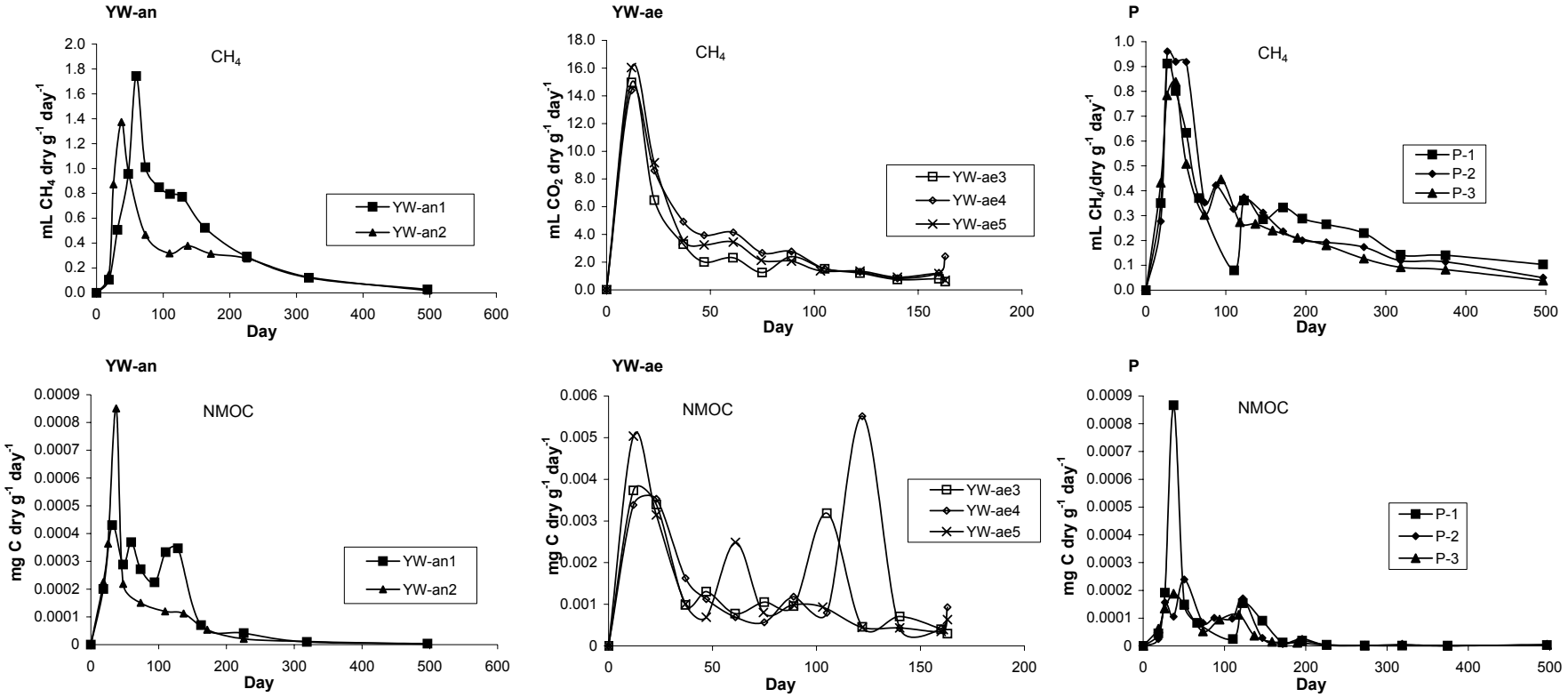

Figure S3. VFA production rates. Solid data points (▲, ■, ♦) indicate reactors operated during phase I whereas open data points (x, □, ○) indicate reactors operated during phase II.

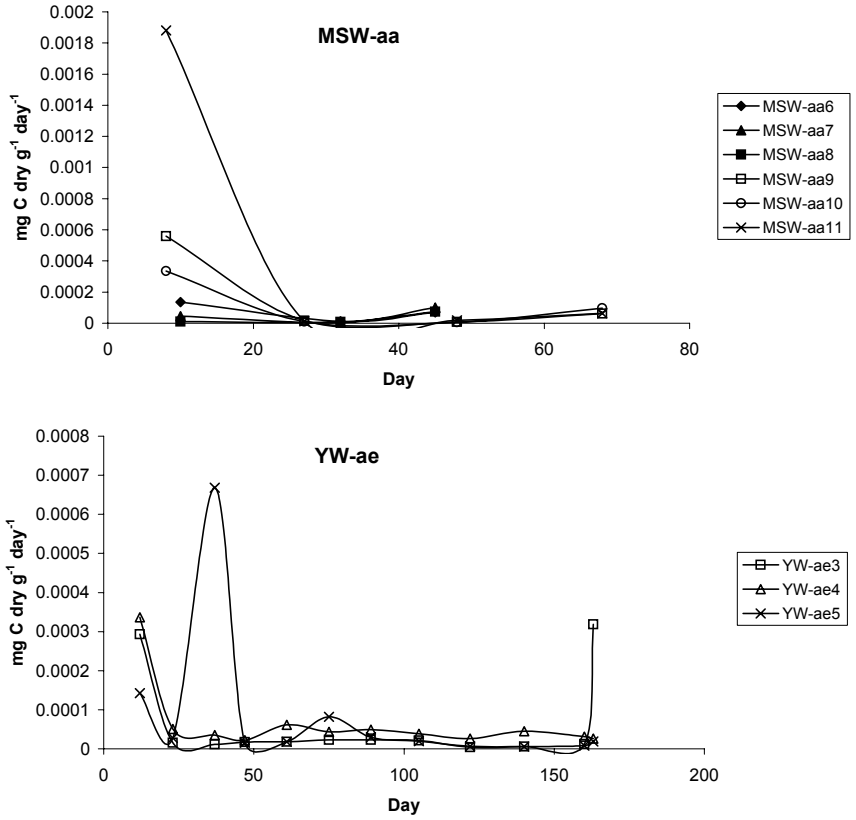

Table S1. Volatile Fatty Acid Recoveries

Volatile Fatty Acid	Recovery (%)[a]
Acetic	116.2 , 82.3
Propionic	106.1 , 78.1
Isobutyric	101.7 , 110.2
n-Butyric	104.1 , 76.7
2-Methylbutyric	111.3 , 103.8
Isovaleric	110.5 , 98.1
Valeric	108.4 , 66.4
Isocaproic	92.6 , 68.3
Caproic	98.2 , 67.6
Heptanoic	107.2 , 92.9

[a]Recoveries for additions of 60 and 80 μg to a gas bag, respectively.

Table S2. Gas and NMOC Yield for Each Reactor.

Treatment[a]	NMOC yield (mg-C dry g^{-1})	Gas yield (mL dry g^{-1})		Total Gas Flow[b] (mL dry g^{-1})
		CH_4	CO_2	
MSW-an1	0.114	97.3	88.5	
MSW-an2	0.111	98.5	83.5	
MSW-an3	0.185	129.8	115.1	
MSW-an4	0.145	103.6	91.9	
MSW-an5	0.201	150.1	129.9	
MSW-aa6	0.278	ND[c]	316.2	2,611
MSW-aa7	0.221	ND[c]	253.6	2,452
MSW-aa8	0.200	6.0	302.9	2,901
MSW-aa9	0.501	ND[c]	419.3	3,759
MSW-aa10	0.140	ND[c]	470.9	5,991
MSW-aa11	0.350	ND[c]	449.3	6,673
MSW-ab12	2.570	ND[c]	0.4	33,893
MSW-ab13	4.330	ND[c]	2.6	41,130
MSW-ab14	2.140	ND[c]	7.3	32,024
YW-an1	0.043	184.0	159.8	
YW-an2	0.033	128.1	123.4	
YW-ae3	0.226	ND[c]	489.8	25,365
YW-ae4	0.271	ND[c]	621.6	28,354
YW-ae5	0.212	ND[c]	569.7	23,384
FW1	0.438	161.1	138.2	
FW2	0.279	147.1	113.5	
FW3	0.324	150.5	108.4	
FW4	0.029	201.1	172.8	
FW5	0.033	212.8	174.4	
P1	0.020	117.0	130.1	
P2	0.015	119.6	136.6	
P3	0.013	103.9	121.1	
C1[c]	0.045	ND[d]	11.8	
C2[c]	0.075	ND[d]	18.3	
C3[c]	0.012	ND[d]	10.9	

[a]See Table 1 for nomenclature. In some cases data are only reported for two reactors due to evidence of gas leakage.
[b]Total gas flow is $CH_4 + CO_2$ except for aerobic and abiotic treatments which are given.
[c]Control reactor NMOC and gas yields are mg-C L^{-1} leachate and mL gas L^{-1} leachate, respectively.
[d]None detected within quantifiable limits.

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	MSW-an Min. Quant. Limit	MSW													
		Anaerobic					Aerobic						Abiotic		
		MSW-an1	MSW-an2	MSW-an3	MSW-an4	MSW-an5	MSW-aa6	MSW-aa7	MSW-aa8	MSW-aa9	MSW-aa10	MSW-aa11	MSW-ab12	MSW-ab13	MSW-ab14
Alkanes															
pentane	0.31	3,254	7,380	6,401	7,303	6,693	6,761	7,783	4,441	14,671	11,158	15,675	14,245	33,495	6,423
2,3-dimethylbutane	0.25	0	0	698	398	182	0	0	0	468	805	135	204	0	0
2,2,3-trimethylbutane	2.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methylpentane	0.12	5	17	823*	435*	298	0	0	0	1,596	2,173	13	0	0	0
3-methylpentane	0.11	0	0	365*	274*	109*	0	0	0	0	836*	11	0	0	0
hexane	0.18	83	194	60*	53*	47	0	0	0	0	0	13	0	248*	0
methylcyclopentane	0.23	8	20	30*	22*	12*	0	0	0	0	0	0	0	0	0
2,2-dimethylpentane	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3-dimethylpentane	0.42	66	143	1*	7*	0	0	0	0	0	0	0	0	2,812	0
2,4-dimethylpentane	0.28	0	0	3*	0	0	0	0	0	0	0	0	0	587	0
3,3-dimethylpentane	1.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cyclohexane	0.47	0	0	3,305	2,411	805	0	0	0	5,783	2,531	8,515	9,691	7,784	4,949
2-methylhexane	0.25	202	262	8	0	0	0	0	0	0	0	6	0	1,546	0
3-methylhexane	0.21	435	543	42	18	10*	0	0	0	0	0	0	369*	6,684*	341
1,1-dimethylcyclopentane	0.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,3-dimethylcyclopentane	0.46	0	15*	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,3-dimethylcyclopentane	0.66	0	14	0	0	0	0	0	0	0	0	0	0	0	0
3-ethylpentane	0.42	0	0	4*	0	0	0	0	0	0	0	0	0	1,214	0
trans-1,2-dimethylcyclopentane	0.27	14	36	0	0	0	0	0	0	0	0	0	0	288	0
heptane	0.24	724	885	86*	88	38	780	805	540	0	612	514	211*	3,563	0
methylcyclohexane	0.20	105*	149*	8*	4*	5	0	0	0	0	0	0	0	2,305*	0
2,2-dimethylhexane	0.68	0	16	0	0	0	0	0	0	0	0	0	0	732	0
ethylcyclopentane	0.29	13	28	0	0	0	0	0	0	0	0	0	0	0	0
2,5-dimethylhexane	0.40	0	103	32	22	24	0	0	0	0	0	0	311	11,576	469
2,2,3-trimethylpentane	0.09	0	35	0	0	1*	0	0	0	0	0	0	0	6,455	170
2,4-dimethylhexane	0.18	58*	221*	63*	23	39*	0	0	0	0	0	412	404	18,806*	817*
ctc-1,2,4-trimethylcyclopentane	0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ctc-1,2,3-trimethylcyclopentane	1.16	0	0	0	0	0	0	0	0	0	0	0	0	12,110	0
2,3-dimethylhexane	0.16	0	167	67*	27	36	0	0	0	657	0	473	496	22,661*	1,450*
2-methylheptane	0.23	0	0	2*	3*	0	0	0	0	0	0	0	0	0	358
4-methylheptane	0.22	0	15	16	29*	2*	0	0	0	0	0	0	0	0	0
3-methylheptane	0.16	0	16	0	0	0.2*	0	0	0	0	0	3	0	2,001*	0
3-ethylhexane	0.41	0	0	0	0	0	0	0	0	0	0	0	5,754	0	0
cct-1,2,4-trimethylcyclopentane	2.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,4-dimethylcyclohexane	2.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-ethyl-1-methylcyclopentane	1.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,2-dimethylcyclohexane	1.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
octane	0.12	228	223	198*	108	179	0	0	0	799	424	313	738*	4,162*	744*
isopropylcyclopentane	2.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-dimethylcyclohexane	2.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0
propylcyclopentane	1.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ccc-1,3,5-trimethylcyclohexane	1.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,5-dimethylheptane	0.16	0	0	0	0	0	0	0	0	0	0	0	0	418*	77*
3,3-dimethylheptane	0.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,4-dimethylheptane	2.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methyloctane	0.15	0	0	21	0	0	0	0	0	0	0	0	0	158*	0
3-methyloctane	0.06	19	26	0	0	0	0	0	0	0	0	0	0	70	0
ctt-1,2,4-trimethylcyclohexane	0.81	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3-diethylpentane	0.12	0	0	3	5*	9*	0	0	0	0	0	0	0	2,276*	0
1,1,2-trimethylcyclohexane	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
isobutylcyclopentane	2.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
nonane	0.14	353	299*	13*	8*	16*	0	0	0	52*	0	0	0	0	0
isopropylcyclohexane	0.62	4	0	0	0	0	0	0	0	0	0	0	0	0	0

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	MSW-an Min. Quant. Limit	MSW Anaerobic					Aerobic						Abiotic		
		MSW-an1	MSW-an2	MSW-an3	MSW-an4	MSW-an5	MSW-aa6	MSW-aa7	MSW-aa8	MSW-aa9	MSW-aa10	MSW-aa11	MSW-ab12	MSW-ab13	MSW-ab14
propylcyclohexane	0.65	121	111	0	0	0	0	0	0	0	0	0	0	0	0
butylcyclopentane	1.08	0	0	0	0	2*	0	0	0	0	0	0	0	0	0
3,3-dimethyloctane	0.29	6	2	0	0	0	0	0	0	0	0	0	0	0	0
2,3-dimethyloctane	0.96	0	0	6*	5*	1*	0	0	0	16*	0	0	0	0	0
2-methylnonane	0.54	188	69	0	0	0	0	0	0	0	0	0	956	2,205	0
3-ethyloctane	1.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-methylnonane	0.98	148	130	0	0	0	0	0	0	0	0	0	0	0	0
isobutylcyclohexane	0.59	43	22	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-2-propylcyclohexane	0.56	43	24	0	0	0	0	0	0	0	0	0	0	0	0
decane	0.09	12	0	350	56	368	0	0	0	241	0	0	1,045	528	1,140
n-undecane	0.12	487	422	1,345	309	964	0	404	124	2,783	1,216	1,140	1,364	4,159	766
dodecane	0.12	0	0	1,042	391*	835	0	0	0	2,540*	778	8,689	5,583*	5,996*	1,307*
t-1-methyl-2-(4-MP)cyclopentane	1.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tridecane	1.75	0	0	38*	0	0	0	0	0	0	0	0	0	0	0
tetradecane	9.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pentadecane	5.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Alkanes		6,616	11,588	15,029	11,998	10,676	7,541	8,991	5,105	29,606	20,533	35,911	41,370	154,839	19,013
Alkenes															
1-pentene	0.18	0	0	141*	86*	47*	0	0	0	104*	0	2	0	0	130*
2-methyl-1-butene	0.26	0	24	118	128	147	0	0	0	0	0	26	0	521	0
2-methyl-1,3-butadiene	0.08	38	20	90*	73*	137*	0	71	83	1,138	538	65	0	0	0
trans-2-pentene	0.18	0	21	30	29	1	0	0	0	0	0	0	0	0	0
cis-2-pentene	0.19	0	2*	51*	58*	132*	0	0	0	0	0	0	0	201*	0
4-methyl-1-pentene	2.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-hexene	1.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methyl-2-pentene	0.15	0	0	2*	0	3*	0	0	0	0	0	0	0	0	0
1-heptene	0.69	0	0	0	0	0	0	0	0	0	0	0	0	177*	0
trans-3-heptene	2.11	0	0	0	0	0	0	0	0	0	0	0	0	2,285	0
cis-3-heptene	2.51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-2-heptene	2.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-2-heptene	3.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-octene	0.19	0	157	40	45	27	0	0	0	4,391	0	0	4,447	20,633	3,863
trans-2-octene	0.14	14	26	13*	8	10*	0	0	0	0	0	0	199*	2,860*	215*
cis-2-octene	0.20	3	18*	5*	5*	4*	0	0	0	0	0	0	0	1,602	0
1-nonene	0.22	0	0	0	0	2*	0	0	0	0	0	0	0	0	0
trans-2-hexene	0.51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-2-hexene	2.34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-3-nonene	1.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-3-nonene	2.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-decene	0.19	25	0	3	5	2	0	0	0	0	0	0	0	1,624	0
cis-2-nonene	0.34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-2-nonene	1.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Alkenes		79	268	493	438	513	1	71	83	5,634	538	93	4,646	29,903	4,207
Aromatics															
benzene	0.10	7	0	19	21	15	0	0	0	0	0	4	76	38	0
toluene	0.09	108	557	3,844	2,451	2,268	1	0	0	4,255	742	36,607	68,849*	95,531*	173,658*
styrene	0.07	73	86	159*	92	99*	0	0	100	1,067	1,107	3,453	2,998*	3,038	5,976*
ethylbenzene	0.09	474	830*	747	424	579*	0	0	40*	6,291*	1,284*	22,842	13,327*	12,284*	9,043*
m&p-xylenes	0.17	255	366	191*	122*	149*	0	0	165	2,694*	1,101	12,984	6,402*	23,320*	8,045
o-xylene	0.03	0	0	64	42*	54*	0	0	0	0	0	0	1,489*	4,456	1,755
propylbenzene	0.04	0	1	27*	17*	15	0	0	0	24	76*	315	48*	134*	0
1-methyl-3-ethylbenzene	0.05	0	0	16*	10	17*	0	0	0	0	0	708	431*	773*	277*
1-methyl-4-ethylbenzene	0.04	0	0	8*	4*	5*	0	0	0	0	0	0	98*	275*	66*
1-methylethylbenzene	0.03	21	22	46	26	28	0	0	0	83	66	85	56	132	70

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	MSW-an Min. Quant. Limit	MSW													
		Anaerobic					Aerobic						Abiotic		
		MSW-an1	MSW-an2	MSW-an3	MSW-an4	MSW-an5	MSW-aa6	MSW-aa7	MSW-aa8	MSW-aa9	MSW-aa10	MSW-aa11	MSW-ab12	MSW-ab13	MSW-ab14
1,3,5-trimethylbenzene	0.06	0	10	6*	5*	5*	0	0	0	0	0	160	111*	134*	0
1-methyl-2-ethylbenzene	0.04	0	0	5*	5*	5*	0	0	0	0	0	105	47*	147*	0
tert-butylbenzene	2.83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
isobutylbenzene	0.19	0	1	0	0	0	0	0	0	0	0	0	0	0	0
sec-butylbenzene	0.05	0	0	0	1*	0	0	0	0	0	0	0	0	0	0
1-methyl-3-isopropylbenzene	0.05	678	548	265	71	600	2,002	0	464	10,730	0	2,321	6,507	69,225	2,201
1-methyl-4-isopropylbenzene	0.05	1,089	1,006	398*	502*	1,125	1,686	1,556	410	14,240	507	16,575	6,313*	111,436*	2,856*
1-methyl-2-isopropylbenzene	0.70	0	0	0	0	9	0	0	0	0	0	0	0	0	0
1-methyl-3-propylbenzene	0.04	0	0	2	0	0	0	0	0	0	0	0	0	85	0
1-methyl-4-propylbenzene	0.03	2	0	0	0	0	0	0	0	0	0	0	0	0	0
butylbenzene	0.29	3*	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3-dimethyl-5-ethylbenzene	0.08	0	0	0	0	1*	0	0	0	0	0	0	0	43*	41*
1,2-diethylbenzene	0.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-2-propylbenzene	0.07	0	0	0	0	1*	0	0	0	0	0	0	0	0	0
1,4-dimethyl-2-ethylbenzene	0.12	119	245	0	0	0	584	0	451	0	0	0	0	0	0
1,2-dimethyl-4-ethylbenzene	0.67	0	0	0	0	7*	0	0	0	0	0	0	0	0	0
1,2-dimethyl-3-ethylbenzene	0.08	0	0	0.3*	0	0	0	0	0	0	0	0	0	0	0
1,2,4,5-tetramethylbenzene	0.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methylbutylbenzene	1.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pentylbenzene	2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-t-butyl-3,5-dimethylbenzene	1.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-t-butyl-4-ethylbenzene	1.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3,5-triethylbenzene	2.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4-triethylbenzene	0.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hexylbenzene	2.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Aromatics		2,828	3,671	5,798	3,793	4,981	4,273	1,557	1,630	39,384	4,883	96,159	106,752	321,051	203,988
Alcohols															
2-propanol	0.41	561	1,505	5,453*	1,592*	620*	0	0	1,619	20,581	0	0	13,496	45,783	29,078*
t-butanol	0.11	0	9	796	601	529	0	0	0	1,468	0	0	4,026*	4,957*	3,863*
1-propanol	2.64	0	0	2,192*	2,458	2,758	3,252	0	0	52,877	0	0	14,283	20,379	0
iso-butanol	2.29	0	0	873	643	96*	0	0	0	0	0	0	10,112	0	0
1-butanol	2.46	2,429	1,132	1,244	562	2,742	7,883	3,704	10,714	56,910	0	0	38,422	31,247	65,510
Total Alcohols		2,991	2,645	10,558	5,856	6,747	11,135	3,704	12,333	131,836	0	0	80,340	102,366	98,451
Ketones															
acetone	0.77	901	1,333	4,925	1,639*	2,033*	0	0	0	50,013	15,752*	51,441	76,030	161,512	94,342
2-butanone	1.41	10,910	18,485	20,011	4,328	7,824	13,185	39,606	26,409	191,168	20,937	55,178	179,205	620,632	212,354
2-pentanone	0.75	1,796	2,146	2,030	407	2,267	0	1,479	631	28,905	0	75,309	10,839*	73,000*	25,678*
4-methyl-2-pentanone	0.25	224	235	404*	70*	338*	0	0	0	0	0	238	1,817*	8,202*	5,693*
2-hexanone	1.00	241	333	306	11	536	0	0	0	0	0	993	4,384*	5,212*	3,172*
Total Ketones		14,073	22,532	27,676	6,455	12,998	13,185	41,085	27,040	270,085	36,689	183,159	272,275	868,558	341,241
Terpenes															
α-pinene	0.08	1,617	1,199	376*	427*	651*	5,256	4,954	1,490	1,178	503	727	1,773*	2,431*	1,165*
camphene	0.11	27	9	28	16	25	0	0	0	0	0	0	0	0	137
β-pinene	0.15	534*	1,472	175*	147*	639	1,177	1,081	794	1,113*	415	835	3,520	2,147*	3,082*
limonene	0.20	6,104	5,896	18,420	16,876	20,172	78,519	199,406	66,330	84,414*	50,697	57,512	157,444*	228,288*	108,651*
γ-terpinene	0.07	119	245	71	60	252	584	0	451	0	0	0	603	590	766
Total Terpenes		8,401	8,820	19,068	17,526	21,740	85,535	205,440	69,066	86,705	51,614	59,074	163,341	233,456	113,801
Chlorinated compounds															
1,1-dichloroethene	4.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
methylene chloride	0.72	0	432	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,2-dichloroethene	1.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trichloroethene	0.55	2*	0	0	0	0	0	795*	0	0	0	0	0	0	0
tetrachloroethene	0.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0
chlorobenzene	0.11	0	0	1*	0	0	0	0	0	0	227	0	48*	0	100*

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	MSW-an Min. Quant. Limit	MSW													
		Anaerobic					Aerobic						Abiotic		
		MSW-an1	MSW-an2	MSW-an3	MSW-an4	MSW-an5	MSW-aa6	MSW-aa7	MSW-aa8	MSW-aa9	MSW-aa10	MSW-aa11	MSW-ab12	MSW-ab13	MSW-ab14
1,1,1-trichloroethane	0.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-dichloropropane	0.84	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2-trichloroethane	0.60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-dichlorobenzene	0.16	0	0	2	5	4	0	0	0	0	0	0	0	531	0
1,2-dichlorobenzene	0.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4-trichlorobenzene	1.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chlorinateds		2	432	3	5	4	0	795	0	0	227	0	48	531	100
Other															
diethyl ether	0.40	0	0	11*	0	0	0	0	0	0	0	0	0	299*	0
ethyl acetate	2.20	575	757	1,746	2,051	2,223	21,324	15,159	1,883	0	4,216	31,352	26,682	22,947	9,281
Total Other		575	757	1,757	2,051	2,223	21,324	15,159	1,883	0	4,216	31,352	26,682	23,246	9,281
Total Speciated Compounds		35,565	50,715	80,382	48,122	59,882	142,994	276,803	117,140	563,249	118,699	405,747	695,455	1,733,951	790,082

* The mass quantified, or a portion thereof, is based on a chromatogram with a signal:noise ratio of less than 10. The mass was quantified after manual review of the chromatogram and peak ion signature.

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	Yard Waste					Food Waste					Mixed Paper		
	Anaerobic		Aerobic										
	YW-an1	YW-an2	YW-ae3	YW-ae4	YW-ae5	FW1	FW2	FW3	FW4	FW5	P1	P2	P3
Alkanes													
pentane	365	201	0	0	0	270	266	319	617	621	58	16	225
2,3-dimethylbutane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,2,3-trimethylbutane	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methylpentane	17	0	0	0	0	0	0	0	0	0	0	0	12
3-methylpentane	0	0	0	0	0	0	0	0	21*	0	0	0	0
hexane	0	5	0	0	0	9	0	0	0	0	0	0	0
methylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,2-dimethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3-dimethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	38
2,4-dimethylpentane	0	0	0	0	0	587	0	3	0	0	0	0	0
3,3-dimethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	0
cyclohexane	0	0	0	0	0	0	0	0	0	217	0	0	0
2-methylhexane	87	0	0	0	0	0	0	0	0	0	0	0	71
3-methylhexane	156*	0	0	0	0	0	0	0	0	0	0	0	146*
1,1-dimethylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,3-dimethylcyclopentane	6*	0	0	0	0	0	0	0	0	0	0	0	4*
trans-1,3-dimethylcyclopentane	7	0	0	0	0	0	0	0	0	0	0	0	8
3-ethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	13
trans-1,2-dimethylcyclopentane	9	0	0	0	0	0	0	0	0	0	0	0	10
heptane	243	0	149*	0	0	0	0	0	0	0	0	0	28
methylcyclohexane	25	0	0	0	1,168	0	0	0	0	0	0	0	34
2,2-dimethylhexane	0	0	0	0	0	0	0	0	0	0	0	0	0
ethylcyclopentane	11	0	0	0	0	0	0	0	0	0	0	0	7
2,5-dimethylhexane	0	0	0	0	0	0	0	0	0	0	0	0	90
2,2,3-trimethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-dimethylhexane	19	0	0	0	1,056*	0	0	0	0	0	0	0	181
ctc-1,2,4-trimethylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
ctc-1,2,3-trimethylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3-dimethylhexane	6	0	0	145*	1,789	0	0	0	0	0	0	0	163
2-methylheptane	0	0	0	0	0	0	0	0	0	0	0	0	0
4-methylheptane	0	0	0	0	0	0	0	0	0	0	0	0	0
3-methylheptane	0	0	0	0	0	0	0	0	0	0	0	0	15
3-ethylhexane	0	0	0	0	0	0	0	0	0	0	0	0	0
cct-1,2,4-trimethylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,4-dimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
1-ethyl-1-methylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,2-dimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
octane	426	361	0	0	217	124	103	28	105*	120*	0	0	38
isopropylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-dimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
propylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
ccc-1,3,5-trimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,5-dimethylheptane	0	0	0	0	0	0	0	0	0	0	0	0	2*
3,3-dimethylheptane	0	0	0	0	0	0	0	0	0	0	0	0	0
3,4-dimethylheptane	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methyloctane	0	0	0	0	0	0	0	0	0	0	0	0	0
3-methyloctane	0	0	0	0	0	0	0	0	0	0	0	0	0
ctt-1,2,4-trimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3-diethylpentane	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2-trimethylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
isobutylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
nonane	81	40	0	0	0	0	2	0	1*	0	0	0	17
isopropylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	Yard Waste					Food Waste					Mixed Paper		
	Anaerobic		Aerobic										
	YW-an1	YW-an2	YW-ae3	YW-ae4	YW-ae5	FW1	FW2	FW3	FW4	FW5	P1	P2	P3
propylcyclohexane	7	0	0	0	0	0	0	0	0	0	0	0	4
butylcyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3-dimethyloctane	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3-dimethyloctane	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methylnonane	0	0	0	0	0	0	0	0	0	0	0	0	0
3-ethyloctane	0	0	0	0	0	0	0	0	0	0	0	0	0
3-methylnonane	11	0	0	0	0	0	0	0	0	0	0	0	6
isobutylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-2-propylcyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0
decane	0	0	0	247	0	5,496	534	3,250	0	0	0	0	0
n-undecane	54	24	0	588	268	10	21	14	50	33	41	65	60
dodecane	0	0	0	0	0	0	17	23	0	0	0	0	18
t-1-methyl-2-(4-MP)cyclopentane	0	0	0	0	0	0	0	0	0	0	0	0	0
tridecane	0	0	0	0	0	0	0	0	0	0	0	0	0
tetradecane	0	0	0	0	0	0	0	0	0	0	0	0	0
pentadecane	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Alkanes	1,530	631	149	980	3,447	6,497	943	3,636	794	991	99	81	1,193
Alkenes													
1-pentene	0	0	0	0	0	5*	0	0	0	0	3	4	0
2-methyl-1-butene	49	36	0	0	0	849	280	367	77	53	15	33	53
2-methyl-1,3-butadiene	45	13	0	0	0	340	139	222	67*	72*	0	0	15*
trans-2-pentene	0	0	0	0	0	6	0	0	0	44	0	0	0
cis-2-pentene	0	44*	0	0	0	179	222	473	0	0	15	31	64
4-methyl-1-pentene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-hexene	17	7	0	0	0	0	0	0	0	0	0	0	0
2-methyl-2-pentene	58	131	0	0	0	0	0	0	0	0	0	0	0
1-heptene	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-3-heptene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-3-heptene	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-2-heptene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-2-heptene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-octene	27	0	1,347	912	3,343	0	0	0	0	0	14	0	106
trans-2-octene	11	7	238*	166	214	4	0	5*	6*	0	3	17	22
cis-2-octene	14*	5*	0	116*	0	1*	0	0	0	0	2	5*	12
1-nonene	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-2-hexene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-2-hexene	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-3-nonene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-3-nonene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-decene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-2-nonene	0	0	0	0	0	0	0	0	10*	0	0	0	0
trans-2-nonene	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Alkenes	221	243	1,584	1,194	3,557	1,383	641	1,067	161	170	52	90	271
Aromatics													
benzene	0	0	0	0	0	0	0	0	4	0	0	0	7
toluene	1,533	96	77,797	142,545*	30,288	7	878	15	519*	2,935*	27	90	1,103
styrene	17	21	347	2,890	0	0	0	0	24	17	0	0	27
ethylbenzene	106	140	1,894*	24,190*	3,799	24	8	3	214*	163*	3	3	58
m&p-xylenes	82	590	1,687	14,235	3,554*	93	63	12	260*	292*	0	3	14
o-xylene	0	0	0	0	0	0	0	0	26	0	0	0	0
propylbenzene	0	0	0	0	0	0	4	1	12	0	0	0	0
1-methyl-3-ethylbenzene	0	0	0	174	0	0	10	0	71*	7*	0	0	0
1-methyl-4-ethylbenzene	0	0	0	0	0	0	8	0	7*	3	0	0	0
1-methylethylbenzene	4	2	0	0	0	1	0	0	4	0	0	0	3

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	Yard Waste					Food Waste					Mixed Paper		
	Anaerobic		Aerobic										
	YW-an1	YW-an2	YW-ae3	YW-ae4	YW-ae5	FW1	FW2	FW3	FW4	FW5	P1	P2	P3
1,3,5-trimethylbenzene	0	0	0	0	0	0	0	0	15	0	0	0	16
1-methyl-2-ethylbenzene	0	0	0	0	0	0	0	0	26*	2*	0	0	0
tert-butylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
isobutylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
sec-butylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-3-isopropylbenzene	366	130	482	4,408	0	1,273	34,439	1,022	166	853	771	1,113	864
1-methyl-4-isopropylbenzene	984	125	31,995*	5,647	141,020	18,277	34,053	1,032	6,221	8,016	1,036	1,163	873
1-methyl-2-isopropylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-3-propylbenzene	0	2	0	0	0	0	0	0	14	0	0	0	0
1-methyl-4-propylbenzene	0	0	0	0	0	0	0	0	1	0	0	0	0
butylbenzene	0	2*	0	0	0	0	0	0	0	0	0	0	0
1,3-dimethyl-5-ethylbenzene	0	0	0	0	0	0	0	0	12*	0	0	0	0
1,2-diethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-methyl-2-propylbenzene	0	0	0	63*	0	0	0	0	2*	0	0	0	0
1,4-dimethyl-2-ethylbenzene	36	57	0	0	0	0	8,419	1,946	8*	0	2	8	33
1,2-dimethyl-4-ethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-dimethyl-3-ethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4,5-tetramethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
2-methylbutylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
pentylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-t-butyl-3,5-dimethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1-t-butyl-4-ethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3,5-triethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4-triethylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
hexylbenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Aromatics	3,128	1,164	114,202	194,151	178,660	19,676	77,882	4,031	7,605	12,287	1,839	2,381	2,998
Alcohols													
2-propanol	2,786	1,294	799	0	0	0	201	48	1,513	0	0	0	31
t-butanol	9*	0	0	0	0	0	0	0	0	0	0	0	0
1-propanol	0	0	0	968	0	87	688	539	1,090*	1,929	110	0	38
iso-butanol	0	0	0	0	0	0	0	0	0	0	0	0	0
1-butanol	1,556	1,500	1,216	19,532	19,184	1,427	1,072	1,033	2,931	2,416	640	1,053	1,138
Total Alcohols	4,351	2,794	2,015	20,500	19,184	1,514	1,961	1,619	5,534	4,345	750	1,053	1,207
Ketones													
acetone	2,799	1,317	61,630	143,989	0	0	0	0	6,845	4,638	0	0	148
2-butanone	14,058	8,351	121,825	591,863	168,464	7,950	3,535	4,071	0	0	705	484	1,397
2-pentanone	4,374	2,919	33,764	35,719	10,039	481	282	289	1,150	1,187*	0	0	366*
4-methyl-2-pentanone	488	178	0	0	0	0	5	0	0	0	0	19	36
2-hexanone	550	668	0	0	0	0	0	0	0	0	0	0	0
Total Ketones	22,269	13,433	217,219	771,571	178,503	8,431	3,822	4,361	7,995	5,825	705	502	1,948
Terpenes													
α-pinene	10,558	7,157	255	872*	1,674	8,902	25,632	7,798	1,397	1,410	0	37	142
camphene	1,202	940	0	70*	0	857	379	1,469	149*	142*	0	0	0
β-pinene	2,990	1,842	159*	401	1,296	3,460	28,232	2,417	345*	301*	0	0	59
limonene	3,252*	5,320	9,680	281,834	69,331	181,885	106,368	211,317	1,982	1,629	1,676	2,355	3,443
γ-terpinene	36	57	0	0	0	0	8,419	1,946	0	0	2	8	33
Total Terpenes	18,038	15,317	10,094	283,177	72,301	195,104	169,031	224,948	3,873	3,482	1,678	2,400	3,677
Chlorinated compounds													
1,1-dichloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
methylene chloride	132	0	0	0	0	0	0	0	0	0	0	0	85
trans-1,2-dichloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
trichloroethene	12	0	0	0	0	0	0	0	0	0	0	0	0
tetrachloroethene	12*	0	0	0	0	0	0	0	0	0	0	54	0
chlorobenzene	0	55	0	0	0	0	118	1	0	0	0	0	0

Table S3. Individual speciated compounds by reactor and compound class (ng dry g $^{-1}$).

Compound Name	Yard Waste					Food Waste					Mixed Paper		
	Anaerobic		Aerobic										
	YW-an1	YW-an2	YW-ae3	YW-ae4	YW-ae5	FW1	FW2	FW3	FW4	FW5	P1	P2	P3
1,1,1-trichloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-dichloropropane	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2-trichloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-dichlorobenzene	0	0	0	0	0	0	0	0	5	3	0	0	0
1,2-dichlorobenzene	0	0	0	0	0	0	0	0	0	2,192	0	0	0
1,2,4-trichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chlorinateds	144	55	0	0	0	0	118	1	5	2,195	0	54	85
Other													
diethyl ether	0	0	0	0	0	0	0	0	12*	0	0	0	0
ethyl acetate	0	69	0	0	0	531	198	339	331	287	89	0	67
Total Other	0	69	0	0	0	531	198	339	343	287	89	0	67
Total Speciated Compounds	49,681	33,707	345,263	1,271,573	455,652	233,136	254,596	240,002	26,310	29,582	5,213	6,562	11,446

* The mass quantified, or a portion thereof, is based on a chromatogram with a signal:noise ratio of less than 10. The mass was quantified after man of the chromatogram and peak ion signature.